RESISTANCE FACTORS TO RAPID RESPONSE IN NATURAL DISASTER SCENARIOS

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ABSTRACT

The research addresses the problems encountered by the disaster relief community in attempting to meet the emergency needs of natural disaster victims. Subsequent research questions are identified including the following: what are the most significant resistance factors to rapid response (RF.RR) in the emergency disaster relief processes; what interventions could be made to address these resistance factors; what specific management decisions need to be adopted to prevent RF.RR at the organisational level; has the International Decade for Natural Disaster Reduction (IDNDR) had a significant impact in minimising the losses occurring from natural disasters; what further research work could be undertaken to address the findings and limitations of the field of study undertaken?

The work is set at a time when losses from natural hazard are increasing and has been undertaken in the aftermath of the IDNDR. It attempts to gain an understanding of the fundamental difficulties experienced by emergency response teams and disaster relief organisations in meeting the acute medical and emergency relief needs of affected individuals and communities. The subject has been approached using quantitative and qualitative research methods including personal engagement at disaster zones. The generic aspect of the research problem is addressed together with a focus on the individual components responsible for delays besetting the relief effort to damaged communities in an attempt to produce a hierarchy of RF.RR.

Research design and methods

This included a survey directed towards the disaster relief community seeking their perceptions as to which were the most significant RF.RR in order to ascertain any degree of consensus within the target group. Additionally questions were posed regarding the effectiveness of the IDNDR. The methods of data collection used to achieve this included the construction of a questionnaire as the research tool after consultation with members of the disasters community. Pre-study and pilot surveys were undertaken prior to the implementation of the main survey. The World Association for Disaster and Emergency Medicine was the main target population consisting of medical personnel engaged in either operational response to disaster victims or research into the subject. Non-Government Organisations (NGOs) were also used.

107 international responses were received from the questionnaire survey and the data analysed using statistical and non-statistical frameworks.

Findings included the three resistance factors occupying the most significant position to be: magnitude of disaster, state of readiness of the civil defence and local emergency services and disaster mitigation and preparedness. Five additional RF.RR had concurrence using two different analytical approaches and these included: transport, communication, political resolve, timing of declaration of the national emergency and bureaucracy. The influence of the IDNDR on response times was not found to be statistically significant. Four important groupings of RF.RR were identified from the principal component analysis and factor extraction method. Terminology was applied expressing the fundamental nature of the underlying variables. The groupings were in hierarchical position: preparation, capacity and dimension, aggravation, attitude and evaluation.

Discussion and conclusions

Discussion concerning the findings from the questionnaire and meetings with the disasters community engages on the relevance of a hierarchical identification of RF.RR to the operational efficiency of the disaster relief process. Additionally a reflection on the impact of the IDNDR on reducing RF.RR is presented. The benefit of using factor analysis to identify underlying issues relevant to the research problem is also given consideration.

Conclusions have been drawn regarding the relevance of the findings and the potential significance for the disasters' community. This includes the importance of planning for high magnitude disasters and capacity-building at the local level including education of vulnerable communities. The need for ongoing attention to disaster mitigation and preparedness is re-enforced. Suggestions have been offered regarding the scope for further research on the subject of RF.RR and a rapid response international model has been presented.
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I hereby declare that this thesis has been composed by myself and has not been presented or accepted in any previous application for a degree. The work, of which this is a record, has been carried out by myself unless otherwise stated and where the work is mine, it reflects personal views and values. All quotations have been distinguished by italics and all sources of information have been acknowledged by means of references including those of the Internet.
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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>A/A</td>
<td>Anglo/American</td>
</tr>
<tr>
<td>AED</td>
<td>Ambulatory External Defibrillator</td>
</tr>
<tr>
<td>BGS</td>
<td>British Geological Survey</td>
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<tr>
<td>BSFs</td>
<td>Basic Societal Functions</td>
</tr>
<tr>
<td>CADS</td>
<td>Computer Aided Dispatch Systems</td>
</tr>
<tr>
<td>CATS</td>
<td>City Alert Texting System</td>
</tr>
<tr>
<td>CBO</td>
<td>Community Based Organisation</td>
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<tr>
<td>CIMIC</td>
<td>Civil and Military Cooperation</td>
</tr>
<tr>
<td>COPD</td>
<td>Chronic Obstructive Pulmonary Disease</td>
</tr>
<tr>
<td>CRED</td>
<td>Centre for Research on the Epidemiology of Disasters</td>
</tr>
<tr>
<td>CRID</td>
<td>Costa Rica Information Department</td>
</tr>
<tr>
<td>DCCP</td>
<td>Disaster Critical Control Point</td>
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<tr>
<td>DEC</td>
<td>Disasters Emergency Committee</td>
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<tr>
<td>DFID</td>
<td>Department for International Development</td>
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<tr>
<td>DHA</td>
<td>Department of Humanitarian Affairs</td>
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<tr>
<td>DMP</td>
<td>Disaster Mitigation and Preparedness</td>
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<tr>
<td>DSS</td>
<td>Disaster Severity Scores</td>
</tr>
<tr>
<td>ERU</td>
<td>Emergency Response Unit</td>
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<tr>
<td>F/G</td>
<td>Franco/German</td>
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<tr>
<td>IASC</td>
<td>Inter Agency Standing Committee</td>
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<tr>
<td>IATF</td>
<td>Inter Agency Task Force</td>
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<tr>
<td>IDNDR</td>
<td>the International Decade for Natural Disaster Reduction</td>
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<tr>
<td>IDRL</td>
<td>International Disaster Response Law</td>
</tr>
<tr>
<td>IFRCRCSC</td>
<td>International Federation of Red Cross and Red Crescent Societies</td>
</tr>
<tr>
<td>IGNS</td>
<td>Institute for Geological and Nuclear Science</td>
</tr>
<tr>
<td>ISDR</td>
<td>International Strategy for Disaster Reduction</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>ITU</td>
<td>Intensive Therapy Unit</td>
</tr>
<tr>
<td>KAP</td>
<td>Knowledge Attitude Practices</td>
</tr>
<tr>
<td>LDC</td>
<td>Lesser Developed Country</td>
</tr>
<tr>
<td>MDC</td>
<td>More Developed Country</td>
</tr>
<tr>
<td>MEDS</td>
<td>Minimal Essential Data Sets</td>
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<tr>
<td>MIRR</td>
<td>Medical International Rapid Response</td>
</tr>
<tr>
<td>MUMBS</td>
<td>Mid-rise Un-reinforced Masonry Buildings</td>
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<tr>
<td>NASBE</td>
<td>National Association of State Boards of Education</td>
</tr>
<tr>
<td>NGO</td>
<td>Non Government Organisation</td>
</tr>
<tr>
<td>NHRAIC</td>
<td>Natural Hazards Research and Application Information Centre</td>
</tr>
<tr>
<td>OCHA</td>
<td>Office for the Coordination of Humanitarian Affairs</td>
</tr>
<tr>
<td>OFDA</td>
<td>Office of the U.S. Foreign Disaster Assistance</td>
</tr>
<tr>
<td>ORIF</td>
<td>Open Reduction Internal Fixation</td>
</tr>
<tr>
<td>OSOCC</td>
<td>On Site Operations Coordination Centre</td>
</tr>
<tr>
<td>PAHO</td>
<td>Pan American Health Organisation</td>
</tr>
<tr>
<td>PDA</td>
<td>Personal Digital Assistant</td>
</tr>
<tr>
<td>PMN</td>
<td>Pledge Management Note</td>
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REA ......................... Rapid Epidemiological Assessment
RF.RR ....................... Resistance Factor(s) to Rapid Response
RNA .......................... Rapid Needs Assessment
SNET .......................... National Services for Earth Studies El Salvador
SUMS .......................... Supply Management System
TFQCDM ..................... Task Force on the Quality Control of Disaster Management
UNDRO ....................... United Nations Disaster Relief Organisation
UNHRD ....................... United Nations Humanitarian Response Depot
UNICEF ....................... United Nations Children’s Emergency Fund
UNOCHA ..................... United Nations Office for Coordination of Humanitarian Affairs
USAid El S .................. United States Aid organisation for disaster mitigation El Salvador
USGS ......................... United States Geological Survey
WADEM ...................... the World Association for Disaster and Emergency Medicine
WFP ......................... World Food Programme
WHO ......................... the World Health Organisation
WMO ......................... World Meteorological Organisation
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CHAPTER 1 INTRODUCTION

1.0 The Research Problem

Delays and difficulties in reaching disaster victims before death occurs through secondary complications is the generic research problem to be addressed. Rising morbidity and mortality to the human race by the increasing frequency of natural disasters is the context of the research problem. Rising losses to people and property through natural disasters has been identified by the scientific community to the extent that 80,000 people are killed each year (OFDA/CRED 2003), half of which may perish from secondary problems associated with strife and displacement (Heyman 1991). It is therefore timely to consider what the underlying issues behind the delays in response are, and to specify what individual factors come into operation to account for the compromised relief efforts. The research period is set at the end of the International Decade for Natural Disaster Reduction (IDNDR) which has been devoted to decreasing the losses through natural disasters by shared insights and strategies directed towards disaster mitigation and preparedness (DMP). The research being undertaken is given an opportunity to gauge the success of the IDNDR and to formulate a hypothesis and intuitive questions that address both the research problem and the international response to the problem.

1.1 The Distinctive Contribution of the research

The research seeks to address an identifiable problem that has not been examined previously and to this end the work is original. Additionally the focus of the study is directed towards personnel and victims who are at the sharp end of service delivery either giving or receiving emergency aid. An examination of the causative factors resulting in delays from relief-provider to disaster victim has high significance on an operational level for the emergency services and disaster relief agencies. The timing of the research immediately following the IDNDR provides a topical focus and opportunity to appraise the efforts of the decade.
1.2 The Body of Knowledge to which the research is addressed

The research seeks to address the body of knowledge existing within disaster relief processes. Several schools of thought are involved in research into natural disasters including the following:

Geography, Anthropology, Sociology and Psychology, Geo-Physics and construction, Medical sciences, Developmental studies, Economics, Criminology (civil strife/conflict). Disaster relief strategies impact on all of these schools of thought and bodies of knowledge. The research being undertaken is chiefly directed towards the disaster relief community with priority towards emergency medical services. The outcomes are seeking to add to the body of knowledge held within pre-hospital and disaster medicine and that held within disaster relief communities.

1.3 Context of the research

This research is undertaken in the context of a significant increase in natural disasters affecting the planet and in the setting of an ongoing rapid rise in global population density, environmental degradation and climate change. Furthermore it is undertaken at the end of the International Decade for Natural Disaster Reduction (IDNDR) instigated by the United Nations General Assembly seeking to mitigate the losses from the rising frequency of natural disasters. It has also been set at a time when the medical profession has been re-challenged to deal with mass casualty scenarios be they from natural disaster or from terrorist threat. Training in disaster management is being offered at different levels including academic institutions, Non Government Organisations (NGOs) and locality based in vulnerable countries. Appointments to specialist posts in disaster medicine are now being offered.

The research is also set at a time when there has been a steep increase in available technology including information technology (IT) and methods of communication. Data can be accessed during disaster scenarios including disaster management protocols and public health information. Telemedicine is now available to assist medical teams in remote areas in mobile field hospitals, providing access to specialist opinions and guidance on trauma management. Additionally the geo-seismic community has entered into a new phase of hazard prediction and modeling using information from Global Position Sense (GPS) networks, radar and
satellite information, real time data from meteorology stations and the use of the Geographic information System (GIS). National geo-seismic communities are now able to provide hazard scenario data to assist the civil defense organizations and utilities.

The work for this particular dissertation has been undertaken during a five year period that has seen major world earthquakes including those in El Salvador, India, Iran, and South East Asia and a hurricane that has devastated coastal areas in the United States of America. The researcher has assisted in the emergency relief operation during the second earthquake to affect El Salvador on 13.2.2001. Information has been gathered at the epicentre of the earthquake during the provision of emergency medical assistance. Subsequent visits to El Salvador on an annual basis have provided a context in which to observe the longer term implications of natural disasters and the rehabilitation processes necessary at government and community level.

A further context in which the research is placed includes the political arena engaging in the problems of climate change and the need to limit emissions of greenhouse gases and environmental degradation. Wider campaigns to ‘make poverty history’ and cancel third world debt are also relevant factors as poverty is the driving force behind people and communities living in vulnerable buildings and exposed locations, together with compromised health. All these factors make poor communities in lesser developed countries more vulnerable to the effects of climatic energy surges. Added to the political context is the increasing awareness of the general public to natural disasters through media coverage and comprehensive reporting. The major tsunami disaster in South East Asia has had a global impact as so many countries were affected either directly or indirectly through tourism.

1.4 Purpose of the research
The research has been undertaken to address issues that directly affect the disaster management communities and emergency medical relief services. Speed of response to victims of disasters reduces morbidity and mortality. Raising the awareness of potential resistance factors to rapid response (RF.RR) and probing into the obstacles encountered within different organisations was considered to be a central objective. The challenge to
address the research at grass roots level and to meet members of organisations directly involved in front line disaster management has had an appeal at academic and social project level. At a personal level the experience gained from participating in an acute earthquake disaster in El Salvador provided the impetus to see improvement in disaster response to those living in remote communities who frequently receive little or no emergency assistance after a severe geo-seismic event. Delayed response, in circumstances such as these, leads to medical consequences of an extreme nature possibly leading to death. This lends itself to seeking an outcome from the research that has a relevance to improving disaster response and increasing efficiency and response times. An element of advocacy for the vulnerable communities in lesser developed countries (LDCs) permeates the research work.

1.5 Direction of the research
The research takes a qualitative and quantitative approach to the problem. To achieve this it has been necessary to seek an understanding of the mechanisms and processes occurring in natural disaster scenarios. This extends from the disaster sequences and dynamics in nature to the humanitarian impact and consequences for victims and the relief agencies. To this end meetings have been sought with members of the geo-seismic community in the United Kingdom and abroad visiting establishments and institutions engaged in monitoring geo-seismic events and responsible for early warning of potential impending natural disasters. Additionally disaster sites have been visited and historical and archive data sought to add background understanding for the research. A most fruitful avenue of background research has engaged victim-centred outcomes. This has entailed discussions with victims of natural disasters, seeking their perceptions relating to the emergency relief process and its effectiveness for them. Conferences have been attended in various global locations on relevant topics to the research with specific attention to earthquakes and to pre-hospital and disaster medicine. A catalogue of meetings and conferences attended is included in the methodology.

It has become apparent early in the assessment of background information that poor people in lesser developed countries (LDCs) are far more vulnerable to death, injury and loss from natural hazards than people of substance in more developed countries (MDCs). For this reason comparisons are made between countries to highlight this discrepancy and New
Zealand and El Salvador have been given attention in this respect as they are situated on opposite sides of the Pacific Ring of Fire.

The direction of the research work is original and literature and internet searches have failed to find any articles or body of knowledge that has addressed 'resistance factors to rapid response in natural disaster scenarios'. For this reason much of the background information has been sought by face to face consultation with those engaged in agencies and organizations responding to natural disaster scenarios. The review of the literature has focused on related topics including vulnerability, disaster mitigation and preparedness, and buildings and structures. Special attention has been given to the IDNDR and to Disaster Mitigation and Preparedness (DMP) on which the available literature information is copious and to the history and demography of El Salvador. Of special interest has been the historical background to the formation of the International Federation of Red Cross and Red Crescent Societies (IFRCRCs) and to the establishment of humanitarian organizations including the United Nations and the NGOs engaged in disaster relief.

The ambit of the research regarding background information and choice of data for inclusion has presented a sizeable challenge. For this reason earthquakes are given centre stage because of the relevance to rapid response to the plight of buried and entrapped victims and El Salvador is given foremost attention as an example of a vulnerable developing country. Systems' modelling has assisted in maintaining the focus of the research.

1.6 The Research Problem

From discussions with members of the emergency relief agencies and with victims of natural disasters, it has become apparent that there are delays occurring in the disaster relief process. There would also appear to be several reasons for these delays in which the prompt response of relief provider to disaster victims is retarded. These delays constitute the research problem. Having identified the research problem subsequent intuitive questions emerge regarding the nature of the problem and the facets and complexities of the component parts.
1.7 Intuitive questions to be addressed include the following:

- What are the most significant delaying factors or RF.RR in the emergency disaster relief processes?
- What interventions could be made to address these resistance factors?
- What specific management decisions need to be adopted to prevent resistance factors to rapid response at the organisational level?
- Has the IDNDR had a significant impact in minimising the losses occurring from natural disaster?
- What further research work could be undertaken to address the findings and limitations of the field of study undertaken?

A theoretical framework has been constructed to pursue these intentions with the aspiration of providing conclusions relevant to the body of knowledge within pre-hospital and disaster medicine and to that of the disaster relief agencies.

1.8 Conclusion

The research has been undertaken at a time of change and challenge for the emergency disaster response teams. The rising losses through increasing frequency of global disasters prompted the United Nations to devote the nineteen nineties to the IDNDR. The topic of RF.RR has been chosen for a research survey to gauge the perceptions of the disasters community into the area of obstacles or problems in reaching disaster victims quickly. This topic, derived from initial exploratory work, and the research problem(s) identified gave rise to intuitive questions which the research was then designed to address, using a survey and other methods to achieve both quantitative and qualitative data.

The task is addressed by appropriate methodology after a comprehensive literature review on subjects relevant to rapid disaster response. Systems modelling is used to maintain an operational bias to the research work.
1.9 EXPLANATION OF THE CHAPTERS

An outline of the chapters contained within the thesis is presented to give guidance to the reader regarding the content of the work and the direction taken to develop the subject of RF.RR. in natural disaster scenarios.

1.9.1 Chapter 1 Introduction
This gives an overview of the research problem and the reasons for undertaking the survey. It gives information as to which methodological approaches are used and background information regarding the International Decade for Natural Disaster Reduction and the researcher's involvement in rapid response to earthquake victims in El Salvador. Additionally it addresses the body of knowledge to which the research is directed and clearly identifies the research problem and the intuitive questions arising.

1.9.2 Chapter 2 Literature review Sections 1 and 2
This chapter presents information on subjects relevant to the topic of RF.RR. Because of the volume of material covered within the literature review it has been divided into sections 1 and 2.

1.9.2.1 Section 1
The first section covers the processes occurring within the environment regarding natural hazards and develops the theme of vulnerability of particular communities and dangerous locations. The section also develops the research focus of rapid response after giving attention to the history of the disaster response movement from its early beginnings, including the inception of the Red Cross and the United Nations.

1.9.2.2 Section 2
The second section opens with the important critique of the IDNDR followed by other literature information on disaster mitigation and preparedness (DMP). Buildings and structures, being such a key issue within disaster response strategies is given substantial attention including failing structures, emergency shelter design and emergency field hospitals. El Salvador receives special attention within Section 2 because of the field work undertaken at the time of the earthquakes in 2001 and during the rehabilitation phase in the subsequent five years. It also stands as a prime example of a vulnerable lesser developed
country (LDC). The section concludes with a review of scriptural references to earthquakes citing the relevance to the historical perspectives and to DMP and response strategies.

1.9.3 Chapter 3 Systems Modelling
This chapter contains models formulated by the researcher and others in order to present a visual understanding of the processes and systems occurring in natural disasters. These sequences include the processes occurring in nature as a disaster unfolds and the response pathways of the disaster relief organisations and emergency medical teams. A brief explanation is presented with each model to guide the reader as to the specific relevance to the research topic and the potential areas for RF.RR. A symbol of the RF.RR is included in several of the models where appropriate to indicate where problems and delays may occur.

1.9.4 Chapter 4 Earthquake tectonics of El Salvador
This chapter gives many figures and illustrations of the high vulnerability of El Salvador to earthquake hazard. Additionally it gives comprehensive detail of the technical aspects of the earthquake of 13.1.2001 and the effects on the environment and habitations of the native community. Photographs of the catastrophic mudslide are included and damage done to various buildings. Much of the information and illustrations have been obtained from the archive data of the Department of Engineering Seismology at Imperial College London University. Material is also presented from the researcher’s own involvement in the disaster relief operation.

1.9.5 Chapter 5 Methodological considerations
This chapter explores ways in which the research problem of delays in reaching the victims of natural disasters can be addressed from a theoretical and scientific standpoint. A theoretical framework is necessary on which to explore the research problem and intuitive questions that are being posed. The chapter contains information on academic principles and tenets on which to build the required framework.
1.9.6 Chapter 6 Research Design and Methods
This chapter gives specific attention to the construction of a survey directed towards the disaster relief community at the operational level. Within the survey scales and methods are employed to address the research problem through the design of a research tool. It gives account of the reliability of the scales employed and the authenticity of the survey in construct design. The specific development of the questionnaire as the research tool is presented with special reference to the non-bias aspect of each question put forward to the target population. The ways in which qualitative and quantitative methods are employed in approaching the research questions is explained. Information concerning meetings with the disasters community concerning the identification of the RF.RR is presented.

1.9.7.1 Chapter 7 Findings 1
This chapter presents the findings from the responses of the members of the disasters community to whom the questionnaires were sent. It deals with the results in a methodical way addressing the statistical and mechanical approaches to data analysis. It addresses the quantitative findings particularly seeking to establish a hierarchy of RF.RR from the responses of the disasters community. The top three and the subsequent five RF.RR in this respect are identified using three methodical comparisons namely the SPSS data analysis, the Average Significance Score and the Section 3 top five enquiry section. Demographic detail regarding the respondent group is presented. Pie charts and tables are presented to illustrate the various stages of the data analysis. Principal component analysis and factor extraction findings are presented from the use of the SPSS data processor and four groupings of variables identified after Varimax rotation. These groupings have been assigned names that represent the underlying nature of the respective variables. Quantification is attempted regarding the responses to the question on the influence of the IDNDR on response times.

1.9.7.2 Chapter 7 Findings 2
This chapter presents the findings from three qualitative sources namely:
- Qualitative findings from the questionnaire
- Qualitative findings from interviews with those engaged in disaster response
- Qualitative findings from the scene of a major earthquake in El Salvador
The responses from the open-ended question in Section 3 c) are demonstrated and the important findings from interviews with the various relief organisations and NGOs. Findings from the earthquake of 2001 are given with due gravitas because of the importance of validating the quantitative findings from the questionnaire responses to the qualitative personal findings at the epicentre of an earthquake.

1.9.8 Chapter 8 Discussion and Conclusions

This is a long chapter that deals with each section of the findings carefully and methodically pointing out areas of concurrence between the qualitative and quantitative dimensions and any areas of contradiction and creative tensions encountered. The importance of the hierarchy is discussed together with the introduction of a theoretical ‘ego’ factor related to disaster amnesia. The comments raised in the open-ended question are given systematic appraisal and modest quantification. Attention is given to the specific aspect of the shortcomings of the questionnaire in achieving the objectives of the survey.

A discussion is included regarding effective response versus rapid response by which the whole survey could be undermined. Advocacy issues are addressed with specific attention to the rich poor divide.

The value of the IDNDR is assayed and discussion regarding the merits of the decade and future initiatives presented.

Outcomes of the survey are presented including possibilities for future research into the subject of RF.RR. A hypothetical model is introduced illustrating the translation of the research findings into a rapid response global network which undertakes training and regular communication. Recommendations are given regarding feed back to the disasters community and to the specific respondents of the questionnaire.
CHAPTER 2 REVIEW OF THE LITERATURE – SECTIONS 1 AND 2

Overview

The literature review spans natural hazards and the human responses to those hazards by both victim and relief worker. From this perspective the research problem with many facets is brought into focus enabling the design of an appropriate survey. The topic of RF.RR has no specific literature research base on which to mount an academic appraisal. For this reason a literature search has been undertaken which seeks to understand the genesis of the problem from grass roots level. Within section 1 the processes in nature have been given attention because the destructive forces and energy surges constitute the underlying dynamic behind natural disasters and the suddenness of the impact provides the trigger for rapid response to the affected communities. Section 1 also includes vulnerability seeking to determine a global perspective to the problem of RF.RR. The literature search attempts to gain information regarding the historical beginnings of rapid response and to try to understand the motives and the mindset of the pioneers in this field.

Section 2 opens with a critique on the IDNDR which addresses both DMP and responses to disasters by local, national and international communities. Buildings and structures are a key element in vulnerability to natural disasters and to response efforts by disaster relief agencies. Coverage is given to failing structures, emergency shelter design and mobile field hospitals. El Salvador is given special attention because of the vulnerability of the inhabitants to natural disasters and because of field work undertaken during the earthquakes of 2001 and the rehabilitation phase in the subsequent five years. El Salvador is regarded as a prime example of a highly vulnerable developing country which provides both an academic and operational research opportunity. Section 2 concludes with a review of scripture references to earthquakes which provide a rich archive of historical data stimulating thoughts on disaster mitigation and response strategies. Prophetic references regarding the increased frequency of earthquakes and other natural disasters provide searching questions and a philosophical perspective to the research.

In summary the literature review seeks to cover a large area of available information on issues related to natural hazards and the human responses to disastrous events. A medical and operational perspective is sought and the consequences of natural events for vulnerable communities are given specific attention. Where information is lacking in
journals or books the researcher has presented information from reports or the minutes of meetings held with the disasters community. Appendix C provides detail regarding the supplementary sources of information. Internet searches have been undertaken where appropriate and the sites and access dates recorded.
CHAPTER 2.1 NATURAL DISASTERS AND ENVIRONMENTAL HAZARDS

2.1.0 Introduction

This chapter seeks to present a broad perspective on natural disasters and environmental hazards in order to put into context the complexity of factors that need to be taken into consideration regarding response strategies and emergency management systems. The scope of this chapter is potentially overwhelming and limits have been set whereby natural hazards are given strong precedence over anthropogenic disasters. Earthquakes are given special attention and used as the chief example of a natural hazard requiring rapid response strategies, and El Salvador is the prime example of a vulnerable developing country. The relationship of man and his environment is an important backdrop to the whole thesis of resistance factors to rapid response.

2.1.1 Natural versus man-made

In the literature disasters are commonly divided into ‘natural’ and ‘man made’, but such distinctions are generally artificial. All disasters are fundamentally human made, a function of where and how people choose to or are forced to live (Redmond 2005). The location and state of the buildings in which people dwell is a fundamental issue relating to vulnerability of individuals and communities and also to access and disaster response from emergency relief organisations. The relationship of humankind with the environment is also relevant as is stewardship of the land. Deforestation can increase vulnerability from increased flooding. Smith (2001) stated that it was deforestation in the upper Arno basin that caused flooding in Florence, Italy in 1966 in which thirty three lives were lost, and in addition 1,400 works of art and 300,000 rare books destroyed. Landslide risk increases as land hunger forces new settlements on to unstable slopes. According to Jones (1992) landslide risk is an underestimated threat because the impacts tend to be frequent and small scale, whilst the process itself is often attributed to other hazards, such as earthquakes and rainstorms.
2.1.2 Disequilibrium

Disequilibrium according to Arnold (2002) is a key issue relating to hazards within the environment and vulnerability of human communities. Energy sustains both the environment and human life. As in nature so in the human body surges of energy, or depletion of energy reserves, lead to instability and disruption of the homeostatic processes. Creation functions through processes that depend upon rhythm, cycles and balance. Anything that disrupts that balance will have consequences both for the environment and for the people that inhabit it. Extremes of energy levels seem to be the key to natural disasters with sudden high intensity events such as an earthquake on the one hand, compared to the depletion of energy directly and indirectly through drought and famine. Similar dynamic changes can be observed in the human body where one observes an internal environment within an external environment. In conditions such as thyrotoxicosis the energy drive is excessive, resulting in loss of body weight through over-stimulation of organs and bodily functions (Frenster 1960). Malnutrition is at the other end of the spectrum of energy depletion through insufficient food energy or ‘fuel’ for the system. Added to this is the acute event, such as a heart attack, in which the oxygen supply to the cardiac muscle is disrupted suddenly threatening to damage or destroy both the heart muscles, supplied by the artery that has blocked, or the individual himself. Mankind depends upon the stability of the outer and inner environments to function effectively and any acute disruption threatens health, well-being, family cohesion and relationships within society. Clearly there is potential threat to human life from the internal and external environments. ‘The prediction of future disasters drives the priorities, urgencies and perceived adequacies of disaster management, public policy and government funding. Disasters arise from some fundamental disequilibrium between hazards in the environment and the vulnerability of human communities’ (Arnold 2002).

Tools for measurement of equilibrium/disequilibrium in natural disasters have now been developed which assess the impact of disasters on regional and national economies (Veena 2004).

The outer environment is subject to variation of energy levels on a seasonal and cyclical basis. For instance the season for hurricanes occurs on a cyclical basis between June and November with wind speeds in excess of 32.7 metres per second. Vast amounts of energy are transferred in this way from the equator to the poles through both wind and water. The
sudden eruption of a volcano or the acute event of an earthquake may appear to be irregular or erratic in nature. On the wider scale of events however these occurrences can be regarded as part of the safety-valve mechanisms for protection of the earth's crust and prevention from massive apocalyptic energy overload and explosion. Natural elements can be regarded as either resource or threat, for instance water can be controlled and contained and utilized for supporting life and health. On the other hand if unchecked or in flood situations it can pose serious threat to life and community safety. It has been stated that the environment is neutral and it is only the human location, needs and perceptions which identify resources as hazards in the spectrum of natural events (Burton et al 1993). This statement has certain credibility but has limitations in that the most securely housed and resilient communities can still succumb to an event of extreme magnitude despite every effort regarding disaster mitigation and preparedness.

An extreme climatic or geological event does not necessarily constitute a 'natural disaster' particularly if the location of the energy impact does not occur in a populated area. If the choice of habitation is unlimited then the human race could situate itself in non-vulnerable locations where adequate food and water supplies existed and where environmental hazard was minimal. Unfortunately these choices do not exist for the majority of the earth's population and often the poorer people will of necessity have their habitation in vulnerable areas. A developing country is defined by the World Bank as a low or middle-income country in which most people have a lower standard of living with access to fewer goods and services then do most people in higher income countries (Unesco/World bank web 2006). Encyclopaedia definitions include: A developing country is a country with a low income average, a relatively backward infrastructure and a poor human development index when compared to the global norm (wikipedia 2006).

Not only are LDCs in general more prone to environmental hazard but also do not have the infrastructure or resilience to withstand such events. It has been reported that there is a twelve fold increase in risk in the LDCs compared to MDCs (IFRCRCS 1999). Regarding MDCs such as the United States there is little loss of life from natural disasters because of solid infra-structure and good buildings together with resilience and good health within the national population. According to Fritzsche (1992) less than 0.01 per cent of the US population has died from severe natural disasters. It could be said however that in the light of the hurricane Katrina disaster in the United States in 2005 that there is no cause
for complacency regarding past statistics regarding natural disaster safety. Ongoing attention needs to be given to maintenance and disaster mitigation in vulnerable locations. Social factors have the centre stage regarding the description or classification of any natural disaster. People and what they value are the essential point of reference for all disasters but there is no universally agreed definition of the scale on which loss has to occur in order to qualify as a disaster. (Quarantelli, 1998). It could be stated that even one death within a family can be regarded as a major disaster, particularly if that individual has responsibility for work and income for the family.

2.1.3 The disaster belt

There are currently in the world’s ‘disaster belt’ of earthquakes, cyclones and desertification over one hundred developing countries, few if any of which have the technical knowledge, planning capacity, and necessary resources to cope with such onslaughts (Gunn 2005). This is highly relevant to the material for research in that the incapacity and lack of resources to cope with a natural disaster means that a humanitarian response will be required from other countries or from wealthier localities within the affected country. With the addition of man-made technological disasters and political and cultural instability he likens the planet earth to a spaceship in a chronic state of emergency.

Between 1992 and 2001, just fewer than 5,000 natural disasters were reported in the world and just fewer than two million people were affected by disasters, resulting in an estimated US$694,424 million of damage according to the International Federation of Red Cross and Red Crescent Societies (IFRRCRS data 2002). The time frame of these losses was during the International Decade for Natural Disaster Reduction and gives ample justification for the efforts undertaken during that decade. It also gives impetus for the disaster relief community to keep a watching brief and a high state of preparedness and training of its members. It has been stated that over the last decade, at least one disaster has occurred somewhere every day, affecting hospitals throughout the world (IFRRCRS 2003). There are 80,000 deaths per year from natural disasters. Ninety five percent of these occur in poor countries (OFDA/CRED 2003). It has been stated that the likelihood of any given disaster is modifiable through the management of its various component hazards and vulnerabilities (PAHO/WHO data 2000). According to data
published by CRED (2005) the number of natural disasters has tripled over the last thirty years. These disasters comprise chiefly droughts, floods, windstorms and earthquakes. From the CRED data there were 111 events per year on average in the 1970s rising to 340 disasters per year between 1996 and 2005. Additionally the number of people affected by natural disasters has risen from an average of 74 million to 245 million over the same time span. It is also reported that the number of windstorms has increased from an average of 56 per year during the 1980’s to 102 per year during the first five years of the present century (CRED 2005).

2.1.4 Potential Hazards within Nature and the Environment

The Natural Hazards Working Group (NHWG) report (2005) entitled ‘The Role of Science in Physical Natural Hazard Assessment’ cited potential hazards within nature and drew attention to the need for hazard warning systems. The potential hazards included the following:

- Earthquake and tsunami threat from faults in Indian Ocean region
- Large magnitude volcanic eruption, or ‘super –eruption’
- Another Tokyo earthquake (within the next 100-150 years)
- Earthquake in American Pacific North-West, generating local and Pacific-wide tsunamis
- Collapse of Cumbre Vieja volcano on La Palma in Canary Islands, posing Atlantic tsunami threat
- Failure of Sarez lake natural dam in Tajikistan
- Impact of comet or asteroid with diameter of 100m or more

2.1.5 Losses in disasters

The losses to human life and to property are the consequences of environmental hazards and natural disasters. In addition to the loss on the acute level there is also loss on many other levels in consequence. These include displacement of people from their original home and community with subsequent loss of health, dignity and self-worth (WHO
2001). Heyman et al (1991) showed that during a period between 1964 - 1989 strife and displaced persons accounted for over half of all disaster deaths. Loss of occupation through loss of amenity or loss of health can lead to loss of hope and economic loss to the income of a family or community. According to Seaman (2005) children are more vulnerable from losses in natural disasters to communicable diseases and environmental exposure than adults. The exposure can occur through economic losses to homes, standing crops, domestic food stock, livestock, and goods and personal possessions. Children of the poor tend to have low nutritional status, increased exposure to communicable diseases, low immunisation rates, high levels of intestinal parasites and limited access to health care (Seaman 2005).

In addition to these material losses loss of function may occur to an individual through injury from the natural disaster. This may include loss of mobility or loss of function of a limb or eyes. This has dire consequences on work capacity and causes loss of self worth and status within a local community.

2.1.6 The cost of natural disasters

Certain aspects of loss are quantifiable and can be audited. These include loss of life and damage to property. The cost of repair and restoration of function of a community or country can also be undertaken. All major disasters are subjected to this form of scrutiny and evaluation and, although the losses may not be totally accurate, comparisons can be made between similar or related disasters. Various databases exist where archive data is stored and can be accessed for research purposes.

Table 2.1.1 Organisations holding archive databases available for research

<table>
<thead>
<tr>
<th>Organisation</th>
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<tbody>
<tr>
<td>The Natural Hazards Research and Applications Information Centre (NHRAIC database) at Boulder, Colorado.</td>
</tr>
<tr>
<td>Resources for the Future (RFF database) in Washington, DC.</td>
</tr>
<tr>
<td>The Centre for Research on the Epidemiology of Disasters (CRED) at the University of Louvain in Belgium.</td>
</tr>
<tr>
<td>World Health Organisation (WHO) Geneva</td>
</tr>
<tr>
<td>International Federation of Red Cross and Red Crescent Societies (IFRCRCS) Geneva</td>
</tr>
<tr>
<td>British Geological Survey (BGS) Edinburgh</td>
</tr>
</tbody>
</table>
The above table presents the details of organisations holding statistical information relating to the losses that have occurred through natural disasters over the years. The databases can be accessed for research purposes and details of losses over defined time periods can be obtained.

2.1.7 History and archive data

Reference to historical events regarding disasters can be of great assistance from the standpoint of improving response. Giving heed to the lessons of history has merit in itself. In each disaster response an appraisal of what went well and which areas where singularly difficult or a disaster in themselves adds to future possibilities for improvement and reduction of losses. In the tsunami disaster of 26.12.04 in South East Asia the Mokem people on the island of South Surin gave heed to the lessons of history regarding the sudden retraction of the sea level heralding a disaster or ‘man-eating wave’ (McElroy 2005). Moken people who have lived as gypsies on the Andaman Sea for centuries were able to ‘read’ the signs in nature and evacuate to higher ground. Tribal tradition and lessons from a close affinity and respect for the sea have been passed down through the generations. The tsunami phenomenon is known to the Moken people as the ‘wave that eats people’. The people live on South Surin Island about 65 kilometres from the Thai mainland. In total there are in the order of 200 people living there chiefly in thatched huts close to the water’s edge. Salama Klathalay, chief of the Moken people reported that his elders taught him to expect a ‘people-eating wave’ whenever the tide receded far and fast. When he saw this phenomenon he started running and shouting. Only one disabled man was unable to escape, the rest evacuating to higher ground. The Moken people are unable to read or write but have a close affinity with nature and particularly the water. They believe that objects have spirits and erect totem poles to communicate with them. The people live without electricity or schooling and have been regarded as both an oddity and a nuisance for fishing in environmentally sensitive waters. They were evacuated to a Buddhist temple on the mainland but became restless and were returned to the island after ten days and commenced rebuilding the village with donated bamboo and palm fronds (Justice 2005).
2.1.8 Perception of natural disaster

The perception of what exactly is a disaster is interesting and variable. Many regard acute losses through earthquakes, floods, cyclones and volcanic eruptions as safety issues. On the other hand losses through more insidious disasters such as drought and famine are perceived as health issues (Sagan 1984). From the vantage point of this research it is considered that disasters are both safety and health concerns but the responsibility for disaster mitigation and preparedness rests with members of society that have more resource and capacity, including the international community. Global news coverage has influenced our perceptions regarding disasters and environmental hazards. Our own attitudes to the images portrayed in the media also affect our perceptions and responses to the suffering of humankind around the world. Distant unrelated events may not have a significant impact on our perceptions or responses but if one of our family members happens to be travelling in a country hit by a disaster then our thoughts and feelings are challenged acutely. These perceptions and emotions are a significant factor regarding disaster response, from the parameters of quantity and speed of aid provided from outside countries. The advent of good global media coverage has led to a major shift in government policies and international relationships and dynamics. The downside to global press coverage is when reporting is biased or focused primarily on gruesome images of victims or the pitiful state of their homes after the disaster impact. This can trigger emotional and practical response but can neglect the more important issues of the need for improving infrastructure and the need for disaster mitigation and preparedness. Short term, sensational reporting can detract from the longer term objectives regarding global and population needs that are ignored by default.

Important views have been voiced by Steinberg (2000) regarding the perception of disasters. These include the following:

- Natural disasters have come to be seen as random, morally inert phenomena- chance events that lie beyond the control of human beings.

- By making out natural disasters to be the 'villain' our society ignores its own responsibilities within natural disasters. It could be considered that we have a collective amnesia about disasters.
Blaming nature has become, in effect, a political tool, which government officials, the media, policymakers, and business leaders use.

Steinberg (2000) makes a critical appraisal of the perceptions of disasters and adds a significant contribution regarding the debate of blame, accident and responsibility. He feels that humans have *put themselves in harms way, disavowed moral responsibility, and, in the aftermath of the destruction, called upon the government to pay and clean up the mess*. These are strong words with important implications and it could be said that the perception of disasters needs to take into consideration human responsibility for where we live and in what structures we dwell. Steinberg (2000) echoes the concept of blaming the devil or God for woes and ills that beset humankind when in actuality it is often human choice and stupidity that is the root of the evil.

### 2.1.9 Classification

Classification of environmental hazards and natural disasters has been attempted by various authors including Hewitt and Burton (1971). In their classification the elements of earth, wind, fire, and water hazard are included in different combinations. Single element verses combined element is a feature of the classification by Hewitt and Burton. For instance a tsunami is a combined element event as is a hurricane. From the standpoint of this research the fundamental issue is how much damage is done and how many victims are in need of emergency medical and humanitarian response. Practical implications for search and rescue will depend on what elements have caused the disaster scenario particularly if hydrologic surges are a feature causing extensive flooding or if sizeable earthquakes have caused severe damage to buildings. Hewitt and Burton (1971) include biological elements such as pandemics or specific highly infective agents such as Ebola virus. They also include technological hazard such as industrial spillage or radioactive leakage. It has been considered necessary to give less emphasis to the latter two types of disaster scenarios but rapid response to such disasters is equally relevant and the identification of resistance factors to rapid response highly appropriate. Substantial hazards that could possibly impact upon the human race and cause maximal damage are man-made disasters or high technological environmental pollution. A sizeable nuclear event, be it accidental leakage such as Chernobyl 1986 or a nuclear war has vast consequences to the global community. A pandemic such as occurred in 1918 also
presents a threat as a potential 'natural' disaster on a global scale. A pandemic (pan-
demos Greek) is defined as an epidemic (a sudden outbreak) that becomes very
widespread and affects a whole region, a continent, or the world. By contrast an epidemic
affects more than the expected number of cases of disease occurring in a community or
region during a given period of time. An endemic is present in a community at all times
but in low frequency (medicine.net 2006).

In addition the use of Chemical and Biological Warfare (CBW) is a major threat to
individual nations and the world at large.

Redmond (2005) gives an appraisal of different types of disaster with a particular
emphasis on the implications for vulnerable communities. This is highly relevant
particularly regarding disaster mitigation and preparedness strategies and also for
emergency medical relief and humanitarian aid efforts. Redmond (2005) indicates that in
earthquakes the consequences and dangers are from falling masonry and debris with
entrainment ensuing. Still focusing on consequences he states that in tsunami events
casualties occur when buildings collapse at the initial impact but many injuries occur
from floating debris. Most deaths he reports occur from drowning. This consequential
approach to classification of disasters has much greater significance for this particular
research work. Related to this pragmatic approach is the question of whether secondary
consequences occur. Mudslides and slope failure can occur in areas of high deforestation
as seen in El Salvador by the author in the 2001 earthquakes. Other secondary
consequences include such factors as release of toxic gases after volcanic eruptions.

Redmond (2005) sets the record straight regarding convention over tropical storms. He
points out that in the North Atlantic, Caribbean and the South Pacific tropical storms are
termed hurricanes whereas in the Indian Ocean they are termed cyclones. Furthermore in
the North and West Pacific they are known as typhoons. From the consequential angle
Redmond (2005) highlights the injuries occurring from building collapse and flying
debris and also the possibility of secondary flooding.

An example of this was the 1998 hurricane Mitch. Oxfam America (2003) lists the
consequences for vulnerable communities in four countries including Honduras,
Nicaragua, Guatemala and El Salvador. This was a category five hurricane with wind
speeds of up to 300 kilometres per hour and the deposition of six feet of rain on the respective countries causing extensive flooding. Nine thousand people were killed and seven hundred thousand made homeless. In Honduras half of the population was evacuated and 75% were without clean water. The Orissa tropical cyclone in India killed 10,000 people. Poor housing and inadequate safe shelter often lead to increased vulnerability to natural disasters but there are exceptions to this. In the Gujarat earthquake disaster in 2001 the vegetation buildings collapsed but did less damage than the un-reinforced concrete structures.

2.1.10 Natural Disaster evaluation

Disaster evaluation is a key issue which will receive more attention but The World Association for Disaster and Emergency Medicine has presented useful work on this subject through its task force on quality control in disaster management (TFQCDM/WADEM 2002). It presents elements of loss that are relevant in the impact of a disaster on a community. From this a working tool of disaster evaluation has been constructed. Fourteen major functional elements of a society that may be affected either directly or indirectly by an event resulting in a disaster are: 1) public health; 2) medical; 3) sanitation and water supplies; 4) shelter and clothing; 5) food; 6) energy supplies; 7) search and rescue; 8) public works and engineering; 9) environment; 10) logistics and transport; 11) security; 12) communications; 13) economy; and 14) education. These fourteen basic societal functions (BSFs) are linked together by a coordinating-and-control function provided by the respective governments. The interaction and relative impairment of any function can be depicted as a change from the pre-event status. A series of three templates provides a structure for the study of disasters. The first groups the chronological, continuous mayhem of a disaster into recognizable, well-defined phases: 1) pre-event status; 2) event; 3) assessments of overall damage; 4) disturbances in health status; 5) needs assessment; 6) responses; 7) changes in health status; and 8) restoration of health status. The endpoint of the management of a disaster is the time when the pre-event situation for the societal function has been recovered. The second provides a structure and guidelines for the conduct of such studies, and the third provides a structure and guidelines for the design of such studies. Two severity scores are proposed: a disaster severity score and a health disaster severity score. The use of the proposed severity scores will facilitate the comparison of the damage of disasters of similar severity and should
facilitate the identification of factors that mitigate or intensify the effects.

Redmond (2005) makes a very valid point regarding famine. He states that famine may complicate all ‘natural’ and human made disasters, and socioeconomic and political issues lie at the roots of cause and prevention. Trigger levels for urgent humanitarian intervention include a rise in crude mortality to 1 in 10,000 a day, pronounced wasting (loss of >15% of normal body weight) and food energy supplies of <1500kcal per day. Famine like other natural disasters leads to the mass movement of people compounding the risks to health. Children are the most vulnerable during a famine where body mass can be seriously compromised by dehydration. This latter point is brought out by other authors including Seaman (2005). He points out that in natural disasters the children of the poorer families are more vulnerable to communicable disease and environmental exposure than the adults. He adds to the argument that the children of the poor tend to have low nutritional status, increased exposure to communicable disease, low immunization rates, high levels of intestinal parasites and limited access to health care. The advocacy issues raised in this research are given credence within such statements.

Table 2.1.2 Eight schools of thought engaged in disasters

<table>
<thead>
<tr>
<th>Geography</th>
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<tbody>
<tr>
<td>Anthropology (human ecology)</td>
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<tr>
<td>Sociology and Psychology</td>
</tr>
<tr>
<td>Geo-physics and construction</td>
</tr>
<tr>
<td>Medical sciences</td>
</tr>
<tr>
<td>Developmental studies</td>
</tr>
<tr>
<td>Economics</td>
</tr>
<tr>
<td>Criminology (terrorism)</td>
</tr>
</tbody>
</table>

Source: Arnold (17:3 2002)

Table indicating the schools of thought engaged in issues surrounding disasters.

The above table indicates the plethora of approaches and interested parties engaged in
natural disasters. It indicates the complexity of disaster management and the multi-task requirements of disaster response. Additionally regarding the thesis of RF.RR it can be seen that a heavy portfolio may impact upon would-be responders.

From the perspective of this particular research work there are positive and negative attributes seen from having a multi-disciplinary approach. From the positive stance the more information and reliable data available and pooled will improve understanding of the processes and consequences of disasters. Additionally networks of organizations can cooperate and communicate both in mitigation strategies and in emergency communication at the time of an extreme event. From the negative stance information overload can detract from a focused approach and poor communication and collaboration can be a hindrance during times of emergency relief efforts. It is however encouraging that more collaboration and sharing of information is forthcoming. The International Decade for Natural Disaster Reduction (IDNDR) has made positive steps in this direction.

2.1.11 Definition of natural disasters

Definitions of a natural disaster are important as many of these are not simply descriptive but give an indication of impact issues for affected communities with possible indicators relevant to DMP and rapid response intervention. The nature of energy surge and imbalance has also been proposed as the substrate of population-related loss and damage. The social implications have been regarded as a key-point regarding natural disasters and the perspective at a personal level has reinforced this stance. Many have attempted definitions of natural disasters without success and the best definitions incorporate the speed of onset of the event and the overwhelming nature or magnitude of the climatic surge in energy. Additionally the state of un-preparedness of the local population and the unexpected nature of the event are characteristic in definitions. Another factor is the lack of resilience of the local population to withstand the impact of the hazardous event. According to Smith (2001) certain common features exist within natural disaster events caused by environmental hazards. These are illustrated in the following table and give the backdrop to the implications for both victims and disaster response agencies including emergency medical response. It will be noted that the rapid and unexpected nature of the potential hazards appears to be a key feature.
Table 2.1.3 Common features within the context of environmental hazards

<table>
<thead>
<tr>
<th></th>
<th>The origin of the damaging event is clear and produces characteristic threats to human life or well-being; for example, a flood causes death by drowning</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>The warning time is normally short, that is, the hazards are often known as rapid onset events. This means that they can be unexpected even though they occur within a known hazard zone, such as the floodplain of a small river basin</td>
</tr>
<tr>
<td>3</td>
<td>Most of the direct losses, whether to life or property, are suffered fairly soon after the event, that is within days or a week</td>
</tr>
<tr>
<td>4</td>
<td>The exposure to hazard, or assumed risk, is largely involuntary, normally due to the location of people in a hazardous area, for example, the unplanned expansion of some Third World cities on to unstable hillsides</td>
</tr>
<tr>
<td>5</td>
<td>The resulting disaster occurs with an intensity that justifies an emergency response, that is, the provision of specialist aid to the victims. The scale of response can vary from local to international.</td>
</tr>
</tbody>
</table>

Table illustrating the common features within the context of environmental hazards and natural disasters- Source: Smith (2001: 1:16)

The above table provides a logical appraisal of the main features that occur in natural disasters and the consequences for disaster response and aid provision. The suddenness of the event is of particular relevance to the discussions on RF.RR. Different schools of thought will by virtue of their particular discipline produce definitions that are relevant to the body of knowledge contained within their ambit. From the factors contained in the table above Smith (2001) derived the following working definition of environmental hazards: Extreme geophysical events, biological processes and major technological accidents characterized by concentrated releases of energy or materials, which pose a largely unexpected threat to human life and can cause significant damage to goods and the environment.

Definitions of disasters are helpful to a measure but no definition is universally accepted. The World Health Organisation and the United Nations have adopted the Disaster Dictionary definition of SWA Gunn 1990 pp23/24: The result of a vast ecological breakdown in the relationships between man and his environment, a serious and sudden (or slow, as in drought) disruption on such a scale the stricken community needs
extraordinary efforts to cope with it, often with outside help or international aid.

Perez and Thompson (1994) pp80-88 in their series on ‘Natural Disasters’ give the following definition: *The occurrence of widespread, severe damage, injury, or loss of life or property, with which the community cannot cope, and during which the affected society undergoes severe disruption.*

Cheng (2002) gives the following definition: *A disaster is a sudden massive disproportion between hostile elements of any kind and the survival resources that are available to counterbalance these within the shortest period of time.*

The United Nation’s International Strategy for Disaster Reduction (ISDR 2001) has confirmed that a natural disaster is to be regarded as: *The consequences of the impact of a natural hazard on a socio-economic system with a given level of vulnerability which prevents the affected society from coping adequately with this impact.*

Organisations such as the World Association for Disaster and Emergency Medicine (WADEM) put a high importance on definition and shared language over factors and processes affecting disaster response. WADEM has gone as far as producing a handbook of definitions which it encourages everyone to use in order to standardize perspectives and objectives within the disaster remit. This would appear to have strong credence and would assist both the academic implications as well as operational dynamics related to disaster issues. In addition to all the above classifications and definitions relating to disasters it could be stated that each disaster, whether it is man-made or natural, single element or a combination of elements, should be regarded as a challenge. This concept is developed for its relevance to the topic of RF.RR and the challenges are multiple and impact upon both people and systems. Attitudes and politics are part of the spectrum of challenge together with the resilience of buildings and structures. The following table represents a personal perspective when viewing a disaster through the lens of RF.RR. It is also relevant to the need for emergency medical intervention to the victims of natural disasters.
### Table 2.1.4 the concept of challenge in natural disasters

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A challenge to the speed or response of neighbours, search and rescue teams, emergency services and humanitarian aid agencies</td>
<td></td>
</tr>
<tr>
<td>A challenge to the resilience and infrastructures of communities and countries. This includes a challenge to buildings and structures, building regulations, implementation of those regulations, planning laws and policies, state of health of a community, including state of nutrition and immunisation and capacity of local hospitals, internal law and order, and attitude to the poor. In addition a challenge to the capacity and resilience of life line organizations and utilities serving the community.</td>
<td></td>
</tr>
<tr>
<td>A challenge to the local civil defence organizations and local and national fire and rescue services. Additionally the disaster response teams within a country and the prioritization of funds and resources. The state of readiness and training of such organizations and the efficiency of their equipment and systems</td>
<td></td>
</tr>
<tr>
<td>A challenge to the motivation and political resolve of a government in their actions and attitudes to disaster events and their relationships with neighboring countries and the wider international community.</td>
<td></td>
</tr>
<tr>
<td>A challenge to the response of the international community in giving and sending appropriate aid and relief teams.</td>
<td></td>
</tr>
<tr>
<td>A challenge to the response of the individual whether victim, rescuer, aid worker or distant observer relating to relationships and attitudes of reciprocation in care, comfort and practical compassion.</td>
<td></td>
</tr>
</tbody>
</table>

Table indicating the factors within natural disasters that present a challenge to buildings, systems and organisations (personal view)

This concept of challenge regarding definition of disasters is highly relevant to the theme of this research because if the challenge meets resistance or obstruction the time frame and effectiveness of response will be adversely affected.
2.1.12 Earthquake Hazard

The literature references to earthquake hazard are overwhelming but focus is given at this point because of the particular relevance to rapid response strategies where victims are entrapped or buried. In these situations rapid response is a key issue and resistance factors to rapid response are highly relevant.

Earthquakes are among the most dangerous and destructive types of natural events (Ashkenazi 2005). Ninety percent of the casualties result from building collapse. Secondary events include landslides, floods, fires and tsunami. The danger, as perceived from the perspective of one who has experienced the full force of an earthquake, comes from the speed of onset and the severity of the ground shaking. Untold damage can occur within the space of one minute of severe ground shaking. Earthquakes have consequences both at the epicentre of the seismic event but also over a potentially vast impact zone as seen in the tsunami of 26.12.04. The consequences for a community will depend on the location and resilience of the buildings and structures within which people are housed or located. The intensity of ground shaking, affecting impact and devastation, is calculated using the modified Mercalli scale adopted from 1931 which has 12 grades. (Smith 2001) The earthquake magnitude measures the absolute strength of the earthquake related to the energy released by the shock. More than a million earthquakes occur every year, by far the greater proportion being of small magnitude. The number per year of magnitude 8 - 8.9 is 1, whereas the number of earthquakes in the area of 2.0 - 2.9 is more than 300,000 and the tremors between 1.0-1.9 are several hundred thousand. According to Perez (1994) there are one million earthquakes per year but major earthquakes causing massive devastation of life and property occur on average once every three years worldwide. The destructive power of an earthquake lasts between thirty and sixty seconds. After shocks are also major sources of devastation to previously damaged or weakened structures. Earthquake forecasting is still difficult because of unsatisfactory methods but earthquake risk maps are used which show the relative vulnerability of various regions to earthquakes. These are often based on recorded earthquake history in any region. Increase in 1 unit on the Richter scale gives a 30 times increase in energy output. The intensity of an earthquake is how strong the quake is at any given point. The intensity is easier to measure than magnitude. There are several intensity scales, the UK uses a macro seismic scale which means this is a scale which deals with the effects of an earthquake.
2.1.13 Earthquake Archive data

Archive data on earthquakes is available from many sources. Time has been spent at the British Geological Survey (BGS) Edinburgh which has a department devoted to archive earthquake data (Musson 2001). Use has been made of the Centre for Research into the Epidemiology of Disasters (CRED) in Louvain Belgium via the internet.

Table 2.1.5 The Ten Costliest and Deadliest earthquakes in the last one hundred years

<table>
<thead>
<tr>
<th>date</th>
<th>Costliest</th>
<th>Losses $ billion</th>
<th>date</th>
<th>Deadliest</th>
<th>Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>Naples</td>
<td>10-20</td>
<td>1908</td>
<td>Messina, Italy</td>
<td>70,000-100,000</td>
</tr>
<tr>
<td>1988</td>
<td>Armenia</td>
<td>14.2-20.5</td>
<td>1920</td>
<td>Gansu province, China</td>
<td>200,000</td>
</tr>
<tr>
<td>1989</td>
<td>Loma Prieta, California, U.S.</td>
<td>5.9-12</td>
<td>1923</td>
<td>Kanto, Japan</td>
<td>143,000</td>
</tr>
<tr>
<td>1994</td>
<td>Kuril Islands, Russia: Hokkaido, Japan</td>
<td>11.7</td>
<td>1927</td>
<td>Qinghai, China</td>
<td>200,000</td>
</tr>
<tr>
<td>1994</td>
<td>Northridge, California</td>
<td>20-40</td>
<td>1932</td>
<td>Gansu province China</td>
<td>70,000</td>
</tr>
<tr>
<td>1995</td>
<td>Kobe Japan</td>
<td>131.5</td>
<td>1948</td>
<td>Ashgabat Turkmenistan</td>
<td>110,000</td>
</tr>
<tr>
<td>1999</td>
<td>Turkey (August)</td>
<td>6.5-12</td>
<td>1970</td>
<td>Peru</td>
<td>66,000</td>
</tr>
<tr>
<td>1999</td>
<td>Turkey (November)</td>
<td>10</td>
<td>1976</td>
<td>Tangshan China</td>
<td>655,000 estimate</td>
</tr>
<tr>
<td>1999</td>
<td>Taiwan</td>
<td>9.2-14</td>
<td>2004</td>
<td>Sumatra, Indonesia</td>
<td>220,000</td>
</tr>
<tr>
<td>2004</td>
<td>Niigata, Japan</td>
<td>28</td>
<td>2005</td>
<td>Kashmir</td>
<td>73,000</td>
</tr>
</tbody>
</table>

Table indicating the hierarchy of magnitude and loss in earthquake scenarios within the last one hundred years around the world (after Nat. Geog. Supp 2.06)

The above table illustrates the concepts of deadly and costly regarding earthquakes occurring within a hundred year period. Earthquake magnitude does not necessarily have deadly or costly consequences if the seismic event occurs in a remote and un-populated area. Where the population density is high and buildings and structures, including life lines are concentrated, the impact of an earthquake can be both deadly and costly. The consequences are relevant to the emergency medical services and to engineering reconstruction. Displacement of populations after evacuation from a disaster zone can
lead to further morbidity and mortality (Leus 2001)

**Table 2.1.5a) Historic seismic events including archive data and information from Ansell and Taber (1999 4:51)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Location and special features including magnitude and losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956</td>
<td>Shansi, China causing 830,000 deaths largely due to the collapse of soft loess carved caves where many of the population lived.</td>
</tr>
<tr>
<td>1755</td>
<td>Lisbon, Portugal causing nearly 60,000 deaths and the shock wave was felt as far away as England, Italy, North Africa.</td>
</tr>
<tr>
<td>1906</td>
<td>San Francisco, United States of America with a magnitude of 8.3 causing devastation to the city and 7800 deaths. Large amounts of destruction were due to fires which followed. There was huge amount of fault breakage.</td>
</tr>
<tr>
<td>1923</td>
<td>Tokyo, Japan of magnitude 8.3 causing devastation to Tokyo and Yokohama with nearly 100,000 deaths and again most caused by fires. A large tsunami was generated.</td>
</tr>
<tr>
<td>1953</td>
<td>Greek islands of Kefallonia, Ithaca, Lefkada and Zakynthos. 113 shocks occurred between 9th to the 14th of August. Virtually all buildings on Kefallonia were devastated by the earthquake except for the Northern tip and the town of Fiskardho. 600 deaths and thousands more were injured. Eighty percent of communities were killed in some areas.</td>
</tr>
<tr>
<td>1960</td>
<td>Chile, South America with an earthquake of magnitude 9.5 causing 5,700 deaths. This earthquake is reported as being the largest instrumentally recorded earthquake and was the first confirmation that the whole of the globe could ring like a bell</td>
</tr>
<tr>
<td>1964</td>
<td>Alaska with an earthquake of magnitude 9.2 with 131 deaths and a tsunami generated.</td>
</tr>
<tr>
<td>1976</td>
<td>Tangshan, China with an earthquake of 7.6 magnitude causing 500,000 deaths and a city flattened within a radius of 50 square kilometers.</td>
</tr>
<tr>
<td>1985</td>
<td>Mexico City with an earthquake measuring 8.1 and causing 10,000 deaths and 1000 buildings flattened.</td>
</tr>
<tr>
<td>1986</td>
<td>El Salvador, Central America of magnitude 7.6 with 1.500 casualties and affecting the major city of San Salvador.</td>
</tr>
<tr>
<td>2001</td>
<td>El Salvador of magnitude 7.8 on 13.1.2001 and affecting the whole country followed shortly afterwards by a second earthquake on 13.2.2001 in which the author was engaged in the emergency relief efforts.</td>
</tr>
</tbody>
</table>
Table indicating notable earthquakes in history of high magnitude/low frequency occurrence causing variable damage according to location

2.1.14 Climate and Geography

Climate and geography add natural vulnerability to situations and countries where disaster victims face added risks from adverse weather or the geographical location in which the disaster has occurred. Local weather conditions influence the survival time among people trapped in collapsed buildings. (Paul 1989). Proximity to active fault lines or active volcanoes is a major factor concerning vulnerability. Communities in such areas need to give particular attention to disaster mitigation and preparedness strategies and hazard mapping can be employed for this purpose (Bhavan 2001). Earthquake vulnerability is seen in certain countries including Japan, Afghanistan, New Zealand, El Salvador and Central American countries, United States of America (Florida and San Francisco), Ionian islands including Kefallonia. El Salvador approximates three tectonic plates including Cocos, Pacific and Nazca. Kefallonia approximates the Eurasian plate, Turkish Hellenic and African plates. The Hurricane season occurring between May and November brings deadly and costly impacts in the Atlantic. An average season has eleven named storms including six hurricanes, of which two are major hurricanes. 2005
according to the National Hurricane Centre (NHC) was a record-breaking year with twenty eight named storms, fifteen hurricanes and seven of these major. The forecast for 2006 is for thirteen to sixteen named storms (NHC 2006).

2.1.15 Conclusion

The topic of natural disasters has been given comprehensive attention to provide an understanding of the processes in nature that impact upon human civilisation. Particular attention has been given to the definitions and classification of disasters in order to obtain both a generic picture and a specific event-centred approach. Earthquakes have been given special attention because of a special interest in this field of natural hazard and the researcher's personal involvement in relief work after earthquakes in El Salvador. Climate change, particularly global warming, would appear to be the catalyst for the increasing frequency and intensity of natural hazard and man's relationship with this environment and stewardship of the ecosystem a key factor in determining vulnerability. From the archive data it has been shown that certain countries are more prone to natural hazard because of their proximity to fault lines or hurricane impact and tidal surges. The vulnerability to natural disasters will receive attention in Chapter 2.2.
Definition: **Vulnerability** is the susceptibility to physical or emotional injury or attack (Wikepedia 2003). "The concept of vulnerability expresses the multidimensionality of disasters by focusing attention on the totality of relationships in a given social situation which constitute a condition that, in combination with environmental forces, produces a disaster" (Bankoff 2004).

Inadequate buildings and poor housing conditions are major factors contributing to the vulnerability of a community. Additionally the location of the buildings can compound the vulnerability. Economic poverty contributes greatly to this type of vulnerability but buildings located in holiday destinations in close proximity to vulnerable coastlines or on flood plains engage the affluent members of society. A community struggling with poverty and disease is less resilient to withstand the impact of an environmental hazard than a healthier more secure society. Within a fragile and poor community and particularly where there is internal conflict or civil unrest the capacity of civil defence services and local medical emergency services will be less efficient than in a secure and stable environment. Where a community is disorganized and where priority is not given to health and safety issues the early warning systems against natural hazards are often sadly lacking as are other disaster mitigation and preparedness strategies.

### 2.2.1 Poverty in relation to vulnerability

Poorer people in lesser developed countries are historically infinitely more vulnerable to the effects of natural disasters than those living in a secure environment in a more developed country. According to Redmond (2005) poverty is the single most important factor in determining vulnerability. He expands this by stating that poor countries have weak infrastructure, and poor people cannot afford to move to safer places. In addition it is stated that whatever the disaster, the main threat to health often comes from the mass movement of people away from the scene and into inadequate temporary facilities. Poverty is a factor that significantly affects vulnerability to natural disasters. One billion people in the world live on less than $1 per day and half of the world population lives on $2 per day. Poverty drives hazard vulnerability at the household level, determining the location and type of housing as well as the resources available for disaster recovery (Benson C 2000). Development and strong infrastructure is often hampered by countries being shackled with intolerable debts to the more developed countries including the
United Kingdom. This discrepancy is gaining political momentum and 2005 put the government of the United Kingdom in a position to make a positive impact on a global scale.

Table 2.2.1 the events of the year 2005 relating to the reduction of global poverty

<table>
<thead>
<tr>
<th>January 2005</th>
<th>Start of ‘make poverty history’ programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2005</td>
<td>Fair trade fortnight</td>
</tr>
<tr>
<td>April 2005</td>
<td>Global action for trade justice</td>
</tr>
<tr>
<td>16.5.2005</td>
<td>World debt day</td>
</tr>
<tr>
<td>2.7.2005</td>
<td>G 8 Summit in Edinburgh</td>
</tr>
<tr>
<td>September 2005</td>
<td>Millennium goals summit New York</td>
</tr>
<tr>
<td>December 2005</td>
<td>World trade organization conference Hong Kong</td>
</tr>
</tbody>
</table>

Table indicating the response of the United Kingdom to the call for reduction of global poverty during the year 2005 with illustration of the timetable for the year (MPH 2005).

High profile was given to the Make Poverty History campaign within the United Kingdom and impetus was given to the cause through celebrities speaking at public meetings and giving television broadcasts. Personalities such as Bill and Melinda Gates and Bono featured highly and were made the Time magazine personalities of the year (Time 2005). Additionally Koffi Annan addressed a rally in Edinburgh at the G8 summit (Annan 2005).

The development work of the many Non-Government Organisations (NGOs) and relief agencies will come to fruition when each developing country possesses a strong infrastructure and population resilience against natural disasters.
Vulnerability is compounded for countries where there is civil unrest with displaced communities being particularly vulnerable to death and morbidity. (Leus WHO 2001)

Displaced communities may not have access to medical services at all or the services may be severely limited. In these circumstances immunization programmes are compromised and emergency medication may not be available. Attention to wound care may be far from adequate.

Table 2.2.2 Potential causes of displacement and population movement

<table>
<thead>
<tr>
<th>Natural Disasters</th>
<th>Human-made events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floods</td>
<td>War</td>
</tr>
<tr>
<td>Earthquakes</td>
<td>Political upheaval or revolution</td>
</tr>
<tr>
<td>Tsunamis</td>
<td>Religious or political persecution</td>
</tr>
<tr>
<td>Volcanoes</td>
<td>Development projects i.e. hydro-electric dams</td>
</tr>
<tr>
<td>Tropical Storms</td>
<td>Chemical or toxic spillage</td>
</tr>
<tr>
<td>Famine</td>
<td>Nuclear Incidents</td>
</tr>
</tbody>
</table>

Table illustrating natural and human factors leading to population displacement relevant to the vulnerability (after Kett 2005 331:98)

The vulnerability of displaced people revolves around certain security factors and the United Nations Development Programme (UNDP) in 1994 highlighted seven security issues:

- Economic security (assured basic income)
- Food security (physical and economic access to food)
- Health security (relative freedom from disease and infection)
- Environmental security (access to clean water and air and non-degraded land)
- Personal security (security from violence and threats). Also danger from landmines
Community security (security of cultural identity)
Political security (protection of basic human rights)

2.2.2 Country Vulnerability profiles

Vulnerability profiles have been considered country by country (Venton 2001), and this gives a useful indicator for target populations regarding availability of emergency assistance, either from neighbouring countries or from NGOs globally engaged in emergency disaster relief. Lesser developed countries tend to have poor infrastructures relating to emergency medical services and local civil defence capability. In addition individuals in countries with low Gross Domestic Product (GDP) can tend to have a vulnerability regarding poor nutrition and compromised health. Their vulnerability is compounded by the fact that buildings and structures in poor communities can tend to be vulnerable to ground shaking in earthquakes and to collapse in storms and floods. Transport arrangements towards a disaster zone and the capacity for movement of substantial numbers of casualties from a disaster area can be less robust and possibly non-existent in certain countries. In El Salvador in the earthquakes of 2001, in which exceptionally the whole country was affected, many rural communities had no access to emergency medical assistance as the emergency services were overwhelmed.

Vulnerability profiles country by country give background knowledge enabling measures to be addressed relating to what particular disasters are likely to befall a given country and the historical frequency of the disaster enabling planning and preparedness. Vulnerability to natural disasters can occur through one of several factors including social, economic and geographical components. From the literature and personal observations it has been possible to construct a table that embodies many of the factors operant in vulnerability to natural disasters. The factors span individual and collective attitude factors together with practical issues including resources and topography. Poverty is a significant factor in vulnerability relating to housing and location. Complex situations include factors such as civil unrest or civil war and conflict compounding the vulnerability for the victims and rescue workers. Tabulating vulnerable factors has virtue in enabling starting grid assessment in which responses can be planned in desk top scenarios and hazard management/ disaster modelling. Additionally if planners are aware of vulnerable factors and locations contingency plans can be put into place regarding
disaster mitigation and preparedness (DMP). Identification of both vulnerable countries and vulnerable locations within those countries enables a global picture to be obtained and financial strategies given attention.

Table 2.2.3 factors operant in vulnerability to natural disasters

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ignorance relating to hazard and disaster with no knowledge of the particular dangers associated with any given hazard and the absence of awareness of its occurrence</td>
</tr>
<tr>
<td>2</td>
<td>Inertia and indifference to the potential threat. Here the awareness of potential hazard is accepted but there is no motivation towards doing anything to mitigate the dangers and possible losses. This can be on a local level or on a national level.</td>
</tr>
<tr>
<td>3</td>
<td>Lack of resources despite awareness and willingness to address the reality and the consequences of natural disasters. Lesser developed countries often fall into this category and have to rely heavily on neighboring countries to assist in times of national crisis. El Salvador is one such country where the hazard intensity and frequency is high but infrastructure is sadly lacking. Lack of resources for such countries includes search and rescue capability, hospital emergency beds, emergency food and shelter supplies, emergency transportation systems, poor accurate needs assessment capability and poor communication systems.</td>
</tr>
<tr>
<td>4</td>
<td>Poverty and poor health and nutrition. This is related to the lack of resources as above and is typical of lesser developed countries. If an individual is struggling with ongoing health issues and compromised bodily function then the lack of resilience may be easily overwhelmed in the event of a natural disaster</td>
</tr>
<tr>
<td>5</td>
<td>Adverse terrain and remote location. Steep topography can lead to additional hazards including slope failure, mud and boulder slides. Access to such locations can be difficult, particularly if access roads have been blocked which can easily occur in the event of an earthquake.</td>
</tr>
<tr>
<td>6</td>
<td>Possibility of more than one hazard such as cyclone and tsunami or volcanic eruption and earthquake occurring simultaneously.</td>
</tr>
<tr>
<td>7</td>
<td>Complex emergency scenarios where civil unrest or warfare is concurrent</td>
</tr>
</tbody>
</table>

Table presentation regarding vulnerability factors operant in natural disaster scenarios. The wide ambit of factors includes attitudes, physical factors and sociological issues (personal view)
According to Smith (2001) vulnerability implies a measure of risk combined with a relative inability to cope with the resulting stress. However Timmerman (1981) states that vulnerability within a society or community is the degree to which a system, or part of a system, may react adversely to the occurrence of a hazardous event. It could however be stated that vulnerability to hazard should be regarded as a threat of loss to different aspects of human status or dignity, including life or health both physical and mental, home or possessions, family and friends, or work capability/independent existence. Additionally under the umbrella of threat of loss community facility losses may include shared resources, communication systems, water and food supplies, transport systems, utilities and infrastructure.

2.2.3 The World Disaster Report

The World Disaster Report 2000 provided data on the absolute numbers of people reported killed and affected by country. Countries were ranked against the annual average (1990 to 1998) of people killed and affected. This indicated where most people were affected by natural disasters – predominantly in the higher populated countries. The actual statistics compiled by the Centre for Research on the Epidemiology of Disasters (CRED) may have limitations in accuracy, but the ranking of countries allows the opportunity to roughly gauge the scale of hazards. The statistics used on numbers of people killed and affected were next considered alongside the population figures. This enabled a comparison of the relative scale of impact of the natural disasters upon individual countries. Within the scope of this research attention has been given to hierarchy and prioritisation. The World Disaster Report (IFRCRCS 2000) assists in this task of identification of the most or worst regarding the dimensions of natural disasters. The original table was sizeable with thirty rankings but the highest twelve rankings are used as an illustration. It will be noted that poor countries rank highest as do countries with high population density. El Salvador was seen as a vulnerable country but because of its low population density does not feature in the highest ranks of vulnerability. It did however rank seventeenth position on the parameter of total number killed as a percentage of the population. The highest ranking, such as Bangladesh, represent chronic vulnerability where death and destruction from perpetual flooding has taken a massive death toll.
Table 2.2.4 Hierarchy of countries measured on four parameters from World Disaster Report (2000) regarding vulnerability to natural disasters

<table>
<thead>
<tr>
<th>RANK ORDER</th>
<th>TOTAL KILLED</th>
<th>TOTAL KILLED AS % OF POP'N</th>
<th>NUMBERS AFFECTED</th>
<th>NUMBERS AFFECTED AS % OF POP'N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bangladesh</td>
<td>Bangladesh</td>
<td>China</td>
<td>Malawi</td>
</tr>
<tr>
<td>2</td>
<td>India</td>
<td>Honduras</td>
<td>India</td>
<td>Guyana</td>
</tr>
<tr>
<td>3</td>
<td>Iran</td>
<td>Guinea-Bissau</td>
<td>Bangladesh</td>
<td>Bangladesh</td>
</tr>
<tr>
<td>4</td>
<td>China</td>
<td>Iran</td>
<td>Philippines</td>
<td>Zimbabwe</td>
</tr>
<tr>
<td>5</td>
<td>Nigeria</td>
<td>P. N. Guinea</td>
<td>Pakistan</td>
<td>China</td>
</tr>
<tr>
<td>6</td>
<td>Philippines</td>
<td>Haiti</td>
<td>Thailand</td>
<td>Philippines</td>
</tr>
<tr>
<td>7</td>
<td>Peru</td>
<td>Nicaragua</td>
<td>Malawi</td>
<td>Dominican Rep.</td>
</tr>
<tr>
<td>8</td>
<td>Afghanistan</td>
<td>Niger</td>
<td>Kenya</td>
<td>Swaziland</td>
</tr>
<tr>
<td>9</td>
<td>Vietnam</td>
<td>Burkina Faso</td>
<td>Ethiopia</td>
<td>Fiji</td>
</tr>
<tr>
<td>10</td>
<td>Indonesia</td>
<td>Somalia</td>
<td>Vietnam</td>
<td>Zambia</td>
</tr>
<tr>
<td>11</td>
<td>Pakistan</td>
<td>Afghanistan</td>
<td>Brazil</td>
<td>Kenya</td>
</tr>
<tr>
<td>12</td>
<td>Nepal</td>
<td>Peru</td>
<td>Sudan</td>
<td>North Korea</td>
</tr>
</tbody>
</table>

Table demonstrating the countries hit the hardest by natural disasters over a period from 1990 - 1998 using the World Disaster Report parameters on disaster scoring (IFRCS 2000)

2.2.4 Massive Events and vulnerability

Mention has already been given to the greatest natural threats to the globe at the present time (Natural Hazards Working Group 2005). Vulnerability to massive events such as an asteroid or comet impact lies at one end of the spectrum of disasters whereas some countries such as El Salvador face frequent risks from natural hazards by virtue of their location close to three active tectonic plates, namely the Nazca, Pacific and Cocos plates. A global alarm network is being given consideration to address these vulnerabilities and
to respond accordingly (King 2005). The G8 summit at Gleneagles was the forum in which this initiative was given due consideration at an international level.

2.2.5 Disaster risk assessment project

A disaster risk assessment project has been undertaken (Venton 2001). This seeks to identify populations at high risk from natural disasters. This has implications for relief agencies and NGOs regarding the provision of focused disaster mitigation and preparedness strategies. Identifying vulnerability enables resources and capacity to be developed and has specific value regarding response strategies and emergency relief. It is highly relevant to the present discussion regarding the vulnerability of the population in El Salvador and other earthquake-prone countries. World maps and regular updates of climatic and environmental hazard is vital in this area as the risk assessments change year by year and one massive event can alter the dynamics of world disaster relief. It is encouraging that the disaster risk assessment project was undertaken by a member of a leading NGO which is a member of the Disasters Emergency Committee (DEC). It could be stated that a regular updated global disaster risk assessment with knowledge of which operational relief agencies are engaged on development work in vulnerable countries gives the building blocks for a precision emergency aid delivery system.

2.2.6 Factors affecting vulnerability to natural disasters

It is possible to identify both vulnerable countries and to pinpoint vulnerable communities within each vulnerable country. Geographical Information System (GIS) is of value in this respect and hazard scenarios can be run in which particularly vulnerable communities can be identified (Hsu 2002). This is of great importance to disaster managers and civil defence capacity with regard to disaster mitigation and preparedness. Certain countries are more prone to the insult of the elements be it earth movement, wind, water or fire. These four primitive elements account for most of the disasters that affect communities within the global ambit. Several factors exist which increase the vulnerability of the global community (Arnold 2002). These include population growth which may be the single most important factor. The world population is increasing by eighty five million per year and the global population has been predicted to rise from 5.7 billion in 1995 to 9.3 billion by 2050. Additional factors include an aging population, mal-distribution of
populations to disaster-prone areas, urbanization and marginalization of populations to disaster-prone areas. Poverty and structural vulnerabilities are consequences of much of these stated factors.

Added to the above vulnerabilities are factors relating to the state of the environment within the 21st century. Environmental degradation with deforestation and soil erosion adds further hostility to the human race. Infectious diseases with emergence of new viruses and resistant strains add a lethal dimension with potential for epidemics and pandemics. Toxic materials from either chemical production or radio-active leakage are a consequence of the ongoing industrialization of societies. Some countries have a singular lack of regard for the environmental consequences of industrial growth. Chemical and biological warfare (CBW) and the rising threat of terrorism is high on the agenda for the security services. Economic imbalance is cited by Arnold (2002) as a source of vulnerability and mention is made of the term cultural tribalism. This is evident in countries where the rich/poor divide is pronounced such as in El Salvador.

2.2.7 Global warming

According to Arnold (2002) environmental degradation and global warming parallel the vulnerability from increased population growth. Global warming has impacted large regions and probably the whole of the planet (Dilley 2000). This is through its affects on weather patterns and sea currents. Global warming is due to overproduction of greenhouse gases due to fossil fuel consumption plus under-absorption of carbon dioxide from shrinking global carbon sink. (WHO 2002)

Global warming would appear to be accelerating and 1998 was the warmest year ever at the time of writing of literature in 2002. 2001 was the second warmest year ever according to the World Meteorological Organisation (WMO 2001)

The global temperature has risen by 0.2 – 0.6 degrees Centigrade over the last century as recorded at different locations (Wikipedia 2005).
The global temperature has risen by 0.2 – 0.6 degrees Centigrade over the last century as recorded at different locations (Wikipedia 2005).

### Table 2.2.5 Increases in global surface temperatures since 1860

![Global Temperatures](image)

Table illustrating instrumental measurements indicating rise in global temperatures since 1860 (Wikipedia 2005)

### Table 2.2.6 Increase in global surface temperatures since 1980

![Surface Temperature Record](image)
Global warming has been accompanied by increased rainfall in the higher latitude countries and increased flooding in many countries. It has also seen increased frequency of droughts in parts of Asia and Africa and increased frequency, intensity and persistence of El Nino (Economist 1998). It is now stated that temperatures are rising faster than previously thought and that this rise is predicted to cause the melting of the Greenland and Antarctic ice sheets by 2600 with a twenty foot sea rise. (Highfield 2006). The Benfield team has predicted that a twenty foot rise would leave many towns and cities in the United Kingdom waterlogged with two million people displaced. Cities included Edinburgh, Newcastle, Peterborough, Bristol, Plymouth, Norwich and Bournemouth. In London Southwark, Lewisham, Greenwich, Tower Hamlets, Bexley, Barking and Dagenham would be underwater along with large areas of south Essex and north Kent (McGuire 2006). It was also stated that a doomsday scenario would see a 270 ft rise but this is highly unlikely and would only happen if nothing is done about carbon emissions leading to a runaway greenhouse effect. (McGuire 2006).

Between 1997 and 1998 El Nino was associated with at least 22 natural disaster events including several floods in S.America and droughts and vegetation fires in Indonesia. It is predicted that by 2100 the mean global temperature is predicted to rise by 1.4 – 5.8 degrees C producing extreme weather conditions but also an increase in mean global sea levels by 9.88 cm if not higher.

Regarding environmental degradation and global warming over the last 30 years the Brazilian part of Amazonia (the world's largest rain forest) has seen a disappearance at the rate of 0.5% per year. This leads to global warming through increased heating from fires together with loss of carbon sink. In addition there is soil erosion. Deforestation is relevant to countries such as El Salvador that are vulnerable to seismic activity. El Salvador has 95% deforestation leading to instability of soil through erosion. During the wet season (May to November) the denuded slopes soak up water as well as causing excess run off. With seismic activity such as occurred in January and February of 2001 the slopes are highly vulnerable to mud slide and slope failure because of instability. If the original tropical rain forest covering had been preserved there would be less risk of this occurrence.
2.2.8 Vulnerability to infectious disease

According to Arnold (2002) there is another 'flash point' for the generation of natural disasters. This is infectious diseases. He points out that there is serious risk of pandemic infections particularly with reference to the increased population density globally. It is pointed out that over the last twenty years thirty new disease-causing organisms have been isolated. This includes HIV, Ebola virus, Hepatitis C, rotavirus and others (WHO 2001/2)

The influenza pandemic of 1918 was cited which killed somewhere between twenty to one hundred million people worldwide. The figures here are clearly variable and one reporter suggests up to fifty million (Highfield 2005). This contrasts to 25.1 million killed in the two world wars. In the United States alone the influenza pandemic killed 500,000. During the early part of 2005 there was a World Health Organization (WHO) alert regarding the potential pandemic from avian flu virus generated in South East Asia. The H5N1 virus could according to the WHO computer models kill between 2 million and 7.4 million people within a twelve month period, based on a 'best case' scenario from the mild pandemic of 1968. Genetic analysis of virus samples is undertaken to assess any change in the epidemiological capability of the viruses. The fear is that if there is a mutation of the virus alongside the human flu virus a deadly genetic mix could result. The monitoring of the situation by the WHO is vital to rapid response strategies and it has been reported that any change in virus epidemiology will lead to an 'aggressive response' (Stohr 2006). Other areas of vulnerability, as has been mentioned, are the threat of illness or disease from the micro-environment. It has been suggested that antibiotics may be ineffective in the battle against the 'superbugs'. (Poste 2005). It was further suggested that 2010 to 2015 will be a 'window of vulnerability' and the increase in antibiotic resistance leading to situations such as the 'Superbug' of Methicillin Resistant Staphylococcus Aureus (MRSA) could occur. Warnings that death rate from MRSA over the last four years has seen a doubling in British hospitals bringing the total up to 1,000 per year are a serious cause of concern.

The World Health Organization announced towards the end of February 2005 that a new strain of bird flu was likely to develop and would spread rapidly across the world. Professor Sir Liam Donaldson stated that wherever in the world a flu pandemic starts,
perhaps with its epicentre in the Far East, we must assume we will be unable to prevent it reaching the UK. (Donaldson 2005)

When civilization crumbles, mankind’s defences against disease break down as well (Gordon 2000). He points out the infectious illnesses that occur when civilization is disrupted including cholera, typhoid and dysentery through poor water supply and sanitation. He also points out that the most harmful and pernicious creature on earth, so far as man is concerned is the rat. It is clever, adaptable and destructive. Rats are supposed to have killed more people in history than wars. It makes its home wherever man is found and carries 35 known diseases. Rat fleas were responsible for the bubonic plague and rat fleas also carry typhus which in four centuries has killed two hundred million people. Rats also menace human food supplies and contaminate them particularly in the underdeveloped countries. The World Health Organisation has written several publications relating to the vulnerability of displaced populations and mention is made in other chapters concerning this. In essence the vulnerability comes from not having an infrastructure of health care including immunization, clean water, sustainable food supplies and hostility from local communities where fear of overwhelming the available health resources is a significant problem.

The culling of Hong Kong’s entire 1.5 million poultry population in 1997 probably averted a pandemic according to Highfield (2006). Aids virus had killed 11.7 million people by 1997. The virus DNA was isolated from a victim buried in the Alaskan permafrost. The reason for the increased virulence of the virus is still not known.

The fragility of the human race is evident from the above. Despite immunization programs and education campaigns there is still vulnerability particularly if a community is lacking in resilience through poverty and malnutrition. Poor sanitation and hygiene often lead to increased risk of infectious disease. Open sewers and contaminated water supplies lead to spread of disease via the faecal oral route. The poorer communities of El Salvador are particularly vulnerable on this front and thereby render themselves highly vulnerable to intestinal infection including bacterial, viral and parasitic. On 8.2.2005 it was reported by the Ministerio de Salud Publica that there had been in excess of 43,000 cases of diarrhoea caused by the rotavirus so far that year with 15 deaths. Within twenty four hours there had been 327 cases from the cities of San Salvador, La Libertad and La
The scope of this thesis is chiefly limited to natural disaster scenarios but mention is made of the anthropogenic aspects to illustrate the vulnerability of the human race from itself. In addition the interrelatedness of the environment and potential triggers to natural disasters from human insult is an important dynamic. Underground nuclear testing is a point in question that could potentially destabilise the earth's crust. Man and his environment create an important equation of hazard and vulnerability. To live quietly in a safe location giving appropriate respect to the natural elements and fauna and flora in the surrounding area makes for an environment with few disasters. Unfortunately since the beginning of creation humankind has a propensity to do damage to itself and to the environment.

2.2.9 Nuclear vulnerability

Nuclear threat is a sinister and sometimes forgotten threat to both humankind and the environment. The global ecosystem is potentially vulnerable through this threat. At the time of writing there are eight nations with a nuclear capability including 31,000 nuclear weapons. Russia and USA have 95% of the world stock. In recent years Israel, India and Pakistan have produced nuclear weapons outside the Nuclear Non-proliferation Treaty. Israel has 200 weapons, India 95 and Pakistan 50. It is thought by Arnold (2002) that the nuclear threat is more likely to come from industrial accident than from a nuclear attack. He cites the 1986 Chernobyl disaster which led to 30 deaths, 100,000 evacuated and 2000 cases of delayed childhood thyroid cancers. Since 1993 police have seized uranium caches in Germany, Turkey and the Czech Republic. The International Atomic Energy agency has reported 175 cases of nuclear trafficking. In recent years El Quaida has tried to purchase uranium from South Africa and the central Asian countries.

2.2.10 Armed conflict

Eight of the world's ten poorest countries have recently suffered from armed conflict (Stewart 2002). There are greater than 6,000 cultural groups within the world (Indonesia has 350). Most countries are reported to be heterogenous with only twenty countries homogenous. This leads to serious risk of tribal conflict which is an anthropogenic
disaster but can have implications on natural disasters regarding relief operations when affected countries have conflict situations or tribal feuding.

2.2.11 Location and buildings

Many countries turn a blind eye when human settlements expand near natural hazards including low-lying coastal areas, which can be vulnerable to tsunami and cyclone hazard, floodplains, seismic areas, landslide prone areas and near volcanoes. (WHO 2005 data). Urbanisation in earthquake-prone countries leads to increased vulnerability especially when the building occupancy is high and the structures close together. A section is devoted to buildings and structures as this is such a vital part of disaster vulnerability and relevant to resistance factors to rapid response. In the article by Arnold (2002) several factors are cited making buildings vulnerable. These include poor design, improper construction technique, use of inferior material, lack of enforcement of building regulations, and building in the wrong or exposed locations. Structural failure is a major determinant of morbidity and mortality from natural events. Foundations give way in floods and landslides, walls topple in cyclones and earthquakes and roofs cave in under the weight of volcanic ash. (WHO earthquake data 2005).

Land use planning has long been recognized as a potentially valuable tool in the long-term reduction of human vulnerability and loss potential to natural hazards (Gunne-Jones 2003). He points out that despite many commentators affirming this fact that it is an area which has not been explored in any detail. From the literature good land-use planning is an excellent measure for reducing vulnerability and providing a very useful method of disaster mitigation.

2.2.12 Differential vulnerability by gender and age

Children, elderly persons, and dependent adults are most vulnerable to the physical and psychosocial impacts of disasters (Amaratunga 2006). In the 2004 earthquake and tsunami disaster in S.E.Asia it is estimated that as many as 400,000 people were killed in 12 countries. In certain regions up to 80 per cent of deaths were women and children (Oxfam 2005). According to Macdonald (2005) disasters are profoundly discriminatory stating that social structures present before a disaster, such as poverty, housing and
property policies, women's rights, and gender roles, determine who will be more affected by a disaster. According to Amaratunga (2006) in the S.E. Asia tsunami disaster women were particularly vulnerable due to social and cultural factors including their roles as caregivers. Many women were on the beaches harvesting fish when the disaster occurred. In Matara in Southern Sri Lanka, many women were at bus stands and morning markets adjacent to the sea. Other factors relating to the vulnerability of the female sex according to Amaratung (2006) include the fact that women and girls are rarely taught to swim and additionally wear floor-length wrap around clothing which makes running from danger difficult. Additionally women are unused to climbing trees to pick fruit and do not have the same upper body strength as their male counterparts. Females can also be vulnerable in the post disaster phase from domestic violence, abuse or even rape in situations where there is a breakdown of community cohesion. This may be compounded by alcohol consumption (Commonwealth Secretariat 2005)

The elderly, dependent adults or chronically ill people have increased vulnerability to disasters and many examples of this were seen in the Hurricane Katrina disaster in the United States in 2005 in which older and dependent adults were unable to evacuate vertically such as climbing stairs or evacuating to the roof to await rescue assistance (Neergaard 2005).

2.2.13 Risk and hazard

Risk is defined as Hazard x Vulnerability/ manageability. This is a useful equation mentioned by several authors and seems to have stood the test of time.

Asia and Africa will continue to be plagued with natural disasters. Asia has 58% of the world population on 31% of the earth's surface area. Asia has suffered 40-50% of natural disasters and 70% of all disaster related deaths since 1970 and 90% since 1990 (Sundnes 2001)

Small island states are found to be particularly vulnerable to environmental hazard and natural disasters. The Caribbean islands are an example of this. A report by the United Nations in 1993 stated that thirteen out of the twenty five vulnerable countries were island states. They are vulnerable to climatic variations and storm surges including tsunamis.
Other factors that render them vulnerable include seismic hazard and possible volcanic eruptions. Where coastal areas have been denuded of their natural defences such as reefs and mango swamps, storm surges, inundation and tsunami vulnerability can occur. Cyclones also render small island communities vulnerable where deforestation has taken place and where buildings are fragile. These small island states often depend on agriculture and tourism both of which are vulnerable to natural hazard scenarios. The resource base in these countries is low and recovery processes and rehabilitation after a disaster can take many years.

2.2.14 Vulnerability within the United Kingdom

In the United Kingdom the vulnerability at this time would appear to be from flooding related to climate change. If predictions are accurate and the rise in mean sea levels by 2050 being approximately 9.8cm then consequences for existing buildings situated within flood plains could be devastating. Articles are now appearing in the press relating to the potential hazards and implications for buildings and planners. Hazard mapping is going to be relevant in this equation and the use of Geographical Information Systems to give accurate data on homes and buildings liable to flooding will be necessary. According to McGuire (2006) a twenty foot or six metre rise in sea levels was thought to be 1,000 years away but now this is thought to be 500 years as the Greenland ice sheet continues to fall apart through global warming.

2.2.15 Flooding vulnerability in the United Kingdom

Vulnerability from flooding within the Thames area of the United Kingdom has received attention (Boase 2005). There are 1,250,000 people presently living and working in the tidal flood plain and the potential for damage in financial cost is in the order of £80,000,000. Included in the property are eight power stations, sixty eight underground and docklands light railway stations, sixteen hospitals, thirty main line stations, four hundred schools and three world heritage sites. Management options will need to be looked at and flood defences will need substantial investment if the disasters are to be averted. Clearly work should start now in a developmental and proactive strategy leading to potent disaster mitigation and preparedness. Not only will the Thames flood plain be vulnerable but also smaller rivers will be prone to flooding through heavier rainfall and
land saturation. A useful research study could be undertaken comparing the potential damage for a small community situated close to a river with that of the Thames flood plain.

Internet search was undertaken with the search topic of 'vulnerability related to natural disasters'. 137,000 references were found. (Yahoo 12.3.05)

2.2.16 Conclusion

Vulnerability to natural disasters has received attention because of the relevance to the potential need for rapid response of the aid organisations and emergency medical services in the event of a further environmental hazard. Assessing vulnerability of countries from archive data has enabled a hierarchy to be established which gives quantification of loss and damage over decades. This sets the scene for targeting of aid provision and capacity building from the developmental and disaster mitigation standpoints. Poverty would appear to be the most pressing cause of vulnerability both at the local level, regarding buildings, location and infrastructure, and at government level regarding capacity to deal with emergencies and mass casualty scenarios. Additionally poverty brings decreased resilience to withstand environmental hazards through compromised health. Other areas of global vulnerability have been presented to understand the shared implications for the emergency services particularly from the medical perspective in dealing with mass casualty scenarios. Vulnerability to natural hazard can predispose a community to further vulnerability if disaster strikes through exposure and the consequences of evacuation and displacement. The wounded victim scenario leads seamlessly into the next chapter regarding the development of relief organisations and the particularly contribution of one man Henri Dunant.
2.3 THE HISTORY OF THE DEVELOPMENT OF RELIEF ORGANISATIONS

2.3.0 Introduction

An appraisal of the history of the relief organisations has been undertaken because of the relevance to the present subject, drawing elements of the motivation and vision of the founders into the context of a high technological arena of disaster relief. The historical data relating to the formation of the Red Cross and later the International Federation of Red Cross and Red Crescent Societies (IFRCRCs) has been accessed through visits to the Red Cross museums in Winchester and Geneva. In addition internet detail from the IFRCRCs web site has been comprehensive. Further information has been gleaned through meetings with staff from the IFRCRCs in 2001 in Geneva. A brief résumé of the pioneering work of Henri Dunant (1828-1910), the founder is considered worthy of inclusion. The historic facts are still used by the British Red Cross in their fund-raising programmes and profile literature.

2.3.1 Henri Dunant

Dunant was a Swiss businessman noted for being the driving force behind the inception of the Red Cross. He visited the northern battlefield in Italy after the battle of Solferino in 1859 and was deeply moved by the inadequacy of resources to treat casualties of the war. He was originally sent by his government to work on a business deal with Emperor Napoleon 111 in Paris. When he arrived he discovered that Napoleon was absent and fighting a war. This prompted him to go to the battle front to find the Emperor. It is reported that Dunant watched in horror as cannonballs ripped open human flesh, maimed and dying men lay all around him. He was so devastated by what he saw that he stayed at the front for weeks helping doctors tend to the wounded. He noted the indignity and agony of wounded victims both combatants and civilians. On returning home he was haunted by the images of war and was unable to keep his mind on banking to the extent that he lost his fortune. He wrote a memoir entitled ‘A Memory of Solferino’. In it he stated ‘It seemed to me that I had something to accomplish, a sacred duty that was destined to have infinite consequence for mankind’. (Gass 2005). It was this memoir that was the inspiration for the founding of the International Committee of the Red Cross (ICRC) in 1863. This has had a huge impact on the way that casualties of war are
was the inspiration for the founding of the International Committee of the Red Cross (ICRC) in 1863. This has had a huge impact on the way that casualties of war are managed both from the humanitarian aspect and also with regard to specific medical care and treatment. Near the end of his book Dunant writes “But why have I told of all these scenes of pain and distress, and perhaps aroused painful emotions I my readers? Why have I lingered with seeming complacency over lamentable pictures, tracing their details with what may appear desperate fidelity? It is a natural question. Perhaps I might answer it by another: Would it not be possible, in time of peace and quiet, to form relief societies for the purpose of having care given to the wounded in wartime by zealous, devoted and thoroughly qualified volunteers?”

Plate 2.3.1 Henry Dunant 1828-1910

Plates of Henry Dunant the founder of the Red Cross organisation and the pioneer of the Geneva Convention and relief organisations

Henri Dunant in 1859 sought to achieve a twofold strategy namely establishing relief societies for the purpose of having care given to the wounded in wartime and formulating an international principle, sanctioned by a convention inviolate in character. This latter would serve as the basis for the relief societies.

Four years after the battle of Solferino and one year after Dunant’s book was published a
included the following individuals: General Dufour, Gustave Moynier, Dr Theodore Maunoir, Dr Louis Appia and of course Henri Dunant.

The recommendations from the conference included:

- The establishment of national relief societies asking governments to give them support and protection.
- In wartime field hospitals and lazarets be declared neutral or 'inviolate' by belligerent parties.
- Protection be given to army medical staff, voluntary helpers and wounded casualties of war.
- That governments choose a common distinctive sign marking persons and objects to be protected.

In 1864 the strategy bore fruit culminating in 11 countries adopting ten articles for the purpose of mitigating the evils inseparable from war. They also recommended that there exist in every country a committee whose mission consists in cooperating in times of war with the hospital service of the armies by all means in its power.

In July 1881 the 'American Association of the Red Cross' was incorporated thanks to the efforts of Clara Barton after her experiences in the Franco-Prussian War and the American Civil War. She made a distinctive contribution which signalled a strategy expansion namely that the services of the Red Cross should include disaster relief. The success and the development of the Red Cross and its aims has had lasting implications and is now known as the International Federation of Red Cross and Red Crescent Societies (IFRCRCS).

Alfred Nobel died in 1896 and left in his will a fund to be used on an annual basis to salute the contribution and 'reward persons whose activities were of the greatest benefit to humanity'.

It was a fitting tribute that in 1901 the first Nobel Peace prize should be awarded to Jean-Henri Dunant, founder of the Red Cross, for his massive contribution to the humanitarian needs of victims of war and disaster. There is a lesson to subsequent generations concerning the need for similar passionate and selfless devotion to the humanitarian
cause. It is of interest that he was too ill to travel to Sweden to accept the award and chose to give the money to charitable causes rather than accepting the money for himself. Ironically towards the end of his life he was living in a poor house in Heiden (Canton of Appenzell, Switzerland) and despite his ultimate worldly poverty his generosity and ‘wealth of spirit’ has given untold missions of mercy to individuals down the years. The author is deeply humbled by his immense and passionate contribution to the humanitarian cause. It is not widely known that Henri Dunant was a Christian who instigated the formation of the World Alliance of the YMCA in Paris in 1855. He started very humbly by inviting a few friends to meet regularly at his house to study the bible and to encourage each other in good works and to bring about a spiritual awakening amongst young people.

2.3.2 The Red Cross Emblem

The actual Red Cross Emblem as a symbol of international protection originated from the early meeting in 1863 in Switzerland along with the strategy of improving the care of the wounded on battlefields. The symbol was worn on the arm with a red cross on a white background as an amulet. It was sometimes known as the Geneva Cross. The Red Cross on a white background is essentially the reverse of the Swiss flag regarding the colours and design.

2.3.3 The Geneva Convention

The Geneva Convention was signed on the twenty second of August, 1864 by the representatives of twelve countries. It established the fundamental principle that ‘wounded and sick combatants, to whatever nation they may belong, shall be collected and cared for’. It adopted the Red Cross emblem as the international symbol to identify personnel, material, and facilities used to care for the sick and wounded in times of armed conflict. By the terms of the treaty, persons and facilities bearing the symbol are protected from attack. Over the years the scope of the convention has been extended to cover the shipwrecked, prisoners of war and the civilian populations affected by armed conflict.

The initiatives and formation of the care pathways for victims of war and their attendants together with casualties of natural disasters has continued to develop from those early
magnificent beginnings. The history of the United Nations is built on the principles of humanitarian aid. It is thought that the name ‘United Nations’ was coined by US President Franklin D. Roosevelt and was first used in the ‘Declaration by United Nations’ of the First of January 1942, during the Second World War in which twenty six nations pledged their governments to continue fighting together against the Axis Powers. This was not strictly in line with the original humanitarian policies of the Red Cross but had a collaborative purpose against a common threat. The protective dynamic of this strategy and moment in history is unquestionable in the view of the author. Outcomes of visits to the Red Cross museums in Winchester and Geneva in 2001 are submitted in the qualitative section of the findings chapter 8.2

2.3.4 The International Peace Conference

In 1899 the International Peace Conference was held in The Hague. This set out to identify instruments for settling crises peacefully, preventing wars and codifying rules of warfare. This was a forerunner of the present United Nations but first of all adopted the Convention for the Pacific Settlement of International Disputes and established the Permanent Court of Arbitration which began its’ work in 1902. The immediate forerunner of the now established United Nations was the League of Nations established under the Treaty of Versailles in 1919 during the First World War. The strategy was to ‘promote international cooperation and to achieve peace and security’ The League of Nations ceased its activities after failing to prevent the second World War.

2.3.5 The United Nations Charter

The United Nations Charter was drawn up in 1945 when representatives from 50 countries met in San Francisco at the United Nations Conference on International Organisation. Various proposals were tabled including those worked out by the representatives of China, the Soviet Union, the United Kingdom and the United States at Dumbarton Oaks, United States in August-October 1944. The Charter was signed on 26th June 1945 by representatives of the 50 countries. Poland signed it later and became one of the original 51 Member States.
2.3.6 The United Nations

The United Nations officially came into existence on the 24\textsuperscript{th} October 1945 after ratification by China, France, the Soviet Union, the United Kingdom, the United States and by a majority of other signatories. This date has become known as United Nations Day and is celebrated annually on the 24\textsuperscript{th} of October. It also coincidentally happens to be the birthday of the researcher.

2.3.7 International aid

International aid is a vital part of disaster response and has grown out of the original principles laid down by both the Red Cross and the United Nations. Aid can be of materials including food and shelter requirements or of personnel skilled in emergency relief. Non-Government Organisations have proved an efficient conduit to channel aid to vulnerable countries and disaster zones. Research into the profile given to disaster mitigation and preparedness has been carried out by Twigg in 2000 for the Red Cross.

International aid can be bilateral where donations are given either directly from government to government or indirectly through NGOs or multilateral where donations are given through international bodies such and the European Union, World Bank and United Nations agencies. The agreed UN target for annual government spending on overseas aid is 0.7\% of the Gross Domestic Product (GDP) of the contributing countries. (Smith 2001). In reality according to Smith the global sum donated has rarely been more than half this figure and during the 1990’s fell to the lowest level ever.

The amount of money donated to disasters is only a fraction of the total aid budget. The proportion of bilateral aid spent on emergencies is normally less than 10 per cent (IFRCRCS, 1998). According to Smith (2001) in general, disaster aid from governments is declining in real terms both as a percentage of donor GDP and in comparison to direst overseas investment in trade and development policies. A point brought out in an extract on International Aid (Smith 2001) is worthy of note. It suggests that all disasters are first tackled at the local level and the pre-disaster establishment of competent local capacity ensures that international relief can be channelled through an effective partner. There has been more international aid given to disaster victims since the 1970’s through NGOs as
these are able to deliver aid to victims faster than government agencies (Smith 2001).

2.3.8 High Profile aid agencies

Other high profile aid agencies have developed some through religious bodies and some through charitable trusts. Some of these include the following with dates of establishment:

- UN Children’s Emergency Fund (UNICEF) 1946
- World Food Programme (WFP) 1963
- United Nations Disaster Relief Organisation (UNDRO) 1972 based in Geneva
- Office for the Coordination of Humanitarian Affairs (UNOCHA) 1998

2.3.9 United Nations Disaster Relief Organisation (UNDRO)

UNDRO original functions were:-

- relief coordination (mobilisation of emergency relief)
- disaster preparedness (raising the level of pre-disaster planning, especially in developing countries)
- disaster prevention (prediction and mitigation of natural disasters, including scientific and technological information)

UNDRO handles the technical and operational part of the UN disaster management from Geneva, coordinating with the various other departments committed to disaster relief and international aid.

2.3.10 The Department of Humanitarian Affairs (DHA)

The DHA was established to handle the political aspects of disaster relief where for instance there are complex situations affecting a country. The political leadership is managed from New York with the intention of facilitating a smooth transition from emergency relief to rehabilitation and development.
2.3.11 Office for the Coordination of Humanitarian Affairs (OCHA)

OCHA has taken over from the DHA but continues many of its functions including the coordination of the UN response to complex emergencies and natural disasters. Its international standing committee brings together all the main UN bodies involved including the Food Aid Organisation (FAO), International Organisation for Migration (IOM) and the International Committee of the Red Cross (ICRC).

Despite the foundations of the relief organisations and aid agencies being rooted in excellent intentions the political constraints and influences can impact upon disaster relief. Relationships between countries, according to Smith (2001), have an influence both on whether aid is offered by a given country or received by a disaster-affected country.

2.3.12 the NGO Circus

The NGOs have proved to be very efficient and specialised in the field of disaster relief. Twelve NGOs are members of the Disasters Emergency Committee which seeks to prioritise and coordinate the relevant NGOs attending a given disaster. Certain NGOs have particular expertise to offer in the acute stages or the rehabilitation phase after a natural disaster. Tearfund has operational expertise in disaster relief with rapid response capability. Oxfam has trained water engineers which are employed during the rehabilitation phase after a disaster for water supply and reconnection of mains water. Additionally they embark upon educational programmes related to sanitation and health. MSF and Merlin have powerful medical resources and Red R is an engineering NGO. All, if well coordinated, can offer a sizeable contribution to the relief effort. Problems can arise if there is poor coordination between each organisation and difficulties in communication with local relief agencies or civil defence services. The term NGO circus is used frequently within the literature and is a somewhat derisory term. It relates to the influx of an excess of NGOs possibly from different nations and somehow ‘competing’ for the limelight. Reference has been made to the NGO circus in the House of Lords with the quote ‘An NGO invasion must be avoided. Last week, 20 NGOs per day were trying to register in Pakistan. The arrival of the NGO circus is always a problem in a high-profile, well-funded emergency—when all agencies think that they must be seen to be
there. That invasion should be kept to a minimum. There are agencies with many years' experience in Afghanistan. In Britain, they include Oxfam—mentioned by the noble Lord, Lord Judd, Save the Children, Tear Fund and Christian Aid. Internationally, there is the International Committee of the Red Cross and the United Nations. Those organisations should be given the room for manoeuvre that they need' (Hever 2001). This quotation exemplifies the difficulties and if too many organisations are present in a disaster zone then the local resources including water and food can be diverted away from disaster victims. If NGOs are seen to be present in major world disasters then the profile and profits received by an individual organisation can be considerable. It could be stated somewhat cynically that disasters are good for business. Some NGOs will be operational within vulnerable countries and engaged on development issues and capacity building. These NGOs such as the Samaritan’s Purse and Compassion within El Salvador are ideally placed to commence work immediately in the event of a natural disaster.

2.3.12 Conclusions

From all the above documentation of the history and present dynamics of the relief organisations it is clear that the whole aid community is both vast and potentially disparate. From the early beginnings of disaster response to the present day situation there are grounds for much encouragement but also potential difficulties relating to the subject of rapid disaster response. The contribution of Henri Dunant in recognising the need for rapid response and emergency nursing care for victims of war stands as the beacon of light that catalysed the relief process. This is notable in considering the worth of an individual contribution in formulating new ideas and initiatives relative to disaster relief strategies. The foundation stones of the Non Government Organisations (NGOs) were also laid by Henri Dunant in establishing the Red Cross and subsequently the International Federation of Red Cross and Red Crescent Societies. Dunant was a respected businessman. People who have an executive position in society can carry responsibility for the needs of the less fortunate. Using a combination of organisational skills and compassion much excellent progress was made, changing the management of casualties be it in wartime or in natural disaster scenarios. Dunant used the network of businessmen to assist in the early days of his pioneering work. Money and network are still of vital importance in emergency relief efforts and in the developmental work performed in poorer countries by NGOs. Dunant had a global ambit. This is essential in
the management of natural disaster scenarios in which a shared responsibility regarding trained staff and available resources is highly relevant. He saw the need for effective wound management and capable caring individuals. This has ongoing relevance regarding nursing care at the scene of a disaster. This needs to be factored into the equation of all effective disaster management programmes. As organisations grow in strength and complexity the bureaucracy can increase. This can have a negative impact on rapid response strategies and potential lack of efficiency. The explosion of organisations contributing to the disaster relief process and the many United Nations humanitarian departments appear to be causing greater complexity and bureaucracy and the need for improved cooperation and coordination. This may represent a substantial resistance factor to rapid response. Leadership issues and command and control aspects become increasingly complex where there is proliferation of international aid agencies and relief organisations. The United Nations have a strong platform from which to operate but do not have the governance over individual NGOs. This makes for logistical problems at the site of a disaster and can cause complications and confusion regarding tasks and roles. This chapter has brought to light several interesting dynamics relevant to the subject of rapid response in disaster scenarios. This is the topic for the following chapter.
2.4 RAPID RESPONSE IN DISASTER SCENARIOS

2.4.0 Introduction

Rapid response to a natural disaster is the major issue encapsulated by this research work. An understanding of the dynamics of rapid response and the systems involved enables a critical appraisal of the obstacles or 'resistance factors' to rapid response. For this reason this particular chapter seeks to cover the subject of rapid response comprehensively, engaging with many aspects including search and rescue areas and information technology uses.

2.4.1 What is a response?

A response is an answer, reply, or a reaction to some perceived question or need (Thompson 1995). It has been stated that responses relating to disaster scenarios constitute reactions to damage (TFQCDM/WADEM 2002). The health disaster management guidelines expand this in stating that the reactions may be to the primary or secondary events and that the responses may be local, regional, national, or international and that they may be immediate or delayed. In addition the guidelines on health disaster management points to the direction of the responses and mentions search and rescue, relief, recovery and /or rehabilitation. It clearly states that responses that elevate the functional status of any basic societal functions (BSF) or its components beyond rehabilitation (return to pre-event status), are classified as development. This is a very helpful framework in which to conduct discussions and analyse responses. The guidelines seek to identify specific needs and to direct responses to clearly defined goals and objectives. They also mention the importance of the Disaster Critical Control Point (DCCP) as the time when available supplies balance all of the needs. The need for coordination and the importance of a control centre are given special mention in the guidelines of disaster management relating to responses, relief and recovery. The theoretical definitions and research-based academic approaches to disaster response are helpful in a measure but disasters present a chaotic set of circumstances that have overwhelmed the local resources and involve respondents from different locations, some of whom may not be able to communicate by virtue of language barriers and may have different expectations or organisational and equipment restraints. Coordination, control
and communication will continue to arise as fundamental issues relating to disaster response and as key factors in resistance factors to rapid response. The importance of needs assessment is brought out in the guidelines/health disaster management discussions as is the level of preparedness of the local community. It also states that the overall objective of disaster responses is to return the affected society to its pre-event status. There may of course be stability with appropriate relocation and reconnection of life lines and amenities but very rarely is the situation 'the same again'. The guidelines stress that poorly coordinated responses to disasters often lead to inappropriate and unwanted provision and also that the demands of a stricken community may not be congruous with the needs. This again highlights the importance of accurate needs assessment.

2.4.2 Global awareness

Response to the plight of victims of natural disasters has altered significantly with increased global awareness and media coverage together with improved methods and equipment and means of transportation available. Disaster response must if it is to be efficient have a proper scientific base and technical underpinning. Fundamental changes are now taking place in worldwide disaster management (Gunn 2005). The issue of use of military assets and re-cycling of equipment from war-time to peace-time advantage is documented. Additionally the changes in attitude from emergency relief to planned contingency and budgeting is notable. The medical profession have to awaken to the increasing threats from natural hazards regarding mass casualty scenarios plus the ever-increasing threat from anthropogenic tragedy.
Table 2.4.1 Changes taking place in worldwide disaster management

<table>
<thead>
<tr>
<th>Change</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major emergencies and disasters are no more considered fatalistic phenomena, but rather as foreseeable events that can be prevented;</td>
<td></td>
</tr>
<tr>
<td>Those who provide assistance now look upon it not as a gesture of sympathy, but as a duty based on mutual aid;</td>
<td></td>
</tr>
<tr>
<td>Disaster aid is being seen not as an ad hoc, emergency repair episode but as an essential factor in long-term development;</td>
<td></td>
</tr>
<tr>
<td>The world community now perceives emergency relief not as a magnanimous contribution but as a humanitarian obligation;</td>
<td></td>
</tr>
<tr>
<td>Armed forces are being 're-cycled' from traditional combat duties to peace-keeping and peace-making functions'</td>
<td></td>
</tr>
<tr>
<td>The medical community, which had long felt the strength of the human factor, is already calling disaster medicine, 'peace medicine'.</td>
<td></td>
</tr>
</tbody>
</table>

Table indicating the changes occurring in approaches to disaster management including alteration of perception and strategies from different communities (after Gunn 20:89 2005)

Gunn (2005) has made some very interesting and somewhat controversial points but worthy of consideration. Many of his statements relate to an altered perception and mind set over the occurrence of natural disasters. The dynamic of 'charity' verses 'responsibility' is a very insightful equation. His observations regarding the use of the military is interesting and shared assets seem highly appropriate. The National Audit Office stated that there was a potential crisis because so many troops were deployed in operations overseas (Harding 2005). The United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) has a department dedicated to cooperation and use of military assets. The researcher has spent time with the staff of this particular department. Gunn's point regarding 'emergency repair' versus 'long-term development' is highly relevant and especially to the dimension of rapid response strategies. Development work from either government investment or NGO involvement strengthens infrastructure and increases the resilience of the local population. This enables a vulnerable community to be better equipped to withstand the challenge of a natural disaster. Additionally with improved infrastructure a vulnerable country is better able to receive effective aid if NGOs are already working within that country. Staff members in such organizations are familiar with the language, safe buildings, and possible evacuation and access routes and may well have relationships with local civil defence organizations and local medical services. It may be considered that this is the direction in which effective progress needs
to be made regarding targeted aid for future disaster scenarios. This concept will be expanded in the discussion section.

2.4.3 The United Nations Security Council Resolution

The United Nations Security Council resolution 688 (5.4.91) gives the International community the ‘right to intervene’ (le droit d'ingerence). This is an important issue regarding rapid response with both positive and negative aspects. The rapid influx of many Non-Government Organisations (NGOs) without invitation can lead to pressure on available resources and limitation of valuable water supply and food. This has been coined the ‘NGO circus’. This is somewhat unfounded as many NGOs and particularly the British contingent have discussion and collaboration prior to rapid access to a disaster zone. Some NGO’s may choose not to engage in a disaster as others are more skilled in the specific areas of expertise that befit the individual disaster damage and loss.

2.4.4 Disaster mitigation and preparedness (DMP), rapid response and first responders

DMP impacts on both development efforts and those of emergency relief organisations. Some NGOs now have DMP on the strategy agenda but not high up regarding their mission statement (Twigg et al 2000). Anticipation of potential hazardous scenarios by both local communities and NGOs working in vulnerable countries can enable response to be more rapid and appropriate. It could be said that resistance factors to rapid response are inversely proportional to the investment on DMP. A key area in the broad picture of response relates to education and awareness of individuals and communities to potential disasters, together with DMP strategies. According to Hart (2004) within the first 72 hours of a disaster 98% of the victims saved alive are rescued by family members or local responders. This gives substantiation to the need for capacity building and DMP strategies in vulnerable locations to improve the education and capability within the local communities. The local population at any disaster site provides the immediate search and rescue (SAR) response. Sadly in disasters involving large numbers of victims trapped in collapsed structures, the local responses lack the technical equipment and expertise to facilitate extrication (Abolghasemi 2006).
2.4.5 Pro-activity regarding response and the International Decade for Natural Disaster Reduction (IDNDR)

The climate of pro-activity, rather than purely emergency response after a disaster has happened, has been developing steadily and this has in a large measure been influenced by the operation of the International Decade for Natural Disaster Reduction (IDNDR) which occurred in the 1990’s and the momentum of which continues in various organisations. A separate section is devoted to the IDNDR.

2.4.6 Emergency Needs Assessment and Rapid Response.

In response to a natural disaster a risk assessment needs to be undertaken regarding the impact and implications for the population affected. Emergency needs assessment and risk assessment for both victims and aid workers is a very important issue. A risk assessment for humanitarian emergencies should include the following according to Seaman (2005):

*What health effects is the given shock likely to have on the population?*

*What were the conditions before the emergency?* This may cover adequacy of health services, immunisation coverage, nutritional status, etc

*What is the local capacity to respond to the needs?*

*How quickly will those needs arise and relief will be required?*

Seaman (2005) is correct in his observations but in actuality the situation in a disaster zone changes day by day. Emergency needs assessment is a vital part of disaster management and response and this is given further attention with input from the World Health Organisation who have specific expertise in this area.

2.4.7 International Response

Responses to disasters primarily are the responsibility of local, regional and national authorities (Lechat 1993). International aid may however be required in a scenario where
the disaster overwhelms the capacity of the affected country to deal with the crisis (Abolghasemi 2006). This is triggered by the declaration of a state of national emergency and invitation for assistance to neighbouring countries or more distant countries with specific expertise and resources in the field required. International aid includes the United Nations organisations including rapid response and the use of the on site operation coordination centre (OSOCC). The OSOCC has the purpose of assisting the local authorities of the affected country with the management of the disaster, in particular the coordination of international Search and Rescue teams (SAR). The OSOCC can be established by the first international SAR teams arriving in the affected country in cooperation with national authorities, or by resources mobilised by the International Search and Rescue Advisory Group (INSARAG) Secretariat in the office for coordination of humanitarian affairs (OCHA) in Geneva and the United Nations Disaster Assessment and Coordination team (UNDAC). The OSOCC will assess the need for and use of international resources, and provide support to the affected country in managing operations and logistical support for international SAR teams and registering their operational capabilities (OCHA 2006). The United Nations forms the backbone of international response and the commitment of the many departments within the office for coordination of humanitarian affairs (UNOCHA) can be regarded as the 'big player' or professionals. Other international organisations assisting in disaster scenarios include non-government organisations (NGOs) one of which is the well known longstanding International Federation of Red Cross and Red Crescent Societies (IFRCRC).

Some NGOs have rapid response capacity including Tearfund and are part of a rapid response network under the umbrella of the Disasters Emergency Committee (DEC 2006). International medical aid may be required not only to assist with the immediate emergency but also to maintain the existing health facilities for unrelated conditions (Redmond 2005). This is a true statement as many of the disasters occur in lesser developed countries (LDCs) and the medical infrastructure is easily overwhelmed. This has been observed in El Salvador in the earthquakes of 2001. Additionally the timing of the declaration of a state of national emergency is also a critical factor relating to rapid response of other countries and their emergency relief teams. Lessons have been learned from the state of emergency in India's Gujarat earthquake disaster and that of the more recent Katrina hurricane disaster in 2005 in New Orleans. Requesting assistance has been considered humiliating by some recipient countries (UNOCHA 2001). In the Great
Hanshin –Awaji earthquake in Japan in 1995 nine countries including England offered medical assistance but the Japanese government did not accept them on the grounds that the teams were unlicensed to practice medicine in Japan (Kunii 1995). Other reasons given were potential language problems and lack of accommodation.

International Rapid Response teams exist which call upon volunteers at short notice who are on a register and able to give short term commitment. Organisations in the United Kingdom include Red R, which was instigated by a group of engineers providing rapid response to disaster sites (Red R 2006). The members receive training and education and are maintained at a state of readiness and competence. The teams have been operational for many years and have a proven track record providing both engineering assistance and medical care. Other countries including the United States of America have similar volunteer organisations with interactive web facilities such as the medical international rapid response organisation (MIRR). The teams seek to provide emergency medical and surgical assistance to people in distress anywhere in the world irrespective of nationality, race, religion or economic state. They seek to organize and deploy a rapid response medical/surgical team for short term assistance in disaster zones. (Gelland 2000)

2.4.8 Transport and rapid response

Transportation is a vital part of disaster response and may include aircraft, helicopters, ships including air-craft carriers, inflatable rescue craft, ambulances, four wheel drive vehicles and makeshift stretchers. Problems can be encountered on many levels related to transportation and from a recent article relating to the S.E.Asia disaster (Foster 2005) it was reported that 25 four wheel drive vehicles were held up at customs in Sri Lanka for one month, only being released after the payment of £500,000 in import duty. Transport issues can be many and varied and can include problems with customs and border control as mentioned, together with fuel problems or maintenance issues. Whichever mode of transport is employed it needs to be suitable for the needs within any particular disaster zone.

2.4.9 Rapid Needs Assessment (RNA) in disaster response

Rapid Needs Assessment (RNA) is a vital aspect of disaster response. It needs to take into
consideration the existing capacity of primary and secondary health care systems in disaster areas. According to Hoffmann (2003) it should not only consider the death toll, wounded and damage to infrastructure including roads, bridges, water, sanitation, gas and electricity but also have access to data on present capacity and resilience of health service within a vulnerable country. This has relevance for pre disaster vulnerability needs assessment and also in the early post disaster phase. In the earthquake in Mexico in 1993 many hospitals were damaged or collapsed. Many doctors did not know where to go or what to do in the acute situation. This constitutes a very definite resistance factor to rapid response (RF.RR). Data required for an accurate needs assessment includes data on the numbers of doctors and nurses, number of clinics and emergency beds, number of functioning hospitals and Intensive Care Units (ICU) etc. If information is available regarding these capacities then decisions as to whether to send field hospitals are made easier. Further data could be compiled on the ratios of victim to the various health professionals.

Nelson (2003) states that a multi-modal assessment using integrated quantitative (numbers of doctors, surgeons, nurses, blood ratio, antibiotic ratio etc.) and qualitative methodologies may offer a more robust alternative to the use of standard surveys (Knowledge, Attitude Practices KAP studies) or use of anecdotal information, for the purpose of identifying priorities in health – system reconstruction in the post conflict and post disaster settings. This is a plausible argument and in an ideal situation would be feasible. However in the heat of the moment and where there has been only limited data available then comprehensive needs assessments will not have been undertaken. It could be stated that rapid needs assessment should be undertaken by specialist teams with maximal information available and with maximal communication with specialized command and control centre.

The importance of needs assessment has been documented thoroughly. Redmond (2005) states that for aid to be effective it needs to be targeted and rapid needs assessment needs to be undertaken by trained individuals acting on behalf of international agencies. It was also stated that that any needs assessment needs to be done in direct consultation with local authorities and that the resuscitation of a population is similar to the resuscitation of a wounded individual with needs assessment all important for the primary survey. It is also pointed out that time can be wasted if too many surveys are undertaken with
duplication of effort. Collaboration and communication between agencies can minimise this dilemma together with consultation of existing reports and web searches. Redmond (2005) also refers to the needs assessment being made in the context of local resources and the local economy. This facilitates an appropriate response and enables the use of the correct quantities and quality of aid provision. In this way planning takes in the possible complication of causing dependency and perhaps lengthening rather than shortening the recovery time for a community affected by a disaster.

Recommendations for the assessment team include the following:

- The team must be self sufficient in food, water, shelter, medical supplies, transport and communication.
- A practical team size is often two to six people, splitting into teams of two once in the country.
- While one assessor does the talking, a companion listens, observes, and takes notes to avoid missing important information or misinterpretation.

Having made an initial assessment prioritisation of needs is the next logical step being measured against the scale of the disaster. Redmond (2005) states that the number of survivors is possibly more important than the number of deaths incurred. Prioritisation of the needs includes drinking water, sanitation, food, shelter, medical needs, and international search and rescue teams. Disaster severity scoring is undertaken in some organisations on mortality parameters.

2.4.10 Communication and rapid response

Communication is a vital issue in rapid response according to Bradt (2002). Rapid response strategies need to be dependent on good communication of factual details both early on in a disaster and at regular intervals, especially during the first two weeks when the rate of change is great. Information can be gathered from many sources and there is scope for a disaster 'nerve centre' situated both in vulnerable countries and also one large global centre. Information coming in to such a centre could be from many sources. Such information highways include data coming from remote sources such as seismology centres, satellite and radar tracking. Information may be received from local sources including land line telephone information or mobile phone communication. National or
local radio and television may provide vital communication during the acute stages of a
natural disaster. IT usage through the World Wide Web is in its ascendancy in disaster management. Other sources of information can include local NGOs and civil defence organizations. Additionally emergency response medical teams and rapid response organizations such as search and rescue teams (SAR) may provide vital timely information. Air reconnaissance from military and civilian sources can assist in providing information relating to disaster events as can utilities and life lines organizations.

If information is frequent, accurate and adequately processed vital assistance can be transmitted to emergency teams and hazard management organizations enabling appropriate and effective response. Communication as an entity features highly in the overall picture of disaster management.

Sharing of data is vital between health professionals and relief agencies. It is encouraging to know that this occurs thereby improving the efficiency of assessment of field conditions, prioritizing of interventions and coordinating relief activities. In the early stages of a disaster the United Nations spends time on this precise aspect of disaster management developing consensus on data gathering instruments. Relief agencies are using minimal essential data sets (MEDS) to enable some form of standardisation in this area. The dilemma of REA according to Bradt (2002) is whether an initial assessment should be site- specific or lifelines- inclusive which takes into account the sustainability of a situation. There is a trade off of giving information as quickly as possible versus the possible outcomes related to life lines and sustainability. This does highlight the need for ongoing data communication as the disaster unfolds. Most agencies will go for site specific data first and then look subsequently at the sustainability issues as resources become available and more facts are to hand.

2.4.11 Information technology and disaster response

The literature contains various reports on the use of Information Technology (IT) in rapid response strategies. Arnold (2004) has performed a literature review on this specific subject. According to Stephenson (1997) and from details obtained from the National Research Council in 1999 the application of its use has been somewhat limited in the emergency phase of a disaster. The advances in technology are advancing rapidly.
however and it is hoped that the emergency relief organisations, including search and rescue teams and NGOs, will have access to highly sophisticated equipment for communication and information use in future disasters. Arnold (2004) sites possibilities for the emergency phase which no doubt will increase in their usefulness and momentum as efficiency improves, including battery life, smaller components and portability. It was reported in the media on 30.3.05 how a worker in the BBC was able to communicate by text message to reassure his brother in Sri Lanka that a tsunami was not imminent after a second major earthquake in the Indian Ocean on 28.3.05. This raises many possibilities using communication utilising satellite communication systems. The challenges posed by IT, according to Arnold (2004), exist on several levels including human challenges, application challenges, communication challenges and security challenges. He points out that on the human level the equipment and system needs to be user friendly and the user must be familiar with the device and its application and limitations. It should also be compatible with existing systems. The information transmitted should be in a form that is understood and meaningful to various agencies operating within a disaster zone. From the application challenge mention is made of whether the system should be text/audio/visual in the message routing process. Localising and directional systems may also prove of value regarding direction of emergency relief to the ‘target’ zone.

Information sharing systems include database systems, needs assessment application, messaging systems, information retrieval systems, localisation and directional systems including Global Positioning Systems (GPS). Geographical information systems (GIS) enables mapping of specific data sets to geographic coordinates and is highly significant in hazard modelling and disaster mitigation and preparedness (Kozuch 2001).

According to Arnold (2004) one of the best known applications of IT during the emergency phase of disasters is the Supply Management System (SUMS). This is a computerized information management tool created by the Pan-American Health Organization that helps national authorities track donated supplies in disasters until they are effectively distributed to the affected population.

The internet has been cited as a potential backbone for information-sharing during the emergency phase of disasters (Hamilton 2003) (Lawry 2002).
Personal Digital Assistants (PDAs) are likely to have a big impact on emergency disaster management situations and are already being used in a variety of situations including data collection, emergency medical service and public health activities (Chandrasekhar 2001). Databases concerning the location of toxic chemicals can be stored on PDAs.

Wireless technology has improved and is becoming more relevant to disaster management scenarios. This is because of increasing band widths for transmission, better equipment efficiency and miniaturisation, longer battery cell life and decreased cost. Wireless peer networks are of use in disaster zones particularly in the acute emergency phase.

Arnold (2004) concludes that IT is likely to have an increasingly important role in information sharing in out of hospital disaster response and that wireless peer networks provide a promising solution to many of the technical challenges of using IT for information sharing in this area.

IT can be used to assess the impact of a disaster on health care provision. This can be achieved using computerized simulation models or using real time data from a disaster zone. A potential disaster sequence can be run at a desk top level and implications for a community studied. The Institute for Geological and Nuclear Science in New Zealand (IGNS) has done much work on providing tools where GIS is used onto which is superimposed multi-spatial data. From this a hazard scenario can be run whereby the impact of a seismic event, be it earthquake or volcanic eruption, on a local community can be gauged with a high degree of precision. For instance the number of burns victims from knowledge of the building materials and the estimated combustibles within each dwelling can be undertaken. This then has a direct implication on the health provision and the number of burns beds needed in a disaster and also the number of burns specialists. (Kozuch 2001)

In a different scenario high technology input has been used gauging the effects of an earthquake on a health care system of Vrancea in Romania. (Steiner 2003). The event was an earthquake of magnitude 7.2 R. where seismic wave duration of 10-15 minutes affected the local population.
Various parameters were used to feed data into a computer system thereby gauging the number of casualties and the medical capacity required to meet the emergency response. The three parameters used included magnitude of quake, duration of seismic wave and moment of appearance of the quake (time). The data was inserted into the computer programme Epilnto 6.03 and EpiMap 2. Using a proper calculation algorithm it was possible to predict the medical capacity needed during similar earthquakes in the light of the expected number of casualties. This could be regarded as an important milestone in gauging the level of resource needed in any given disaster scenario and matching the impact caused by an extreme hazardous event to practical strategies and logistical requirements for any particular disaster response.

2.4.12 United Nations Rapid Response Base

The United Nations Rapid Response Base was opened in Brindisi, Italy in 2001. It is otherwise known as the United Nations Humanitarian Response Depot (UNHRD), and serves as an emergency logistics base and storage site for equipment to be made available at short notice for natural disasters. The base is managed by the World Food Programme (WFP) but represents other UN organisations including UNOCHA and the World Health Organisation (WHO). The depot in Brindisi was reported to be the first of its kind (Bertini C 2001). The Italian government donated 4 million euros to the depot to assist in the inauguration. The supplies held at the base include communication equipment, emergency medical items and emergency trucks. Additionally shelter material and blankets, cooking facilities and water sanitation equipment are stored within the base for emergency use. Personal safety equipment for relief workers is also supplied.

The United Nations General Secretary Mr Kofi Annan commissioned the World Food Programme (WFP) to manage the depot because of its long and proven track record in distribution of resources globally over the previous 35 years and its shipping thousands of tons of food and equipment around the world each year. In the run up to the official opening in 2001 several emergency airlifts had already been undertaken to locations around the world including El Salvador, Mozambique, Eritrea, India, Kosovo, Ethiopia and Guinea.

The objective of the depot is to airlift supplies within twenty four hours of a crisis. This is
clearly an excellent strategy and being managed on highly professional lines.

The United Nations has given an excellent lead regarding the identification of assets and having access to stockpiles of emergency equipment. NGO’s including the British Red Cross also has similar access to emergency shelter and food/water supplies. The levels of resources and monitoring of expiry dates of supplies is an ongoing process and good communication and high levels of competent staffing of these locations is important. Disaster training and desk-top rehearsal scenarios are equally of vital assistance relating to rapid and effective response of the emergency services including the transportation of equipment and resources from one location to a distant location. Equipment and trained staff go hand in hand. Trained staff need to be au fait with the equipment that they are using or distributing. Deployment of emergency field hospitals is a vital dynamic in large disaster areas such as that seen in S.E.Asia. NGO’s such as Medecin Sans Frontier’s (MSF) is used to this process as are other specific countries. Personnel and equipment go hand in hand.

2.4.13 Military Assets in disaster response

Military assets and resources have traditionally been recruited in disaster response. In general military budgets have been shrinking leading to smaller units having to cover larger areas. Since the end of the cold war military resources have to rise to the challenge of multi-threat and uncertainty. NATO now does out of area operations under the title of NATO response force (Van Hoof 2003). So in general military forces will be smaller and more rapid in their response to face the current threats which may include chemical and biological warfare. There is a great necessity for cooperation with the military and for possible use of military assets in disaster scenarios. Where the local civil defence and rescue services are overwhelmed the military resources are often called upon by the government for dealing with the crisis event. In addition the employment of military assets from other countries can also be a vital link in disaster management. One United Nations department is devoted to monitoring and brokering of the use of military assets. Regular communication between the department and potential donor countries is in operation. Assets of benefit in natural disasters include heavy lifting gear, earth-moving plant, helicopter air reconnaissance, rapid deployment of field hospitals and personnel. Appropriate equipment and trained staff are the key to good disaster asset and the military
have had the covering of disaster situations as part of their brief for many years. With decreasing military budgets and the changes in structures within individual countries the effect on the dynamics over natural and other disasters has changed. Many armies are now smaller and have to cover larger areas. According to Van Hoof (2003) since the cold war armies have to deal with a wider ambit and also operate within a field of 'uncertain threat'. Civilian and Military Cooperation (CIMIC) is a new name for a 150 year old process according to Sundnes (2003). He points out that the military are the only organisation that has a complete system capable of managing a disaster. He also states that the use of military assets in disaster scenarios has trust implications and that the military disasters caused far outweigh the ones that they have prevented or assisted in. According to Sundnes CIMIC could be described as a new institutionalised approach to developing a permanent strategic and tactical system that will facilitate provision of joint functions in scenarios involving both civilian agencies (local and voluntary organisations) and the armed forces. Apparently NATO and the UN have different definitions of CIMIC. This gives rise to conflicting ideas over regulations and civilian and military cooperation. Sundnes thinks that these threats and weaknesses need to be ironed out. Difficulties with rapid response, whether using military assets and personnel or emergency relief agencies, are many and varied. A significant problem is the identification of victims and establishing a cause of death in mass casualty scenarios (Knusdsen 2002). Animals are still used for surveillance, detection of chemical and biological agents and for the collection of diagnostic/forensic evidence (Cottrell 2003). Sniffer dogs have been used very effectively within the search and rescue services for location of entrapped victims after earthquakes.

2.4.14 Rapid Response and Search and Rescue (SAR)

Many countries have search and rescue capability including local civil defence services, coast guard and fire and rescue services. Some have specialist training in retrieval in earthquake scenarios including the British Red Cross service. Switzerland, Mexico, Israel and the United States of America also have considerable expertise. The United Nations keeps a register of international search and rescue teams and these have been approached with regard to completion of the research questionnaire. The success of the efforts of these teams depends on the speed that they can reach a disaster zone together with the level of their training and expertise and available equipment. Much of the search and
rescue occurs at a local level within the first few hours after a disaster.

2.4.15 The Golden Hour

In emergency medicine the golden hour is defined as the first sixty minutes after the occurrence of major multi-system trauma (Wikipedia 2003a). It is widely believed that the victim's chances of survival are greatest if he or she receives definitive care in the operating room within the first hour. It was the late Dr R. Adams Cowley (1917-1991), a military surgeon to be credited with coining the phrase golden hour. His vision was as follows: “every critically ill or injured persons had the right to the best medical care, according to the state of the art and not according to location, severity of injury or ability to pay”. It was approximately 1960 that the theory gradually emerged based on the importance of speed as well as skill in operating procedures. Adams Cowley (circa 1960) stated “There is a golden hour between life and death. If you are critically injured you have less than 60 minutes to survive. You might not die then: it may be three days or two weeks later but something has happened in your body that is irreparable”.

It has however very little evidence base according to Lerner (2001). He states that the golden hour remains a useful tool in teaching providers the importance of minimising scene times and rapid transport but that recent studies throw the concept into question. The studies did show a weak correlation between time into surgery and mortality from trauma. Bledsoe (2002) states that there is no ‘magical time’ or evidence to suggest that the Golden Hour is anything but a myth.

An appraisal of the responses of search and rescue (SAR) teams over a period of two decades has been undertaken (Ashkenazi 2005). Within this study the importance of a practical model for the treatment of casualties buried alive under rubble is given special emphasis. The advanced trauma life support protocol (ATLS) was brought into being as it is the standard taught in many countries. SAR teams are confronted with responding to victims who are trapped in confined spaces. This poses problems for both the casualty and the SAR team’s intervention. Most of the severely injured in earthquake scenarios are trapped under rubble. The teams are trained in their responses to suspect crush syndrome in the victims unless proved otherwise. SAR teams have found consistently that the death rates are much higher in trapped as compared to non-trapped victims in earthquakes (Noji
1993). In addition the mortality is related to the duration of the entrapment period.

The overall survival rates from the responses by SAR to the Kobi earthquake in Japan were 40% (Tanaka 1996). According to Ashkenazi (2005) it would appear that a significant proportion of mortality could be prevented by implementation of early and appropriate medical response at the disaster site. This is a highly significant statement and goes against the whole principle of ‘scoop and run’. In earthquake scenarios the local health resources may well be compromised and to throw a victim into the back of an ambulance with the intention or supposition that medical assistance will automatically follow is misguided. Pre-hospital and disaster medicine has come about precisely for these case scenarios.

Studies of SAR findings over a period from 1980 to 1995 in countries including Southern Italy (1980), Armenia (1988), Costa Rica (1991), Turkey (1992) and Japan (1995) show up to 20% of deaths occur after extrication (Safar 1986). According to Pretto (1994) 13-14% of deaths could possibly have been prevented by early implementation of medical/surgical intervention from airway control, limiting blood loss, treating crush injury and prevention of hypothermia.

2.4.16 Early Warning Systems and Rapid Response

Early warning systems and local education within countries prone to natural hazards are key elements in rapid response. Plans are now afoot for improvement in these early warning systems by closer collaboration and communication between the scientific communities and countries vulnerable to natural hazards (King 2006). This has been undertaken by a panel backed by both the Natural Hazard Working Group in the United Kingdom and also by the Government and its chief scientist Sir David King. The panel is working to reduce the impact of natural hazards, including tsunamis, asteroid impacts and earthquakes. The working group has criticised the United Nations for duplication of effort and recommends setting up the panel for less than £1 million a year. This criticism appeared in a report entitled ‘the Role of Science in Physical Natural Hazard Assessments’ (Rincon 2005). The group was established by Sir David, who was asked to look for gaps in the existing international system. He reported that it had been known that a tsunami was likely but there had been no obvious communication channels to give
governments authoritative warnings. The Natural Hazards Working Group (NHWG) recommended that the existing early warning system operated by the World Meteorological Organisation be expanded beyond its present emphasis on weather to include other natural hazards (Rincon 2005). There have been criticisms of early warning systems from organisations such as Action Aid (2005) which stated that a technology-driven early warning system, while politically attractive, would not offer poor people all the help they needed. According to Yates (2005) communities in poor countries simply are not in a position to make use of such a high-tech, science-led solutions.

2.4.17 Problems encountered in rapid response

This area is the main thrust of the research thesis for which little material is available within the literature. Some facts however emerge when particular disaster events have been documented and a critical appraisal undertaken with lessons learned demonstrated. In the earthquake in Iran on 26.12.2003 affecting the city of Bam despite sufficient amounts and types of resources provided by the international teams, the efficacy of international assistance was not supported as has been experienced in similar events in other countries (Abolghasemi 2006). The massive international response with early arrival and interventions still lacked coordination and delays were encountered. The speed of declaration of a national emergency is a key issue regarding rapid response. In the Bam disaster the event occurred at 03.42 hours and the declaration of a state of national emergency was launched at 15.30 hours. One interesting fact that emerged was that the SAR teams were not used optimally (UNOCHA 2003) due to their unfamiliarity with working in buildings constructed of mud as opposed to concrete. Coordination is an area of particular difficulty when such a massive influx of organisations occurs. Within the Bam response 34 urban search and rescue teams (USAR) were present. Within three days 1,600 international rescue workers were operational within the disaster zone. Fourteen mobile field hospitals were employed with the first arriving on day three. Language problems were encountered by some mobile field hospital teams where a translator was not available. Language difficulties in disaster response regarding NGO involvement have been described (Ardie 2006). This is an important issue relating to rapid response. Nearly 40 international teams provided SAR services in Bam but only five of them arrived within the first 24 hours (UNOCHA 2003). Delays in this area lead to an inability to meet the immediate emergency needs caused by a disaster.
2.4.18 Conclusion

The subject of rapid response has been given comprehensive attention and evaluation through the available literature. The quest for an understanding of the systems and processes that contribute to rapid response strategies in natural disasters has been fulfilled. The subject material is potentially overwhelming but simplification is possible by relating the rapid response systems to the natural processes occurring in disasters. Key features have emerged namely early warning systems, preparation through disaster mitigation efforts; communication, particularly early needs assessment, and efficient movement of personnel and equipment via appropriate transport. The stratification of rapid response into the categories of local, regional, national and international enables the researcher to develop theories relevant to resistance factors to rapid response. Rapid responses are dependent on prior knowledge of factors relating to vulnerability. The IDNDR set out to examine ways in which losses could be mitigated and galvanised the world in regard to disaster mitigation and preparedness to which the next chapter is devoted.
LITERATURE REVIEW SECTION 2

2.5 THE INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION

2.5.0 Introduction

It is opportune that the present research has been undertaken at the end of the decade designated the International Decade for Natural Disaster Reduction (IDNDR) by the United Nations. The decade was devoted to increasing awareness of disaster mitigation and preparedness and bringing professionals working within disaster management and scientists together for meetings and discussions with sharing of information. The detail of the activities of the IDNDR are relevant to the topic of resistance factors to rapid response as cooperation between organisations and better understanding of disaster mitigation and preparedness strategies leads to improved response times to natural disasters.

2.5.1 The United Nations Resolution

The IDNDR took place during the 1990s. This was brought about through the United Nations General Assembly resolution in 1988 consequent on the escalating losses through the increasing frequency of natural disasters affecting the global community. The resolution was made with Mr Kofi Annan in the chair at the 42nd session of the United Nations General Assembly (UN resolution A/RES/42/169 1988)

The resolution stated: ‘The objective of the IDNDR is to reduce through concerted international action especially in developing countries, the loss of life, property damage and social and economic disruption caused by natural disasters such as earthquakes, windstorms, tsunamis, floods, landslides, volcanic eruptions, wildfires, grasshopper and locust infestation, drought and desertification and other calamities of natural origin’

2.5.2 International cooperation in disaster mitigation and preparedness

The United Nations called on all governments to formulate natural disaster mitigation programmes and to participate in concerted international action to reduce the effects of natural disasters. It also suggested the establishing of national committees in cooperation with relevant scientific and technological communities. It also encouraged the provision
of appropriate support from the public and private sectors taking measures to increase public awareness of damage risk potential and the value of preventative and mitigation measures. In December 1991 the United Nations General Assembly resolution 46/182 created the UN Department of Humanitarian Affairs to combat more effectively the major emergencies. The principle aim of the IDNDR was to capitalise on existing knowledge of ways whereby the impact of these natural events can be mitigated, and to foster the systematic transfer of this knowledge to those countries and communities recognisably most at risk.

2.5.3 History of the IDNDR

The IDNDR was instigated because of the alarming increase in natural disaster losses in the prior two decades which was cited as being of the order of 3 million dead, 800 million affected, $US 23 million. Between 1992 and 2001, just fewer than 5,000 natural disasters were reported in the world and just fewer than two million people were affected by disasters. During that period, 200 million people were affected by natural disasters on average each year (IFRCRCS data 2002). Progressively throughout that period there was a steady increase in the number of disasters from 368 in 1992 to 759 in 2000. These disasters resulted in the deaths of 622,363 persons, with more than half of the fatalities occurring in nations of low human development. It has been predicted that by year 2050 100,000 lives will be lost each year to natural disasters. The five main goals of the decade included the following:

1. To improve the capacity of each country to mitigate the effects of natural disasters expeditiously and effectively, paying special attention to assisting developing countries in the assessment of disaster damage potential and in the establishment of early-warning systems and disaster resistant structures when and where needed.

2. To devise appropriate guidelines and strategies for applying existing scientific and technical knowledge, taking into account the cultural and economic diversity among nations.

3. To foster scientific and engineering endeavours aimed at closing critical gaps in knowledge in order to reduce the loss of life and property.
4. To disseminate existing and new technical information related to measures for the assessment, prediction and mitigation of natural disasters.

5. To develop measures for the assessment, prediction, prevention and mitigation of natural disasters through programmes of technical assistance and technology transfer, demonstration projects, and education and training, tailored to specific disasters and locations, and to evaluate the effectiveness of those programmes. (Smith 2001). The alarming rise in the deaths and losses through natural disasters during the decade are illustrated below to give emphasis to the urgency that surrounded the decade regarding the instigation of disaster mitigation methods and preparedness strategies.

Table 2.5.1 Data from the Centre for Research on the Epidemiology of Disasters (CRED) for the period 1990 to 1999 the top 4 hazards

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Number of people killed (% total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind Storms</td>
<td>201,790 39% of total</td>
</tr>
<tr>
<td>Floods</td>
<td>103,870 20%</td>
</tr>
<tr>
<td>Earthquakes</td>
<td>98,678 19%</td>
</tr>
<tr>
<td>Epidemics</td>
<td>84,047 16%</td>
</tr>
<tr>
<td>Other</td>
<td>31,517 6%</td>
</tr>
</tbody>
</table>

Table illustrating the highest four hazardous events occurring during the 1990’s with numerical values on disaster casualties

2.5.4 Further Data from CRED

In the World Disaster Report new data from CRED (IFRCRCS 2001) suggested that the methodology for determining the statistics had changed. Drought is now attributed with
killing 42% of the total number of people killed compared to less than 1% in the previous years data. Statistics on drought have been linked directly with famine, as these statistics are easier to ascertain. Due to this approach epidemics no longer feature as a separate category. The results now indicate that the total number of people killed by each phenomenon is as follows; Drought/Famine 42%, Wind Storms 31%, Floods 15%, Earthquakes 9%, other 3%.

2.5.5 Activities of the Decade

Throughout the decade of the nineties meetings were held across the world on the vitally important subject data outlined above. Meetings, special days and working groups were instigated to achieve the level of cooperation and discussion. Sponsorship was sought to give financial backing to the initiatives. The United Kingdom National Coordination Committee was established in 1993 jointly sponsored by the Royal Academy of Engineering and the Royal Society and supported by the government through the overseas Development Administration, now Department for International Development (DFID). At that time a series of working groups were formed addressing a variety of natural hazards. Each of the groups had a representative on the United Kingdom committee whose role was to give profile and publicity concerning the issues of the IDNDR.

2.5.6 Working Groups in the United Kingdom

Several working groups were established in the United Kingdom to address different facets of the problem of increasing losses in natural disasters. Different professions and disciplines were brought together in these groups including medical personnel and social scientists, engineers, geoscientists and climatologists. Meetings were held on a regular basis to give opportunity for deepening links and understanding of roles between the participants. Discussions then took place with a broad base of knowledge on which to address the issues surrounding disaster mitigation and preparedness.
Table 2.5.2 Working Groups in the United Kingdom within the IDNDR

<table>
<thead>
<tr>
<th>Working Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Application and Implementation Working Group. This group provided a forum</td>
</tr>
<tr>
<td>for the exchange of ideas, to encourage practical action, to assist other</td>
</tr>
<tr>
<td>working groups, and to examine ways in which obstacles to implementing risk</td>
</tr>
<tr>
<td>reduction measures could be removed.</td>
</tr>
<tr>
<td>Drought Mitigation Working Group</td>
</tr>
<tr>
<td>Hazards forum</td>
</tr>
<tr>
<td>Medical and Social Sciences Working Group</td>
</tr>
<tr>
<td>Science, Technology and Engineering Committee</td>
</tr>
<tr>
<td>Society for Earthquake and Civil Engineering Dynamics</td>
</tr>
<tr>
<td>The Wind Engineering Society</td>
</tr>
</tbody>
</table>

Table illustrating the seven working groups devoting attention to the problem of DMP within the 1990’s within the United Kingdom (Twigg 2003)

The strategy was comprehensive and well thought through. Each year during the decade the second Wednesday in October was designated IDNDR Day with a special theme initiated by the IDNDR Geneva Secretariat. In 1999 the theme was 'providing a '1000 speakers in a 1000 schools' to publicise and promote the issues involving natural disasters. (United Nations fact sheets from www)

2.5.7 Opinions and criticisms

Informal discussions with people engaged on the committees gave varying responses to the usefulness of the meetings. Some felt that the decade and the meetings were a waste of time whereas others were more positive and emphasised the cooperation and profile given to the wider implications of the humanitarian response within natural disasters scenarios. One misgiving that became evident in these discussions was the lack of invitation and involvement of the respective NGOs engaged in disaster response, many of whom are engaged in development work in vulnerable countries. The question was posed to members of the World Association of Disaster and Emergency Medicine as to the effectiveness of the IDNDR in their estimation. The results are given in Chapter 8.1. In
the Discussion chapter the question of progress since the decade regarding disaster awareness, mitigation and preparedness will be dealt with more fully. History will be the judge as to the fruitfulness of the decade. Scope exists for further research into the effectiveness of the decade. This will also be dealt with in the discussion section of the research chapter 9.

Criticisms of the IDNDR were tabled at a mid term review (Bruce 1994) and included several issues including the following:

- The exploitation of scientific solutions employing hazard-mitigating technologies was capital intensive and out of range for lesser developed countries
- The social, economic and political aspects of hazards were possibly being neglected in favour of the scientific and technological approaches (Bates 1991)
- The omission of technological hazards from the IDNDR brief was regarded as an oversight
- The lack of integration of hazard reduction with the basic human needs of food, fuel, shelter and health provision in order to achieve sustainable development (Oaks 1990).

2.5.8.0 Extracts on important issues

Some extracts are presented on important issues regarding information and recommendations by the United Nations Secretary General towards the completion of the IDNDR (Annan 1999).

2.5.8.1 Major disasters within the decade

One article was prompted by two earthquakes in Greece and Turkey reminding the readers of the pressing challenges of our time. Annan (1999) pointed out the extraordinary increase in the number and extent of natural disasters and included statistics of the cost of weather-related disasters in 1998 which exceeded the costs of all such disasters during the 1980s. Tens of thousands of mostly poor people died during the year and tens of millions of people had been temporarily or permanently displaced. In the
Caribbean, hurricanes designated George and Mitch killed more than 13,000 people, with Mitch being the deadliest Atlantic storm in 200 years. A much less publicized cyclone in India in June caused damage comparable to Mitch and an estimated 10,000 deaths.

Annan (1999) reported how major floods hit India, Nepal, Bangladesh and much of East Asia, with thousands killed Two-thirds of Bangladesh was inundated for months, leaving millions homeless. More than 3,000 people died in China’s catastrophic Yangtze River flood, millions were displaced, and the financial cost was estimated at an astonishing $30 billion.

Fires ravaged tens of thousands of square kilometres of forest in Brazil, Indonesia and Siberia, with devastating consequences for human health and local economies. In Afghanistan earthquakes killed more than 9,000 people while the exact toll of the horrific seismic event was still unknown at the time of writing of the article.

2.5.8.2 Natural disaster a misnomer

Annan (1999) reported that human communities will always have to face natural hazards but the present day disasters were seen as owing as much to human activities as to the forces of nature. The misleading term of natural disaster was mentioned. Most disaster victims (90%) live in developing countries, where poverty and population pressures force growing numbers of people to live in harms way. This includes flood plains, earthquake-prone areas, unstable hillsides and unsafe buildings. The vulnerability of those living in risk-prone areas is perhaps the single most important cause of disaster casualties and damage according to the Annan (1999). It was also stated that unsound development and environmental practices exacerbate the problem. This included massive logging operations and destruction of wetlands thereby reducing the soils ability to absorb heavy rainfall making erosion and flooding more likely. The fact of global warming was also given attention and the potential link to the upsurge of weather-related natural disasters was laid at the feet of human activity and lack of responsibility. While the earth does have cycles of warming and cooling the 14 hottest years since records began in 1860 have occurred in the past two decades. 1998 was the hottest year on record at the time of writing of the article. Given that the pressures of poverty and population growth continue to increase, the disaster trend is likely to worsen if disaster prevention is not taken more
seriously. Annan (1999) made the statement that there were three times as many great natural disasters in the 1990s compared to the 1960s but that disaster costs increased nine fold during that time.

2.5.8.3 Early warning systems and conclusions for action for the global community

The staff of the United Nations IDNDR has continually stated that better prevention requires better early warning systems to enable vulnerable populations to have time to move out of harms way. It was also pointed out that more effective disaster response policies were required. Annan (1999) stated that effort should be concentrated at tackling the root causes of vulnerability. Conclusions regarding points for action for the global community included developmental issues with improved land use, and habitation policy must be informed by a thorough understanding of the scientific and technical requirements of prevention. Disaster reduction legislation was considered to be of crucial importance with effective and impartial enforcement. Additionally a need for global realization that it is poverty, not choice, that drives people to live in risk-prone areas. It was concluded that equitable and sustainable economic development is the best from of disaster insurance.

2.5.8.4 Grounds for optimism

Annan (1999) gave information regarding grounds for optimism in the late 1990s with radical improvement in wide area satellite surveillance revolutionizing disaster early warning and the internet providing the rapid dissemination of information and other warning data. This had a great implication for weather-related natural disasters. The success of a local disaster reduction pilot programme in a Honduran village in 1998 in the pathway of hurricane Mitch prevented any deaths, whereas in a neighbouring village 150 lives were lost where no such programme was in existence. In China reduction of deaths from flooding was thought to be due to extensive disaster control policies which had proved highly successful. In 1998 flooding caused the loss of 3,000 lives whereas in 1931 and 1954 the losses were 140,000 and 33,000 respectively. Prevention strategies saved tens of thousands of lives.
2.5.8.5 Local level investment and poor countries

Annan (1999) concluded with a statement regarding the many things that can be done at the local level with modest financial resources but that major risk reduction programmes required levels of funding that poor countries could not afford. International assistance is both critical and cost-effective in this respect. The final statement made the point that it is known what needs to be done but that we now need the political will to do it.

From the above article it is clear that there is ongoing global vulnerability which may get worse unless responsible measures are taken concerning the environment and particularly land use and the housing needs of the poor. It is the view of the author that there is a growing and pressing need to have efficient disaster response systems and that any resistance factors to rapid response, within those systems, should be identified and ironed out. It is a salutary lesson that many apposite statements, particularly concerning the need for early warning systems, were not implemented by the time of the S.E.Asia disaster of 26.12.04 over five years after Mr Annan made the statement. His reference to the need for political will was left unheeded.

2.5.9 Responses to the United Nations resolution

2.5.9.1 Rapid health assessments

In response to the United Nations resolution the World Health Organisation (WHO) analysed the implementation of rapid health assessments in disasters. The United Nations declaration called specifically for the development of measures for natural disaster assessment through programmes of technical assistance and technological transfer.

2.5.9.2 Rapid Epidemiological Assessment (REA)

REA was under way prior to the IDNDR but made steady progress and expanded during the decade. UNICEF made a substantial contribution to the concept of REA prior to the decade and by 1999 the WHO revised and reissued its own Rapid Health Assessment Protocols for Emergencies. Instruments for the assessment of disaster public health issues have emerged and these are intervention- specific. They are multi-purpose and applied to
assessment of disaster impact, refugees, displaced persons together with health facilities and entire health sectors.

Much work has been done and handbooks and protocols suggested. Rapid Epidemiological Assessment is vital as part of the total needs assessment in any given disaster. The IDNDR would appear to have made a substantial impact on this area.

2.5.10 The International Strategy for Disaster Reduction (ISDR)

This is an important strategy that has grown out of the IDNDR and seeks to continue the impetus of the decade (Ben 2001). The ISDR seeks to achieve this from its headquarters in Geneva by hosting meetings and supplying literature on disaster-related subjects and measures that have or could be taken to improve disaster mitigation and preparedness (DMP). The strategies advocated include small and large scale DMP measures for vulnerable countries and the international community at large. The supply of information is seen as a key area of keeping the profile of disaster mitigation on the drawing board. Within the ISDR is an inter-agency task force (IATF) which is an excellent initiative.

2.5.11 The Inter-Agency Task Force (IATF)

IATF has several main functions including serving the main forum within the United Nations for devising strategies and policies for the reduction of natural hazards. It also seeks to identify gaps in disaster reduction policies and programmes and recommends remedial action. It also tries to ensure complementary action by agencies involved in disaster reduction and provides guidance to the secretariat for ISDR. Additionally it convenes ad-hoc meetings of experts on issues related to disaster reduction.

Of particular interest and link to the high vulnerability example country of El Salvador used in this thesis, the ISDR has a Latin American Unit based in Costa Rica. The objectives of this unit include increasing public awareness on disaster risk and coping mechanisms enhancing the culture of disaster reduction. It also seeks to increase the level of access to disaster information with exchange and network between countries and organizations both community based and NGOs. It acts to reinforce the regional disaster information system initiated during the IDNDR and also the profile of the Costa Rica
Information Department (CRID). It also seeks to increase the capacity at national and local levels in the field of disaster relief by accessing knowledge and information sources and networks thereby encouraging educational links. Additionally it seeks to increase political awareness on the need for sustained disaster reduction and risk management policies. The Inter-Agency Task Force comprises 22 organisations in total, many of these are United Nations organisations and also regional entities and civil society and NGOs. The purpose of the IATF was essentially to have an inter-disciplinary forum for advancing disaster reduction and also having a commitment by all to the implementation of the ISDR strategy. The task force suggested priority areas including early warning, El Nino and La Nina phenomena and climate vulnerability assessment. Additionally a commitment to looking at eco-system management with land use planning, with particular regard to urban areas and mega-cities and secondary cities was discussed. Advocacy issues and capacity building in LDCs was also considered part of the ambit of the IATF. Other aspects of importance were included in the remit of this committee.

2.5.12 Conclusion

The International Decade for Disaster Reduction (IDNDR) devoted the 1990’s to strategies focussing on disaster related issues with particular reference to disaster mitigation and preparedness strategies. It achieved this by establishing global contacts and encouraging meetings and debate bringing the scientific communities together including the social scientists and other professional bodies engaged in disaster relief such as doctors, engineers, seismologists and climatologists. The literature that was generated by the IDNDR was extensive in volume and content and the researcher has deliberately limited the presentation within this thesis. The particular impetus given by the United Nations Director General Mr Koffi Annan was impressive. Criticisms were levelled at the initiatives undertaken during the decade but the reasons for engaging the various professions on the strategy were justified by the high increase in losses through world disasters. The three fold increase in great world disasters between the sixties and the nineties and the nine fold increase in losses over that time amply justify the need for beginning the process of concentrated efforts towards disaster reduction and preparedness strategies. The concept of Disaster Mitigation and Preparedness (DMP) seems to have been catalysed since the decade. The initiatives have continued in the form of the International Strategy for Disaster Reduction and the Inter Agency Task Force at the
United Nations. The merits of the IDNDR and the ISDR are discussed in Chapter 9. The following chapter looks more closely at DMP and seeks to examine other sources and implications for vulnerable communities and disaster victims.
2.6 DISASTER MITIGATION AND PREPAREDNESS (DMP)

2.6.0 Introduction

Much of the previous chapter is devoted to the dynamics and aspirations of disaster mitigation. Further aspects are now presented from other perspectives from the literature and from meetings at various global locations. This aspect of disaster anticipation and preparation is highly relevant to the subject of response strategies and speed of access to a disaster zone. Additionally, good preparation and planning leads to huge reductions in losses on the human and material scales. The International Decade for Natural Disaster Reduction was reportedly supposed to have 'galvanised' the concept of disaster mitigation and preparedness through meetings and cooperation between scientists and disaster relief agencies. The Disaster and Emergency Committee (DEC) has twelve NGOs devoted to disaster relief at the time of writing, many of which have specific involvement in DMP. From meetings around the world and discussions with emergency planning teams a synopsis of DMP measures is presented. The subject spans both development and emergency relief work and seeks to limit losses from natural disasters through several contingencies.

2.6.1 Factors relevant to Disaster Mitigation and Preparedness

DMP has risen to prominence both as a concept and operational imperative since the IDNDR. Prior to the decade preparation and security measures were in existence regarding vulnerability to natural hazards but not given focussed attention. Agendas and priorities change and develop and DMP as an issue has risen in prominence and is now on the specific agendas and mandates for several NGOs (Twigg 2001). He reports that many of the activities of NGOs are in effect related to disaster mitigation but many of these measures are not labelled DMP. Additionally the evidence of the demonstrable quality and benefits of DMP involvement is poor. According to Twigg (2001) although there is an early indication of momentum for change, there are a number of problems that need to be overcome before DMP can be satisfactorily mainstreamed into NGO development and post disaster rehabilitation programmes. It could be said that DMP needs to be an immovable pillar rather than a passing fad for it to bear fruit in protecting and saving the lives of vulnerable communities.
2.6.2 Relationship to Relief and Development strategies

Christoplos (2001) states that DMP falls between the cracks of the grander framework of development, cooperation and humanitarian assistance. It could be stated that DMP is not as sexy a topic as emergency disaster relief where the public's imagination is caught by gruesome imagery on television screens or in newspaper reports. Christoplos (2001) reinforces this view by stating that DMP neither has the allure of saving lives or the dimension of saving people from poverty. DMP in essence could be regarded as an umbrella that arches over development and relief work or could be seen as part of the relief/development continuum. According to Christoplos (2001) with the rising economic costs of disasters the emergency appeals and donor aid will only cover a fraction of those costs thereby leading to new approaches and institutional configurations. This then is the spur to change namely reduction of losses and costs by preparation and prevention. Other words that enter into the debate on relief/development discussions include security issues, risk assessment and risk management. Health and safety issues have grown in influence and permeation of government departments and working practices of the health sector and commercial enterprise. There is a strong legal implication to this with additional insurance ramifications. According to Christoplos (2001) dealing with risk and insecurity is a central part of how poor people maintain their livelihood and this has begun to position DMP on poverty alleviation agendas.

2.6.3 Positive steps to implement DMP at institutional level

In Latin America and the Caribbean high levels of natural, technological and complex disasters have led the region to move from ad hoc response to institutional preparedness (Poncelet 1996). The coordinators of the strategy sought to understand the basic principles and definitions under-girding institutional DMP. According to Poncelet (1996) a realisation was tabled that DMP does not just consist of a written disaster plan but is an ongoing process of coordination, planning, training and logistical elements. This is an enlightened view and history has proved that where a disaster plan is put in a file on the shelf ongoing security issues can be neglected as with the levees in New Orleans where a written disaster plan was in existence but the maintenance and prevention aspects had been neglected.
2.6.4 Major disasters transforming political agendas

Rocha (2001) describes how a major disaster can transform a political agenda. He describes how in the aftermath of hurricane Mitch in 1996 Nicaragua undertook the development of alternative models of cooperation with NGOs regarding DMP. Prior to the disaster alternative development models had overshadowed the need for risk management. The new strategies brought in institutional departments, NGOs and other players in disaster relief. The proposal was excellent but dependent on ongoing financial prioritisation and sustained political will. Christoplos (2001) states that this is a longstanding challenge to maintain the political will rather than it becoming a passing fad. Disaster amnesia can seep in as a RF.RR. Luna (2001) describes how in the Philippines there is a high vulnerability to disasters including natural, socio-economic, poverty and political. In this setting of high vulnerability and frequency of disasters the government cannot be lulled into a state of amnesia such as occurs with high intensity/low frequency disasters. Certain countries that have chronic hazard to contend with attempt to use DMP at local and government level. Large areas and weak resources lead to confusion and a sense of discouragement. In Bangladesh according to Matin (2001) NGOs have tried to make the government move from disaster response to DMP. The country is one of the most vulnerable countries in the world and suffers cyclones, floods and arsenic poisoning. The difficulties encountered according to Matin (2001) relate to neither the government nor NGOs having clearly defined roles.

2.6.5 DMP at the local level

DMP at the local level would appear to be infinitely more cost effective than major institutional programmes. Simpson (2000) presents arguments for the development of neighbourhood-based disaster preparedness organisations. The proposal is to establish medical triage centres as a treatment resource after a disaster. Again this is going to be dependent on political will and ongoing financial commitment and prioritisation. Simpson (2000) states that success of the strategy would depend on standardisation of training and coordinated drills between public safety organisations, hospitals and the voluntary sector. In the view of the researcher this strategy is plausible but could fall on the rocks of bureaucracy and finance together with un-sustained political will. Despite this a move to locally resourced DMP strategies and involvement of local defence services and
emergency care makes enormous sense. According to Luna (2001) collaboration at the local level occurs in the Philippines in which NGOs, relief organisations and local government all participate in decision making on DMP issues. Luna (2001) states that both relief and development organisation participate in this built in government strategy.

2.6.6 DMP and local education

Compared with the issue of stockpiling of emergency equipment local education is a vital and cost effective aspect of DMP. Messages can be conveyed to pupils and local communities through educational programmes whereby individuals and families can protect themselves from potential disaster when natural hazards strike. Wellington City Council in New Zealand and the government’s national education policy embraces the importance of DMP with the publication of documents and regular earthquake drills (WCC 2006). Additionally in the United States of America the National Association of State Boards of Education have addressed this (NASBE 2003) following the Prince William Alaska Sound earthquake in which many schools were damaged or destroyed. Measures were implemented regarding safety policies, school safety plans and checklists. Additionally vision statements on holistic descriptions of school safety embraced disaster preparation, mitigation and response. Children are most vulnerable to natural disasters (Noji 1993) and local education measures in hazard prone countries and locations could save thousands of lives. The quick thinking and knowledge of the natural phenomena preceding a tsunami enabled a British tourist to trigger the successful evacuation of a beach in the Indian Ocean. At the 100th anniversary of the San Francisco earthquake which revealed the existence of the San Andreas Fault the 1906 Centennial Alliance has overseen the publication of hundreds of thousands of preparedness pamphlets to educate the local population for the 62 per cent chance of a 6.7 magnitude earthquake hitting the Bay Area before 2032 (Elsworth 2006). It could be stated that this is a far better strategy regarding DMP to use a key date to educate and keep the vulnerability profile of the area in people’s minds rather than allowing a state of disaster amnesia. Other celebrations planned include a concert celebrating Carlos Santana and a firemens’s costume ball. It is the researcher’s view that local education regarding the vulnerability to disasters and the measures to be taken in the event of a natural hazard are key features in loss reduction and should be a mainstay of DMP.
2.6.7 DMP, Communication and Information Technology

De Grace (2001) presents a case for telehealth being a new initiative for DMP in which global links and networks could be established for communication and training issues regarding DMP. The researcher has presented information regarding the use of information technology (2.4.12) including data systems and the use of telemedicine. De Grace (2001) discusses how research into the development of the telehealth modality is now opportune and that all major players in disaster management could be involved. He points out that data collation on disaster related issues could be shared using telehealth networks and that standards and protocols could be formulated including needs assessments for multidisciplinary teams. De Grace (2001) makes a very important statement in suggesting the more sophisticated use of the media in disaster management. It could be stated that television as an instrument for DMP is sadly under-used and under-valued. Television networks could be utilised to educate vulnerable countries and communities regarding measures to be taken in the event of an emergency including available safe buildings and potential use of evacuation routes. It is the opinion of the researcher that immense progress could be made for DMP if a global communication network is established which harnesses the use of IT and telehealth.

2.6.8 DMP meetings and outcomes with distillate of literature searches

It has been stated that the literature regarding the IDNDR was extensive in its ambit and volume. Equally the topic of Disaster Mitigation and Preparedness is overwhelming. A distillate of the literature and many meetings with members of the disasters community is presented.

Table 2.6.1 Factors relevant to Disaster Mitigation and Preparedness

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<tr>
<td>1</td>
<td>Early warning systems- perhaps the highest priority. Cooperation between seismologists regarding potential tsunami and communication systems operational between coastguard stations and seismology/meteorology stations</td>
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<td>2</td>
<td>Safe buildings and safe location</td>
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<td>3</td>
<td>Sound resilience of the local population</td>
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<th>Factors relevant to disaster mitigation and preparedness (cont'd)</th>
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<td>4 Good civil defence capacity in vulnerable areas/countries</td>
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<td>5 Engagement of life lines organisations and utilities in disaster management</td>
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<td>6 Local education regarding safe places and measures to be taken in the event of a hazardous event. Disaster drills and awareness of evacuation routes. Awareness of local hazard and risk.</td>
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<td>7 Reciprocal arrangements between cities regarding command and control in the event of disaster</td>
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<td>8 Early needs assessment regarding hospitals in vulnerable locations and contingency plans in the event of compromise</td>
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<td>9 Cooperation between community based organisations and NGOs in vulnerable countries</td>
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<td>10 International partnerships in place regarding emergency relief aid</td>
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<td>11 Training of doctors in disaster medicine</td>
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<td>12 Knowledge of access arrangements for heavy lifting gear and ground moving plant in the event of a large earthquake with multiple building collapse</td>
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<tr>
<td>13 Respect for the environment and attention to natural defences including coral reefs and mangrove swamps. Avoidance of deforestation in areas with vulnerable slopes</td>
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<td>14 Training and cooperation between search and rescue organisations</td>
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<td>15 Maintenance of flood defences in low-lying areas</td>
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<td>18 Hazard modelling for vulnerable cities with use of systems such as 'City Aware' and use of GIS, multi-spatial data and IT programmes</td>
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<tr>
<td>19 Knowledge of how to access emergency supplies including military assets, foreign field hospitals, emergency shelter material and essential supplies</td>
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<tr>
<td>20 Raising public awareness of the vulnerability of poorer countries and general advocacy issues regarding the poor within the global community Table illustrating the many parameters impacting on DMIP (multi-source personal compilation)</td>
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2.6.9 Conclusion

Disaster mitigation and preparedness is relevant to all countries and should be an ongoing process particularly as the IDNDR has increased the awareness of the global community regarding the increasing losses through natural disasters which are ongoing. DMP has relevance at all stages of the spectrum of disaster management including local capacity building and preparedness extending to national and international strategies. History can provide the key to important lessons for future DMP strategies and local education and training would appear to be cost-effective measures. Safe buildings and safe locations are a key aspect of DMP. Buildings and structures are now presented regarding relevance to the topic of resistance factors to rapid response.
CHAPTER 2.7 BUILDINGS AND STRUCTURES

2.7.0 Introduction

Disaster mitigation seeks to prevent losses or minimize secondary events after a hazardous event. Buildings may stand or fall in a natural disaster or may be damaged to the extent that function within is curtailed on safety grounds. It could be stated that buildings and structures occupy the focal point of disaster dynamics and therefore need to have a high position on the agenda for all aspects of disaster management. Information has been included from both the literature review together with information collated from visits to institutions specializing in this field. Buildings and structures are relevant to natural disaster losses and are included in all areas of natural disaster evaluation and operational disaster management strategies. Buildings and structures enter the process of disaster management at all levels including DMP, vulnerability, search and rescue operations, temporary shelters, mobile field hospitals and evacuation scenarios.

2.7.1 Overview of the Problem

Worldwide the frequency and death tolls from disasters is rising, reflecting the increasing vulnerability of the poor primarily in the rapidly growing urban centres of the South. This is mostly because they are living in precarious circumstances on hillsides and waterfronts, where damage is likely to be greatest (Davis 1975). It was reported that there are an enormous quantity of post-disaster relief design ideas, most of them are conceived without an understanding of the realities of post-disaster shelter needs. Most temporary structures affording short term shelter from the elements are either tents or plastic sheeting slung across two A frames. Salvaged materials may also be used.

2.7.2 Construction and Risk

Multi-storey framed construction leaves cavities in a ‘lean to’ or ‘tent’ collapse where minimally injured survivors may be found. Medium and low rise buildings of brick or local materials collapse into rubble with little or no room for survivors. Residential property is more fully occupied at night, when earthquakes can be more deadly (Redmond 2005). Building design and materials are key issues regarding the resilience of a building
when stressed by an adverse climatic surge of energy. Redmond is correct regarding the
time of a natural hazard. If an earthquake occurs at night there is often a higher casualty
rate from building collapse and fire hazard compared to events occurring during the day.
Smith (2001) gives an excellent synopsis of the various types of structures which are
vulnerable or resilient to earthquakes. He points out that simple one or two storey
structures are more resilient than complex structures or multi-storey. Reinforced and
ductile material is far more resilient than poorly prepared concrete. Medium rise un-
reinforced masonry buildings (MUMBS) are the most vulnerable to collapse and cause of
mortality.

2.7.3 Building design in relations to earthquake stability

The following diagrams illustrate four aspects of building construction relevant to
earthquake hazard. The simple profiles are generally more resilient against ground motion
with the exception that tall multi-storey buildings could collide under strong rocking
motion caused by an earthquake. Complex masses are more vulnerable to ground motion
and rupture at angled construction areas can occur. The description of difficult sites is
important regarding particular vulnerability when buildings are located either close to a
fault line or on soft soil structures which amplify the ground motion. Cut and fill building
methods are particularly dangerous in earthquake prone areas and this has been observed
in El Salvador. Steel re-enforcement, retrofitting and deep foundations all assist in the
protection of buildings against earthquakes.
Figure illustrating the dynamics of earthquake hazard relating to building design and location source, Tectonic Hazards: earthquakes Smith 2001(6:145) the effects of ground-shaking on buildings and some construction methods adopted for seismic resistance a-c simple building profiles; d-f complex building masses; g-l coping with difficult sites; j-l methods of building reinforcement.

2.7.4 Location of buildings

The location of dwellings is another highly relevant equation. Buildings and structures are most vulnerable when construction occurs in known hazard zones or on loose alluvial or
sedimentary soil structures. Gunne-Jones (2003) develops a strong argument for land-use planning and states that risks can be substantially reduced by directing development away from hazard-prone areas. Sadly this is often not adhered to where poorer communities migrate to urban locations and live in shanty town poor housing and often in vulnerable areas. Conversely the wealthy can seek dwellings either in flood plains or on vulnerable slopes because of either proximity to water-sporting or holiday pursuits or to have exceptional views from an elevated location. Government policy and investment pressure impacts on this equation according to Gunne-Jones (2003).

2.7.5 Buildings and DMP

Lewis (1999) makes a strong argument for disaster mitigation by the proposition that it is better to deal with the root cause of the situation rather than being forced into giving emergency assistance. Building design and foundation regulations together with engineering control measures are the important factors which he is suggesting. Furthermore it could be stated that what is necessary for the future should be to give attention to controls on materials, design, construction methods, location and implementation and inspection at each level of construction. Sadly many poor communities do not have the privilege of good housing and make-shift dwellings are often constructed out of poorly mixed un-reinforced mortar or adobe bricks. These tend to dry out and are prone to collapse with ground shaking or external force from hurricane and storm surges.

2.7.6 Building Codes

Celebi (1991) suggests that building codes are the first line of defence against future earthquake damage. He proceeds to argue that records should be kept of buildings that have either failed or been damaged in earthquakes and lessons drawn from these events and building codes and practice modified accordingly. This is a very strong argument and even a developing country could give attention to this equation and avoid building in ways that have been known to fail in the past. Sadly the human race according to the author often has disaster amnesia and does not learn from past mistakes. New Zealand is conscientious in application of building codes with registration of all public buildings.
2.7.7 Impact of earthquakes on buildings

Smith (2001) provides a useful résumé of the impact of earthquakes on buildings and structures including the impact of the particular wave forms on ground, water and buildings. The ground shaking and damage to buildings and structures is caused by the different components and wave forms produced by the earthquake itself radiating out from the epicentre. Each component has different dynamic properties

Figure 2.7.2 Seismic Waves

Figure illustrating the various components of seismic waves demonstrating the dynamic changes in ground movement distinctive to each wave form: after Smith 2001 (6:131)
The P wave or primary wave is the first to strike and is a compression wave moving very quickly (8 km/sec). P waves travel through both solid rock and liquids, such as the oceans and the earth's liquid core.

The S or secondary waves move at half the speed of the P waves and do not travel through the liquid parts of the earth. When they reach the surface the resulting vertical ground motion can be highly damaging to structures. The S waves cause vibrations at right angles to the direction of travel of the waves.

The Love waves and Rayleigh waves are both surface waves and the magnitude of these is reflected in the local magnitude or Ml scale. They do not possess vertical motion but shake the ground horizontally at right angles to the direction of propagation of the waves. Love waves travel faster than Rayleigh waves and pose a special problem for the security of buildings.

2.7.7.1 Earthquake damage to hospitals

Inevitably hospital buildings are damaged in earthquakes and this has been observed first-hand in El Salvador at Santa Tecla near the capital San Salvador after the disaster of 13.1.2001. Public buildings should be constructed to high earthquake resistance specification but in high magnitude events even adequately built constructions may fail. In Latin America between the years 1981 and 1996 93 hospitals and 538 health clinics were destroyed (PAHO/WHO 1995). The report from PAHO indicated that during the Mexico City earthquake many hospitals were damaged and some destroyed including Juarez hospital in which 561 people died including patients and medical staff.

2.7.8 Buildings and secondary hazards

Buildings and structures can be affected by secondary earthquake hazards such as landslides, boulder slides, mud slides and slope failure through soil liquefaction, tsunamis and flooding. It becomes apparent that dwellings need to be robust and reinforced in countries prone to earthquakes and also situated in locations at a distance from potential secondary earthquake hazard. Aftershocks can cause the collapse of a building that has been weakened by the initial impact of an earthquake.
2.7.9 Effects of earthquakes on buildings and other structures

According to Graymer (2006) the rupture of utility lines is a common feature in which major quakes can cut unprotected electric power lines, water mains, and gas lines, adding fire and flooding to building collapse. Older wood-frame houses are shaken off their foundations with chimneys and roofing falling onto the local populace. Mid-rise unreinforced buildings are the most vulnerable to collapse and cause of death of the occupants. Roads and bridges can give way under relentless shaking and swaying. Damage can slow rescue efforts (RF.RR). High rise structures are designed to sway but internal damage can occur and windows can be broken. Buildings can lean or sink in an earthquake if saturated soil is vibrated turning it into a fluid rather than solid.

2.7.10. Hazard-resistant design

Construction methods can be undertaken to improve stability and resilience to external hazard. From the seismic risk geo-technical assistance from engineers is especially useful and can give information on building construction relative to the underlying soil structures and propensity to ground movement (Smith 2001). Use of small-scale maps of the substrate taking into consideration the presence of fault lines, alluvial deposits or volcanic ash can assist in the type of foundations and structures optimal for earthquake resilience in any given location. Graymer (2006) gives useful information as to how buildings can be protected and given increased resilience. Retrofitting of vulnerable buildings can be undertaken. This includes bolting wooden frame houses to the foundations. In masonry buildings fibre-mesh can be incorporated in the walls and the walls and roof tied to each other. Internal fixtures and fittings can be stabilised by strapping or bolting. Subway lines and tunnels are most vulnerable when they run from one ground material to another. Flexible joints are used to accommodate the differential in pressures exerted during an earthquake. Mid rise buildings can have their walls reinforced with sprayed concrete (a method used to stabilise slopes in Hong Kong). Base isolators can also be used in which the structure is lifted off its foundations and steel and rubber pads are inserted to act as shock absorbers. The use of common utility ducts (CUDS) to carry lifelines, such as water and electricity cables prevent damage by moving with the ground displacement. Highways and bridges can be strengthened by the use of long pipe-like anchors or micropiles. Bridge columns can be strengthened by encasing
them in steel jackets or fibre mesh. High-rises are buttressed with braces and shock absorbers bolted to inner steel skeletons. This allows movement but prevents catastrophic swaying.

2.7.11 Shelter after natural disaster

One of the primary requirements after a natural disaster is the need for adequate shelter from the elements. The purpose of the shelter is to provide protection from adverse conditions including cold, excessive heat, wind, and rain and from predators be it animal or human. The shelter can be constructed from material to hand after the disaster such as vegetation or wood. However after a disaster it may be that the local population is not capable of competent emergency shelter construction for various reasons and this may include injury and incapacity or mental shock and anguish. Additionally there may be excessive rubble and debris or threat of further trauma from ongoing hazardous events. A large part of emergency relief strategy and disaster management policy will seek to provide emergency shelter to a vulnerable or dislocated community. Many NGOs have made a specialist study in this area and Oxfam is the leading UK NGO in this field.

2.7.12 Emergency shelter material

Emergency shelter materials can include the following:

- Salvaged material from the disaster area, including from fallen buildings and structures or from nearby vegetation. Further casualty rates are incurred through people entering damaged buildings and this may be occasioned by genuine attempts to locate family members and possessions or through looting and theft.
- A-frame and plastic sheeting. This simple but effective emergency shelter material has advantages of being simple and compact for transport purposes. It still remains as one of the main resources in emergency shelter provision. The sheeting is available with different specification and has received much attention and development for emergency shelter purposes. ‘Monarflex’ has highly sophisticated and versatile properties as mentioned below.
- Tents. These are used greatly in emergency disaster scenarios and as mentioned the UN have stockpiles of these kept in Europe and Africa for access in the event
of a natural disaster. Pisa and Brindisi have been used in the past as locations for stockpile of emergency tent supplies. Tents are more durable than A frame and plastic sheeting and give a medium term solution from the emergency shelter aspect. The International federation of Red Cross and Red Crescent Societies (IFRCRC) was able to provide substantial numbers of tents for the village of San Carlos after the earthquakes of 2001 and these were observed to be fulfilling a very satisfactory function particularly as the villagers were able to remain in close proximity to their friends and neighbours and familiar surroundings. The sense of dignity was preserved because substantial tents do provide privacy which is of particular importance after a natural disaster.

- Containers. This is quite a novel solution for emergency shelter provision but has been observed as being most effective in Turkey after the severe earthquakes of 1999. Much protection is afforded against the elements and the box-like construction gives substantial protection against earthquakes and rising water. Certain NGOs made vital efforts in provision of containers for Turkey in 1999 and World Vision set up schools for the local population by welding two containers together thereby affording substantial space for classroom facilities.

2.7.13 Notable buildings and earthquake resistance

Certain buildings have been specifically designed to withstand severe ground shaking. One of these is the Te Papa (Maori for ‘Our Place’) Museum on the waterfront in Wellington New Zealand.

Plate 2.7.1 The Te Papa Museum Wellington New Zealand
This building is particularly interesting in that the ground on which it was built was essentially reclaimed shore line. The area employed for the building was the size of 3 rugby pitches (36,000 sq.metres), and because the ground material was loose and vulnerable to ground shaking compaction had to be undertaken. This was achieved by dropping a 30 ton weight onto the ground 50,000 times from a significant height. The amount of concrete employed was 80,000 cubic metres and the reinforcement of steel is reported to span a distance from Wellington to Sydney Australia. The design features include lead cored base isolators which are situated under the building itself and act as massive shock absorbers in the event of any significant earthquake. The architect was Ivan Mercep from JASMAX of Auckland. The firm won the contract in an architectural competition and the building work was completed in 1998 after 4 years of construction. The Te Papa Museum is a large public building and it is essential to provide good safety and disaster mitigation strategy. Smaller public buildings should equally comply with safety measures and afford good protection to the occupiers. Good quality material with appropriate reinforcement and the location of the structure on solid ground, wherever possible, and away from known hazards, all work in concert to give good safety standards and disaster mitigation.

2.7.14 Buildings and Hazard mapping

Building design and building regulations together with good implementation of the regulations are vital elements of public safety and disaster mitigation strategy. Certain cities have taken the risk of earthquakes very seriously indeed and have adopted policies engaging utilities and disaster managers. This makes enormous sense. Wellington City Council has also used information from the Institute for Geological and Nuclear Science (IGNS) regarding disaster mitigation and hazard mapping. Scientific organisations such as IGNS can give substantial input into disaster management strategies and disaster mitigation policy (Kozuch 2001). Using the Geographical Information System (GIS) and super-imposing multi-spatial data, hazard scenarios can be run in desk top fashion with estimation of losses to populations and to buildings. Commercial packages are now available including ‘City Aware’ to assist city councils and disaster managers in their policies and strategies.
2.7.15 Foreign Field Hospitals

Where the local capacity of the medical service is overwhelmed in a natural disaster foreign field hospitals (FFHs) are needed to support a failing health infrastructure. These particular structures may be deployed with variations of speed and maintained in situ for different durations according to the local demand. Although undamaged, well equipped, local clinics and hospitals could provide definitive medical care most properly, collapse of local health capacities necessitates the deployment of FFHs in major disasters (Abolghasemi 2006). A FFH must be on site within the first 24 hours of a major disaster to be effective in dealing with the surge in demand on health capacity (WHO/PAHO 2003). The competence of FFHs according to Abolghasemi (2006) can be assessed in three phases:

- Early emergency medical care within the first 48 hours
- From day 3 to day 15
- The long term from day 15 up to two years

All FFHs must be self-sufficient with adequacy of staff, medicines, equipment and supplies, orthopaedic surgery and minor interventions capacity, anaesthesia and accommodation of the FFH staff (WHO/PAHO 2003). Provision of food and water supply for staff and patients needs to be sufficient for the task. In the Bam earthquake of 26.12.2003 in Iran fourteen FFHs were deployed and provided care for thousands (Abolghasemi 2006). FFHs require not only medical staff but also specialists in logistics and communication. X ray facilities are very important and laboratory diagnostic equipment essential. Remote diagnosis with the use of Telemedicine is being used with increasing frequency. FFHs treat not only emergency admissions from impact damage but also chronic diseases and inter-current illness where the local medical capacity has been overwhelmed.

FFHs are vital in major disasters where the local health capacity has been overwhelmed but the long-term cost effectiveness during the third phase after a major disaster (from two weeks to two years), when reconstruction of health facilities is occurring, needs to be carefully assessed (Abolghasemi 2006). FFHs are an important structure providing not only a place of safety and shelter but also a community of medical and technical/logistical members with a vital task-orientated mission.
2.7.16 Conclusion

The relevance of the research topic to buildings and structures relates to the need to access victims through several possible obstacles involving damaged or collapsed structures. Safe buildings in hazard-free locations are vital to disaster mitigation and preparedness strategies. Building design can assist in protection of occupants and retrofitting can reinforce vulnerable structures. Attention to construction methods and adequate materials with appropriate re-enforcement is essential. Attention to the substrates and soil types with appropriate foundations is important regarding earthquake resistance. Building regulations and implementation of the regulations with inspection occurs in more developed countries but often is neglected in lesser developed countries. Emergency shelters and Foreign Field Hospitals may be necessary when buildings fail in disaster scenarios leaving victims exposed or wounded.
2.8 EL SALVADOR

2.8.0 Introduction

El Salvador is given special attention in the literature review because it suffered a severe earthquake affecting the whole country at the commencement of the research period (13.1.2001). Opportunistic attendance at the disaster yielded much qualitative material for use in the research.

El Salvador is the smallest and most densely populated of the Central American countries and is known as the land of the volcanoes. It suffers from frequent earthquakes because of its proximity to the intersection of three tectonic plates namely Nazca, Cocos and Pacific. An active sub-duction trench extends along the coastal region. The civil war, ending in 1992 was a traumatic time for the country with the loss of 75,000 lives after twelve years of conflict between guerrilla and government forces. The country has a population of approximately 6.7 million comprising a mixture of native and Spanish stock. Some Europeans live there. Deforestation and soil erosion are major environmental issues. The researcher has used El Salvador as the prime example of a vulnerable developing country and assisted in the earthquake relief programme of 2001. Additionally ongoing interest and provision of medical assistance has continued throughout the rehabilitation phase after the disaster that affected the whole country.

2.8.1 Dimensions and History

El Salvador covers an area of only 21,040 square kilometres of land. This makes the country the most densely populated of the Central American States. El Salvador is situated next to Honduras to the north and east, Guatemala to the west. The Southern border faces the Pacific Ocean and there is 307km of coastline. Two million people were forced out of the country during the civil war between 1980 and 1992 and made their homes in Honduras, United States and other neighbouring countries. Much of the income of El Salvador is through money sent in by those living abroad. Exports have included coffee, sugar cane and historically cotton. The Spanish invaders under Pedro de Alvarado in 1524 found little in the way of gold or other natural resources and other Spaniards proceeded southwards. Some remained later to develop the coffee and cotton trade.
Interruption with the native population gave the term of ‘mestizos’ a mixture of Spanish and Maya and Pipil Indian stock. Mestizos make up 90% of the population, 1% are indigenous and 9% Caucasian. Some Europeans now live in the capital of San Salvador. The official language is Spanish and the Religion is Roman Catholic 86%.

Flores (2003) speaks as a native of El Salvador and gives many useful insights into the struggles which the people of that country have had to face particularly over the twenty years up to 2003. The following factual details are taken from various sources including Flores (2003) and the Foreign and Commonwealth Office (FCO). In addition insights have been gained from involvement in the emergency relief effort of 2001 with further visits on an annual basis.

2.8.2 Vulnerability

The country of El Salvador has been the focal point of much suffering from both political instability and also from natural disaster. The city of San Salvador was badly damaged by a severe earthquake in 1986 and the whole country was affected by two powerful earthquakes in January and February of 2001. In addition hurricane Mitch caused massive amounts of damage in 1998 through flooding and windstorm damage. Steep topography and volcanic ridges add to the vulnerability as does the fact of deforestation (over 90%) and soil erosion. San Salvador itself is built on volcanic ash which accelerates the impact of ground shaking which accounted for the devastation of 1986. The country is still prone to violence and gang warfare and 2,846 people were murdered in 2004 according to local newspaper reports. The major cause of death is due to road accidents as there is very little control of vehicle maintenance and safety and no traffic police since the civil war. The second highest cause of morbidity and mortality is through stabbings and shootings. Large Samurai swords are carried by the country folk and there is very poor regulation of gun laws. Local reports from doctors indicate that even convicted criminals can still possess two legally-owned guns.

2.8.3 Climate and health

The climate is sub-tropical with a wet season which can add to the vulnerability of tree-denuded slopes giving rise to slope failure and mudslides. Endemic diseases include
Denge fever, Chaga’s disease, Cholera, enteric pathogens including parasites and HIV AIDS virus. Malnutrition is not uncommon particularly in the area of Morazan in the North East of the country. Water supplies are limited and water purity and distribution is an ongoing problem despite natural reservoirs in the form of volcanic calderas. In El Salvador the quality of and access to healthcare are directly tied to income levels. Adequate health care is available to those able to pay the high cost. Health care for the urban and rural poor is limited. Health services are not readily accessible to a majority of the population. In the more isolated regions of El Salvador, there are almost no physicians. Government clinics often lack adequate personnel, equipment and medicines.

Life expectancy: Male 67.02 years, female 74.4 years (2003).


Palliative care is very basic and no opiates are available for care of the dying. The strongest analgesic is Tramadol (Zydol). Medical drugs are very expensive and although the government ruling states that medical treatment is available for all, and that the price of a prescription is $1, many are not able to afford this particularly as more expense can be incurred if a procedure is required or blood or stool investigations. The health service is three-tiered namely private, social security system (for white-collar workers) and the national health.

Observations have been made during visits to El Salvador regarding the severe problems affecting the elderly in the form of untreated arthritis and ophthalmic problems. The high incidence of cataracts and pterygium is due to the high ultraviolet exposure of the rural population. More details are submitted in the next chapter of ‘findings’ during the five project visits to El Salvador.

2.8.4 Buildings and regulations

Building regulations and environmental laws are still in the developmental stages and the country is still regarded as a lesser developed country (LDC). There is still a substantial rich/poor divide that makes for poverty and vulnerability of the country folk who live in poor housing and have less access to clean water and medical services.
2.8.5 NGOs in El Salvador

Various non-government organisations (NGOs) are operational within the country including Compassion, Samaritan’s Purse, Salvation Army and others. Many NGOs were involved in the emergency relief effort of 2001 including Medecin sans Frontier’s and the United Nations office for the coordination of humanitarian aid (OCHA).

2.8.6 History

During 300 – 600 AD El Salvador formed part of the Mayan Empire.

In 1524 the country was conquered by a Spanish adventurer named Pedro de Alvarado. Indigenous resistance occurred but this was finally crushed in the year 1540. The country gained independence from Spain in 1821 but joined the Mexican Empire. In 1823 El Salvador became part of the United Provinces of Central America which encompassed other countries including Costa Rica, Guatemala, Honduras and Nicaragua. On the dissolution of the ‘United Provinces’ El Salvador became fully independent in 1840. Coffee growing was introduced into the country by President Gerardo Barrios in 1859. During 1932 30,000 people were killed during the suppression of a peasant uprising led by Agustine Farabundo Marti and the right wing National Conciliation Party (PCN) came to power in the wake of a military coup. Farabundo Marti is the name subsequently adopted by the guerrillas in El Salvador (FMLN). On 14.7.69 war broke out on the Honduras-El Salvador border which lasted one hundred days. The cause was a disputed result in a football match between the two countries prompting nationalistic emotion and aggression. Approximately two thousand deaths occurred chiefly among Salvadorean working in Honduras. Diplomatic relations between the two countries broke down completely and the Organisation of American States (OAS) had to negotiate a cease-fire. It took until 1992 for the final agreement on the location of the boundary between the two countries by the International Court of Justice.

During the 1970’s there was some optimism that electoral reform would provide hope for stability for the populace. This was however a false hope as fraud and corruption was rife amongst both government and the armed forces. In 1972 dictatorship was imposed by the Salvadorian army and Arturo Armano Molina of the National Conciliation Party (PCN)
was at the head of this. To achieve this electoral victory the National Opposition Union (UNO) had to be overturned. Again in 1977 a similar scenario occurred with the PCN snatching electoral victory from the UNO and General Carlos Humbero Romero was installed as dictator. From 1977 there was a time of substantial danger with all opponents of the regime finding themselves under threat of disappearance with subsequent revelations exposing torture and death. Rocks at the sides of roads and footpaths were painted with messages of opposition to the regime.

A ray of hope emerged for the Salvadorian people in 1977 with the appointment of Monsignor Oscar Romero as Archbishop of San Salvador. He was elected by the Catholic hierarchy for his conservative stance and his good relationships with the oligarchic sectors in society. He experienced a transformation in his outlook through both hearing the outcry of the poor people within the country and also through a spiritual experience of profound magnitude. It was through his innate qualities of humanity, empathy and simplicity that were the substrate for the passionate advocacy for the repressed within the society at that time. He became the mouthpiece for the common people and the voice of the voiceless. He used both the Catholic radio YSAX and the cathedral of San Salvador as instruments to speak out against the repressive regime. He bore witness to the anguish of the families where members had died or disappeared and spoke out openly against the repression and political murders rife at the time. On 24.3.1980 he was martyred by the military regime prompting an international outcry. He was one of 7,000 Salvadorians that had been murdered before him and many thousands had disappeared. Among these were priests, nuns, students and teachers and some of the finest sons and daughters of the Salvadorian people.

Civil war ensued from 1980 to 1992 and more than 80,000 were killed and 12,000 disappeared.

Certain key dates and factors affecting the people of El Salvador are mentioned by Flores(2003) and these include the following:-

During October 1980 representatives from the five guerrilla groups met and agreed on a common strategy of leadership and formed the party that is still in existence today known as the Farabundo Marti National Liberation Front (FMLN). The vision of this party was
to be a militant force determined to rid the country of extremist right wing control of the
country.

In 1981 Ronald Reagan became president of the United States of America and believed
that the FMLN was part of a communist drive and a threat to U.S. national security. From
that time the American influence became very apparent and the U.S. government became
involved in political, military and economic affairs. The strategy was considered as low-
intensity conflict for Central America but in actuality gave birth to brutal death squads
with members drawn from civilian, police and military groups. These death squads
repressed the people of El Salvador and the U.S. government trained Salvadorian units in
counter-insurgency tactics. The brutal military regime was backed by Washington dollars.

In 1984 the U.S. promoted elections to install a right wing civilian government. In the
1984 general elections the chief candidate was Major Roberto D’Aubuisson of the
Nationalist Republican Alliance (ARENA). He was the reputed chief of the death squads
and assassin of Monsignor Romero. The elections were boycotted by the FMLN and the
Democratic Revolutionary Front (FDR). The Christian Democratic Party (PDC)
sponsored Jose Napoleon Duarte. Of eligible voters fifty one percent did not vote. Both
Duarte and D’Aubuisson declared themselves as winners as did the Salvadorian Defence
Minister. Despite the chaos of this process it did mark a turning point in which the armed
forces publicly supported reform and democracy.

Public opinion throughout the world impacted upon the conflicting factions and political
parties encouraging a peace process and dialogue, the first of which was one between the
FMLN-FDR, the government and the armed forces in La Palma and Ayagualo in 1984.

2.8.7 Earthquake of 1986

In 1986 a devastating earthquake hit El Salvador adding to the chaos within the country
but generating more world sympathy for the war-torn country. The FMLN-FDR and the
government agreed to a truce, allowing for time for the country to recover from the
tragedy. The actual magnitude of the earthquake was comparatively modest ($M=5.4$) but
the damage produced was enormous including:

1,500 deaths
10,000 injured
250,000 people homeless.

This was an exceptional situation and was caused through the layers of volcanic ash on which much of the city is built. These layers are up to 25m thick in places. The 3 second quake arising through the ash under the city magnified the ground shaking by up to five times.

2.8.8 The Esquipulas Accords

In 1987 The Esquipulas Accords were signed with the participation of the governments of Central America. This provided for a continuation of the dialogue and implementation of Geneva Accords for the treatment of prisoners.

In 1988 Alfred Cristiani of the ARENA party won the presidential elections prompting a military offensive by the FMLN in which they occupied important parts of the city of San Salvador. This evoked a desperation bid by the government forces who bombed densely populated areas of San Salvador including the Central American University. The military tortured and murdered seven Jesuit priests and their housekeepers at the university. This caused a national and international outcry and the Salvadorian and military government lost all credibility in the world’s eyes. Pressure was brought to bear to end the conflict.

2.8.9 Peace agreement

Mercifully on 24.4.1991 a peace agreement was signed by the FMLN guerrillas and the Cristiani government in Chapultepec, Mexico and on 30.4.1991 the FMLN declared itself a political party.

Under the leadership of the United Nations Secretary General Boutros Boutros Ghali and the Organization of American States a peace accord was reached and a Truth Commission created. On 16.1.1992 the FMLN and the Salvadorian government signed the final peace accords. The U.S. had spent $10 billion on the war effort.

In 1994 there were peaceful elections and the FMLN participated in the Democratic Convergence coalition with other political parties opposing the ARENA candidate Armando Calderon Sol in the first post-war elections. Calderon Sol was declared the
winner and became president.

In 1997 the FMLN became much more powerful through the democratic process and elected 27 National Assembly deputies as opposed to the ARENA 28 but only forty percent of the eligible voters participated.

2.8.10 Economic neo-liberalism and dollarisation

Between 1999 and 2003 The ARENA government under Francisco Flores promoted the U.S. led economic neoliberalism according to Jorge Flores (2003). This included privatization of services, dollarisation, structural adjustment as required by the International Monetary Fund and Washington, a free trade agreement between Central America and the European Union, and the Free Trade Agreement of the Americas (FTAA).

2004 saw further democratic elections in which the ARENA party candidate Elias Antonio Saca succeeded as president. His manifesto stated ‘towards a lasting peace’ but the economy continues to struggle in the aftermath of the civil war and the natural disasters that have befallen the country. The presidential elections took place on 21.3.2004 and Saca took 57.51 per cent of the votes and the FMLN trailing at 35.9% thereby a second round was not necessary in the electoral process.

2.8.11 Economy

The economy of El Salvador has undergone a transformation, moving from an agricultural economy, centred around coffee production, to a largely services-based economy focusing on commerce and financial services. Manufacturing has also grown over the last ten years due mainly to industries dealing with offshore assembly for re-export. Inflation is low and stable. Positive business climate features include a stable currency, rising international reserves, a low debt burden, continued tariff reductions, and progress in the government’s programme to privatise basic infrastructure such as telecommunications and energy distribution and administration of pension funds. It could however be stated that the economic improvements are in the early stages of development and that the rich/poor division in the populace leaves the agricultural and poorer
communities struggling to maintain their livelihoods and healthy living conditions.

2.8.12 Basic economic facts

Basic economic facts include the following:-

Nominal GDP per head 2.200 US dollars (2003)
Annual growth 1.94% (2002)
Inflation 2.8% (2002)
Major industries: Offshore assembly exports (58%), coffee, sugar, shrimp
Export partners: US 63%, Guatemala 12%, Honduras 7%, EU 3% (2002)
Import partners US 53%, Guatemala 10%, EU 10%, Mexico 7% (2002) (FCO data)

2.8.13 Membership of International Groups and Organisations

El Salvador has built good political and trading partnerships with various countries including neighbouring countries. It is a member of the United Nations and several of its specialised agencies. These include the Organisation of American States (OAS), the Central American Common Market (CACM), the Central American Parliament (PARLACEN) and the Central American Integration System (SICA) whose General Secretariat is based in El Salvador. It has also been chosen for the Headquarters of the Puebla-Panama Plan (PPP). It actively participates in the Central American Security Commission (CASC) which seeks to promote regional arms control. In addition it is a member of the World Trade Organisation (WTO) and is pursuing regional free trade agreements. El Salvador has joined its six Central American neighbours in signing the Alliance for Sustainable Development known as the Conjunta Centro-America-USA or CONCAUSA to promote sustainable economic development in the region. El Salvador was the first Central American country to ratify the Central American Free Trade Agreement (CAFTA) with the USA on 18.12.2004. Together with its neighbours, El Salvador has successfully negotiated a Political Dialogue and Co-operation Agreement with the European Union, which was signed in Rome on 15.12.2004. El Salvador is also an associate member of the Mega-Cities Initiative, an International organisation giving assistance relating to disaster mitigation and preparedness.

With ongoing political stability and freedom from internal conflict and violence, the stage
is set for economic growth and improved conditions at all levels. The rich/poor divide needs to be addressed as does the vulnerability to natural disasters and attention to good building practice. The health service needs a thorough overhaul with particular reference to the needs of the poor, the elderly, clean water and sanitation, improved clinics and hospitals and attention specifically to the high mortality from infectious gastro-enteritis among young children. Orthopaedic surgery and ophthalmic surgery needs to be made available to all strata of the society within El Salvador. Attention to road safety and control of arms purchase has to be a very high priority as these are the two issues causing the highest mortality. Cancer patients and palliative care needs much attention and investment.

2.8.14 Conclusion

El Salvador is a highly vulnerable developing country which has been battered by geo-seismic hazard and hurricanes. It has a chequered history with Spaniards invading and intermarrying with the native Maya and Pipil Indians. The rich poor divide and civil unrest led to a blood bath between 1980 and 1992 in the civil war between the revolutionary guerrilla forces against the government. Deforestation and steep topography render the country vulnerable to mud and boulder slides and the wet season can be accompanied by flooding. The country presents a challenge to disaster mitigation and preparedness and is relevant to the debate of resistance factors to rapid response. The researcher has devoted much time to medical issues and matters related to the rehabilitation phase after the earthquakes of 2001. Hurricanes George, Mitch and Stan have affected the country. The proximity to three tectonic plates namely the Cocos, Nazca and Pacific plates with an active subduction trench running along the coastline makes it one of the most vulnerable places on the planet. The country is still struggling with endemic illness and poor health infrastructure. Many vulnerable buildings are situated within the country and the capital itself is built on 25 metres of volcanic ash making it particularly vulnerable to earthquake hazard. Violence and murders are frequent and traffic and gun laws lax. Despite these dangers El Salvador is a vibrant country. The dollarisation and the switch from trading in coffee and cotton to finance and utilities would appear to be bringing stability and hope for the journey out of poverty. It is hoped that education and the fragile health service will benefit from an upturn in the economy.
CHAPTER 2 LITERATURE REVIEW CONCLUSION

Attention has been given to subjects relevant to the research topic in order to establish the grounds for a methodological approach to address the hypothesis and specific research questions.

**Hypothesis:** Many remediable resistance factors to rapid response exist despite the efforts of the IDNDR and despite the current state of development of disaster mitigation, preparedness and management strategies.

**Intuitive questions:**

- What are the most significant resistance factors to rapid response in the emergency disaster relief processes?
- What interventions could be made to address these resistance factors?
- What specific management decisions need to be adopted to prevent resistance factors to rapid response at the organisational level?
- Has the IDNDR had a significant impact in minimising the losses occurring from natural disaster?
- What further research work could be undertaken to address the findings and limitations of the field of study undertaken?

The literature review has sought to establish a series of building blocks, around the hypothesis presented, from which a methodological approach can be undertaken to answer the intuitive questions. The literature review has extended through the historic development of the relief agencies to the present state of operation of the disaster relief community. Specific attention has been given to earthquake hazard as the prime example of a natural disaster requiring rapid response and El Salvador has been used as an example of a seismically vulnerable developing country. Attention has been given to the IDNDR because of the proximity of the decade to the research study period and to the relevance of the proposals and outcomes of the IDNDR to the hypothesis and the intuitive questions. Vulnerability has been explored as a broad issue regarding countries prone to natural disasters and the hazard-prone communities situated within. Buildings and structures has been covered comprehensively because of the central part that safe
structures play in providing prevention of morbidity and mortality for communities within hazard-prone locations. DMP has been investigated in the literature review including the aspects addressed within the IDNDR. It becomes apparent that the whole spectrum of DMP has particular relevance to any methodological approach to the question of RF.RR.
3.0 Introduction

Definitions

A system is an entity through the mutual interaction of its parts. A system exists and operates in time and space. Examples include particles, molecules, cells, organs, organisms, eco-systems, solar-systems in increasing order of complexity (Bellinger 2004).

A model may be defined as a simplified description of a system, generally developed for an understanding of, or the analysis, improvement and/or substitution of a system. The model can be used to obtain information about the systems and for making predictions about the systems behaviour as a result of its activities, relationships and constraints (Dodig-Crnkovic 2005).

Systems modelling provides useful diagrammatic information on the different aspects of disaster dynamics. The presentations seek to illustrate the sequences and patterns of activity that occur within the disaster time framework. There are two essential sequences the first being the dynamic changes that occur in nature and the environment, and secondly the response of humankind either being the victim of the hazardous event or the agent of mercy and practical assistance. This assists in identifying potential obstacles to the response process and also gives thought for possible interventions from the management perspective. An explanation and discussion is included with each systems model. A symbol is used to illustrate potential RF.RR at certain points in the sequences thereby tying in the models to the research topic. Identification of weaknesses and opportunities within a systems model makes a critical appraisal possible thereby adding a possibility for quantification and recommendation to the disasters community.

The foundation of the thesis addresses a model of relief-provider to disaster victim attempting to qualify and quantify the obstacles and obstructions retarding the prompt response identified as RF.RR. The following model illustrates the research problem mirroring the intuitive questions that need to be asked of the disaster relief community. The obstacles or obstructions in provision of emergency assistance are many and varied and the research seeks to identify from the disasters community itself what are the experiential difficulties encountered, thereby providing suitable data for measurement and analysis.
3.1 Foundational model to the research of RF.RR

Figure 3.1 Foundational model

Foundational model to the research thesis illustrating relief provision to disaster victim with obstacles and obstructions impacting on the directional movement (crj personal illustration)

The above model has a directional flow between relief-provider and disaster victim. The separation between the two represents both time and distance. Obstacles or difficulties can hamper the process thereby retarding the response time. For instance the distance may be excessive or the pathway hazardous. Additionally the movement from provider to victim may be fraught with other complications including navigational or communication problems. Information to identify these retarding influences can be gained from either end of the model namely from provider or victim. The research seeks chiefly to ascertain the problems encountered from the disaster-relief community thereby formulating a methodology for addressing the hypothesis and intuitive questions and applying measurements with appropriate tools. The perspectives of victims are given consideration in the qualitative data presentation.

Relief provision can be accessed locally, nationally or internationally. When the local emergency services are overwhelmed assistance needs to be requested from greater distances. When the whole country is overwhelmed then a state of national emergency is declared prompting an international response. Responders can include the United Nations personnel or NGOs specializing in disaster relief such as the Red Cross now recognised as the International Federation of the Red Cross and Red Crescent Societies (IFRCRCS).
3.2 Environmental hazard and damage to the ecosystem

Figure 3.2 dynamics of environmental hazard

The linkage of this model to the foundational model relates to the consequences of damage to topography and domestic housing/public buildings from a natural hazard causing the disaster victim status. Earthquakes, mudslides, hurricanes, floods or volcanic eruptions can constitute the natural hazard causing this vulnerable status.

The model demonstrates the environmental hazard impacting upon the physical substance of mother earth. The hazard is a surge in energy within the environment sufficient to give it destructive power. The hazard may be single or contain a double potential for destruction on the environment such as a hurricane with tidal surge, or earthquake and flood. Double hazard is particularly damaging on the environment such as wind and fire, or hurricane and flood. In the massive energy arena nature is struggling with itself jostling for supremacy in a primal duel. The dynamic melee is an extraordinary battle...
between the elements of earth, wind, fire and water. The structure of the powerless may rise to sustain the energy surge of the aggressor and hold fast. It may however appear to have sustained the impact but have been weakened only to crumble with a further blow to its substance. It may however buckle or topple with the first insult and change drastically in shape and form. Additionally the changes occurring in physical structure can have a knock-on effect setting off a chain reaction in the environment, irreparably damaging and changing the terrain permanently. Underground water courses can be diverted or land masses can be raised dramatically after earthquakes. These massive shifts and dynamic changes within the environment have been present since time began but would appear to be increasing in frequency and intensity. The National Hurricane Centre (NHC 2005) reported that the year 2005 saw a record number of hurricanes occurring in the Atlantic Ocean and maximal energy surges were documented from archive data comparisons. A weakened structure such as a slope denuded of forest or foliage can be more vulnerable to the impact of an environmental hazard than one where environmental degradation has not taken place. Mudslides, rock and boulder falls are the secondary hazards that can occur after an initial impact as are floods and tsunamis.

3.3 Systems interface human and environmental systems

This model connects with the previous illustration demonstrating the interface between the natural events and human use systems. It brings in the dimension of the human race co-existing with the environment, and also the reality of hazard in both human and natural systems. Resources and hazard often go hand in hand within human development systems. Additionally it seeks to portray the opportunistic benefits in living in an environment where the resources and benefits to be gained from nature and the environment have to be balanced with the risk-potential for dwelling in a particular location. An illustration of this could be seen in the holiday resort scenario where potential for profit has to be balanced by the potential for storm surges and flooding in the locality. A further example is seen in El Salvador where local peasant farmers capitalise on the mineral-rich soil on the slopes of volcanoes providing excellent crops and rich grazing ground. The low frequency/high intensity hazards make the risk to the farmers low but possible. An understanding of the principles incorporated within the model is relevant to the present research as the location of a vulnerable community has implication for both victim and relief-provider especially if remote and dangerous locations are
3.4 Sequence of Events model and disaster management

This model is essentially a combination of impact and response dynamics. It is linked to the previous two models as a sequel to the initial impact and engages with the movement of relief-provider to victim during increasing time frames after a disaster. It also identifies needs of the damaged community during various stages.
needs of the damaged community during various stages.

The impact may be from one of several adverse climatic or geo-physical events which lead to an energy surge causing damage to buildings, and death or injury to the inhabitants of the affected community. The impact or disaster zone may be localized and affect only one community or conversely the event may impact on several countries through secondary hazards such as tsunami. The model demonstrates both the early and ongoing responses to disasters and seeks to complete a cycle where lessons learned are fed back into disaster mitigation and preparedness and appropriate development efforts. Rapid response is relevant to the initial sequence of events and can draw upon local or distant resources.

The model tends to suggest a chain reaction of events which could be regarded as erroneous. Time frames may overlap and sequences will be context specific within any individual disaster. The model does however demonstrate the movement and management stages after an environmental hazard. In the acute stage of a disaster activities accelerate, whereas in the relocation and rehabilitation phases many months may ensue before the repair process is complete.

Resistance factors to rapid response impact on all relief pathways as demonstrated by the orange RF.RR symbols. The research seeks to assess which are the frequently encountered obstacles and what significance is accorded to each by the disasters community. Identification of the ingress points on the model of the delays and problems leads to possible solutions in dealing with the individual RF.RR.
3.5 Resources Model and disaster management

This model seeks to enlarge on the previous model with regard to the specific demand for personnel/organisations and provisions necessary in the disaster response. It brings in the dimension of possible displacement of a community which may occur and have significant consequences. The model demonstrates the entry into the disaster zone of outside agencies and provisions including equipment for shelter. One shortcoming of the model is that the local fire and rescue services and civil defence agencies may be
operational within the disaster zone. It does also suggest that community-based NGOs are coming in from outside, whereas they may also be operational within the disaster zone itself. The press is included as a resource for the communication of information to the outside world. One other shortcoming of the model is the omission of the resource of family and neighbours in the initial search and rescue operations. This is a vital contribution in the immediacy of a disaster. Resistance factors to rapid response (RF.RR) can impact upon any agency or resource provision as demonstrated by the symbols.

**Figure 3.5 Resources Model**

Figure illustrating the movement of resources towards a disaster zone and potential for RF.RR (personal illustration)

**3.6 Disaster Mitigation and preparedness (DMP) model relating to disaster**
3.6 Disaster Mitigation and preparedness (DMP) model relating to disaster management

The link to the previous model is the demonstration of how DMP measures can obviate the necessity for external agencies and outside resources. It also seeks to illustrate some of the varied dimensions to DMP highlighting the importance of local education at the heart of the solution. Substantial buildings are also featured within this model to show the special significance of the protective effect of sound buildings and structures. Protective structures could include levees or substantial barriers to rock falls and slope failure. Early warning is also illustrated because of its relevance to enabling vulnerable communities to prepare or to evacuate in the face of an impending disaster. Broader issues touching on the rich/poor divide are alluded to in the model, also initiatives arising out of the International Decade for Natural Disaster Reduction. NGOs feature importantly. The importance of a healthy community is illustrated in this model as compromised health and poor nutrition and lack of immunization can render a local population less able to sustain the impact of a disaster and the secondary hazards that ensue. The RF.RR symbol has been inserted to illustrate how DMP can be frustrated at many levels. Where early warning systems are absent, inefficient or not taken heed of, dire consequences can result as seen in the SE Asia disaster of 2004. Preparation and planning are the key aspects to DMP with particular attention to environmental hazard vulnerability and facts concerning the past history of disaster events and relief operation shortcomings. Capacity building at the local level where known disasters occur is on the agenda of the United Nations as the most logical way to apply DMP. Additionally preparation and training of the local civil defence and local emergency services is an outcome of the research survey and should be given high priority within the ambit of DMP according to the consensus of the disasters community. The model demonstrates the importance of early warning systems and the many RF.RR symbols seek to illustrate how this aspect of DMP is prone to fail or be absent.
Figure illustrating the potential for DMP at local and international levels with reminders relating to RF.RR (personal illustration)

3.7 Risk Management Cycle

This model is related to the DMP model in seeking to draw attention to the need for risk assessments. Health and Safety policies worldwide seek to establish a risk assessment for every activity involving potential danger or disaster. In addressing this the model shows
the sequence of assessment, response and education which is essential for disaster reduction. In essence it is proposing global risk assessment and the acceptance that there are world hazards needing to be monitored, measured and interpreted. Assessment and education feature highly in the model as does planning. A model such as that presented could be viewed as theoretical and somewhat idealistic and is highly dependent on resources and motivation at local and government levels. The many dimensions of RF.RR can impact upon both the efficiency of assessment of risk and the interpretation of those risks. Training and education can be neglected in this vital area of systems interface thereby rendering the populace vulnerable and uninformed.

Figure 3.7 Risk Management Cycle

Figure illustrating the risk/management cycle relating to natural disasters and potential for
Figure 3.8 Earthquake casualty model

Model illustrating the medical consequences seen in earthquakes (personal compilation)
3.8 The Earthquake Casualty Model

The relevance of this particular model to the research undertaken relates to the specific consequences to disaster victims from earthquakes that need to be addressed by the relief-provider. Additionally the model demonstrates the consequences of time delays with regard to additional medical problems and potential complications. The model has been compiled from first-hand knowledge of earthquake hazard plus information learnt from others engaged in search and rescue organisations. Literature information and input from the World Association for Disaster and Emergency Medicine is also encapsulated within the model. The model demonstrates specific injuries encountered within earthquake scenarios together with the implications for secondary hazard on victims and vulnerable communities. Wound management is touched upon as is the infection risk. This latter has a high implication for emergency needs assessment and public health input which is not illustrated within the model. Polluted water and shortage of food supplies have a massive implication for earthquake victims. RF.RR are particularly relevant to earthquake victims where delays have dire consequences as illustrated within the model. Women and children bear the brunt of the morbidity and mortality of earthquakes (Noji 1993). It could be argued that their bodies are more vulnerable to trauma and entrapment.

3.9 Communications model

This model connects with the previous because of the high relevance of communication in earthquake disasters where contacts and search and rescue assistance is required urgently. Other natural disasters equally need communication between victim and relief-provider together with communication between different organisations and agencies engaged in disaster response.

The Communications model attempts to cover a vast area of networks engaged in natural disaster scenarios. It also makes reference to equipment used in communicating information relevant to the various stages within a natural disaster, from early warning to world news coverage, as a disaster unfolds. Methods, mechanisms and equipment are all relevant to the present research as is the efficiency of the user and equipment engaged to communicate vital information. RF.RR can occur within any communication system either from the delay in transmission or from the difficulties with reception. Even if a
message has been communicated promptly and received without interruption the response may still be slow or minimal depending on the motivation or efficiency of the recipient. Communication is a vital part of disaster management at every level. Regular communication is required at every day and stage as the disaster unfolds, in order to convey accurate needs assessments and epidemiological data. Communication using information technology can provide emergency relief workers with management strategies and resources from data bases. Additionally communication methods can be used within mobile field hospitals for remote diagnosis and management suggestions for wounded victims.

The cellular and satellite telephone networks have become a vital part of communication technology within disaster management and it is hoped that this will progress in order that response times and effective emergency aid delivery will be accelerated. Basic and primitive communication still occurs and can still be highly relevant and effective to warn vulnerable communities of impending disaster. For instance, word of mouth or shouting are simple but effective methods of communication as are flares, flags, beacon fires or smoke. Reflections from hand-held mirrors are not included in the model but have been effective in communicating the location of victims to guide responders.

The RF.RR symbol again features in the model to illustrate how effective communication, if frustrated or interrupted, can lead to substantial delays in disaster response often through bureaucracy. The model presents the dual illustration of the direction towards which the impact community can transmit the need for assistance to, and below, the modes of communication that may be employed.
Model illustrating the avenues of communication after natural disasters and the equipment and systems available. Potential for RF, RR included (personal compilation)
3.10 Response Model of Humanitarian Aid

This model seeks to demonstrate the movements of funds triggered by a high impact, low frequency disaster such as the Sumatra earthquake and tsunami inundation around the Indian Ocean. The movements of aid and resources are a vast subject but are an integral part of disaster response. Money and the adequate funding of organizations and systems is the fundamental issue in effective disaster response. Political issues impact upon the delivery of humanitarian aid and the whole scenario of financial constraint or diversion of funds casts dark shadows across the charitable process. In essence disaster response comes with a price tag and the research undertaken has to address this fact as do decision-makers and politicians.

Figure 3.10 Model of Humanitarian Aid

Model illustrating the movement of funds and resources towards a disaster-affected community with potential problems relating to RF.RR (personal compilation)
community with potential problems relating to RF.RR (personal compilation)
The above model seeks to illustrate the movement of emergency funds towards a community affected by disaster. Many routes exist and the NGOs operational within a country are well placed to receive and allocate funds in an appropriate manner. Partner projects are similarly well placed. The model alludes to the need for both short term emergency funds together with longer term rehabilitation and mitigation/development costs. Appeals and donations are a vital part of disaster response and can become politically charged regarding longer term implications for international relationships. Media coverage is not illustrated in this model but the impetus for donations can be driven by disaster reporting. The Inter Agency Standing Committee (IASC) has the brief to coordinate funding and is an international organization.

3.11 Transportation model

This model has similarities to the resources model but specifies the various forms of transport that can be utilized by the various agencies and relief services. Emergency relief supplies often need to be transported in bulk necessitating large carriers. Remote locations and steep topography requires robust transport by road or aerial support by the use of aeroplane drops or helicopter supply or rescue. The model presents the macro picture from the national and international levels together with the transport modes usable within the disaster-affected country. RF.RR is highly relevant to this model and gives background information to the specificity to be addressed within the research.
Figure 3.11 Transportation model a

Donor country at distant location
United Nations Depot
Host country Resources

Road
Rail
Air
Water

Military Assets
home/international

Disaster Zone

Figure relating to the sources of transportation towards a disaster zone

Figure 3.11 a. Transportation Model b

Within the disaster Zone
Trucks and four-wheel Drive
Helicopters aerial reconn.

Victims
Small and large boats/ships
Ambulances Make shift victim carry

Safety
Hospital
Shelter
Secure location

Figure illustrating the directions and methods of transportation of equipment and victims to and from a disaster zone with potential threat of RF.RR (personal compilation)

It can be seen that the relationship of these models to the foundational theoretical model
It can be seen that the relationship of these models to the foundational theoretical model 3.1 that transportation is also of fundamental importance in the quest for identification of potential RF.RR. Specific points could be identified where delays and obstacles can occur. The parameter of transportation will feature in the matrix of the study design outlined in the methodology.

Transportation in a natural disaster is of key importance. The distances involved within the aid/relief process to the disaster zone and also within the disaster zone itself may be considerable.

Transport is called upon to: -

- evacuate casualties to hospitals
- dispose of dead bodies or to remove to a mortuary, either permanent or makeshift
- evacuate vulnerable families and possibly communities to a place of safety
- evacuate casualties with specific trauma to specialist centres
- bring in to the disaster zone relief supplies and aid workers including medical personnel and possibly emergency field hospitals
- bring in forms of transport including four wheel drive vehicles, boats/inflatables and helicopters (large transport planes such as Russian Antonov may be required)
- bring in key NGOs specializing in disaster relief at the behest of the host government
- provide aid and relief supplies within the disaster zone particularly to remote communities
- bringing in heavy lifting gear and plant for removal of rubble and debris
- bring in large mobile resources e.g., aircraft carrier to disaster zone
- deal with fires
- bring in emergency search and rescue teams
- bringing emergency field hospitals

The types of transport required include ambulances, fire engines, emergency all terrain vehicles (4x4), helicopters, boats (large and small plus inflateables/ribs), aeroplanes (including large transport planes).

Delays and obstacles can occur regarding transportation on many fronts and these can include the following which constitute resistance factors to rapid response:-
1. political intransigence regarding the supply of transport
2. inadequate resources within the host country emergency services
3. hold ups at customs regarding import duty on vehicles
4. problems with fuel supply for vehicles within the disaster zone
5. delays through adverse weather conditions
6. unfavourable terrain with remote communities difficult to access
7. hazardous conditions and ongoing threat from further events such as flooding or aftershocks, landslides etc
8. blocked roads from slope failure and boulder slides after earthquakes
9. communication and coordination problems within the disaster zone
10. lack of competent drivers/pilots

3.12 Conclusion

All the above models are highly relevant to the study of RF.RR and disaster management strategies. In addition, using the RF.RR symbol, it becomes obvious that there are many pitfalls and obstacles that can beset the various systems, organizations or transport facilities. Additionally, from the DMP viewpoint it is possible to assess where the specific resistance factors could have their impact and to prepare and plan accordingly. The presentation of the various models provides a theoretical framework on which the research can be based with scope for quantification and identification of specific factors to incorporate into a research instrument to present to the disasters community, by unfortunately quality data not being available to allow formalisation of the systems modelling approach.
CHAPTER 4 EARTHQUAKE TECTONICS OF EL SALVADOR

Introduction 4.0

This chapter presents the technical aspects of the geo-seismicity of El Salvador. It seeks to give the reader an understanding of the high vulnerability of the country together with background information and insights into the devastating earthquakes of January and February 2001, the latter in which the researcher had the privilege of providing emergency medical assistance. This chapter has been deliberately weighted with a high content of figures and imagery. It is hoped that this will add a pragmatic and operational dimension to the research. Many of the figures have been obtained from archive data from Imperial College London, Department of Engineering Seismology, with kind permission (IC a.d.)

4.1 El Salvador

El Salvador is a Central American country bordering Honduras to the North East and Guatemala to the North West. The Pacific Ocean faces the southern aspect and it is one of the many countries situated on the Pacific ring of fire. It has three tectonic plates that produce a high vulnerability to seismic activity namely the Caribbean, the Cocos and Nazca plates. Additionally there is an active subduction trench that runs along the Pacific southerly border. This extraordinary number of tectonic plates and fault lines produces a high frequency and intensity of earthquakes otherwise known in El Salvador as terramotos. The country has a population density of 6.3 million inhabitants occupying 20,742 square kilometres of land. Much of the terrain is mountainous and there is a line of volcanoes, one of which erupted in 2005. The population is chiefly concentrated around the major cities but there is a fertile coastal plain, and fertile pasture on the volcanic slopes. Over 80% of the population are poor and engaged in coffee manufacture or farming with one major crop being sugar cane.

The following maps and figures provide detailed information of location and seismic vulnerability. The return times for high magnitude earthquakes is alarmingly short with the previous serious earthquake occurring in 1986 affecting the capital city, San Salvador, which is built on 25 metres of volcanic ash, compounding the problems of ground shaking. Steep topography and deforestation of slopes adds to the high vulnerability of the country.
4.1 El Salvador and neighbouring Central American Countries

Chart indicating global position of El Salvador among the Central American countries with neighbouring countries including Guatemala and Honduras (IC a.d.)

The comparative small size of El Salvador is noted. It is the smallest of the Central American countries. Many fled to Honduras and Guatemala in the bloody civil war that ended in 1992. It is seen situated on the Pacific ring of fire. The Spanish invaders occupied the country in their search for gold but found little.

4.2 Seismicity of El Salvador

El Salvador is prone to much seismic activity and has a chain of volcanoes running through the centre of the country. Its close proximity to three tectonic plates gives additional high frequency of ground activity and periodic severe shaking from earthquakes. The Southern edge of the country is bordered by the Middle American trench which is a subduction zone between the Cocos and Caribbean plates. The movements of the three plates which impact upon El Salvador are illustrated in the figure below.
Figure 4.2 Seismicity of El Salvador showing tectonic plates and fault lines

Chart indicating the tectonic plates impacting on Central America with demonstration of the rate and direction of movement of each plate (IC a.d.)

Figure 4.2 illustrates the movements and dynamics of the various tectonic plates and fault lines. The Middle American Trench is the active subduction area in which one tectonic plate dives under another. It will be noted that the movement of the Nazca and Cocos plates is the remarkable distance of 7cm per year. The chain of volcanoes can be seen extending from Guatemala to Panama.
Figure 4.3 The collision zone at the Middle American Trench

Figure indicating the collision zone occurring along the middle American Trench with subduction of the Cocos plate under the Caribbean plate (Press and Siever 1986)

Figure 4.3 gives an excellent example of the forces being exerted at the collision zone or subduction area where one plate slides under another, with generation of enormous amounts of heat, leading to the formation of magma and volcanism. The Cocos plate is seen sliding under the Caribbean plate. From the tectonic activity El Salvador is known to have a shallow seismicity which produces the more destructive earthquakes. In technical terms this is given the value $h<25\text{km}$ indicating that the earthquakes tend to occur at a depth of under twenty five kilometres.

4.3 The earthquake of 13.1.2001

The earthquake occurred at 11.33am local time when general activity including commerce and traffic would have been maximal. The earthquake occurred at a depth of 39Km approximately 50Km offshore from El Salvador. The ground shaking levels were considerable with moment magnitude levels Ms 7.6 and Mw 7.7 according to the National Earthquake Information Centre (NEIC)
Figure 4.4 the Earthquake of 13.1.2001

Chart indicating the location of the earthquake of 13.1.2001 along the Southern border of El Salvador in the Pacific Ocean (USGS 2001).

Figure 4.4 gives the precise location of the epicentre or the earthquake and the details of time and moment magnitude equivalent to the amount of ground shaking. No tsunami occurred in this hazardous event. The effects of the earthquake on El Salvador were devastating, triggering mud and boulder slides throughout the country. The most devastation occurred at Santa Tecla which suffered a massive slope failure and hundreds of people in modes dwellings were engulfed and succumbed. The researcher visited the disaster site with police escort.

4.4 Aftershocks

There was a high frequency of aftershocks as illustrated in Figure 4.5 below. Aftershocks can be particularly dangerous in causing weakened or damaged structures to collapse hence the advice to not enter buildings after an earthquake until damage has been surveyed. Many slept out in the open for several days after the earthquake.
Figure 4.5 Map of aftershocks

Chart indicating the locations of the aftershocks in and around the country of El Salvador after the earthquake of 13.1.2001 (IC a.d.)

Figure 4.5 illustrates the epicentres of the aftershocks. As can be seen these were multiple and affected a wide area in the Pacific Ocean and also a concentration around the San Vicente area. Aftershocks can cause enormous amounts of damage where buildings and structures have been weakened by the initial impact.

4.5 Monitoring Devices

A network of monitoring devices is in place in El Salvador which measures the ground movements and accelerations. The devices are called accelerographs. The information generated can assist the hazards teams and local defence organisations to gauge the extent of the damage in any given area. There are ten digital accelerographs within the Taulin network in El Salvador.
Chart indicating the locations of the various seismic monitoring stations within the country of El Salvador in which the seismographs are recorded (IC a.d.)

Figure 4.6 illustrates the network of accelerographs which gave recordings of the amount of ground shaking in both the initial earthquake and the ensuing aftershocks. The square varieties are GESAL and the ring-shaped the CIG.

4.6 Seismograph of event of 13.1.2001

The seismographic recording of the earthquake of 13.1.2001 is demonstrated. There are three tracings which measure the shock waves in three planes. The P or primary wave is the fastest moving shock wave and hits with a sudden impact followed at about half the speed the S or secondary wave. The primary wave is a compression wave that moves linearly whereas the S wave and the longer frequency Love and Raleigh waves cause shaking at right angles to the direction of travel. The measurements on the recording below are sizeable and accounted for the extensive damage incurred. The tracing below
was recorded at La Libertad which is a coastal resort to the South of the country hit badly by the earthquake in 1986. The major shock wave lasted approximately five seconds only but caused an enormous amount of damage.

**Figure 4.7 the earthquake seismograph of the event of 13.1.2001**

Figure indicating the seismic recordings taken on the equipment stationed in La Libertad on the South Coast of El Salvador (IC a.d.)

La Libertad is situated on the coast and the accelerometer gave the above recording which is impressive. The different dimensions of the ground shaking are expressed in the N/S, Vertical and E/W as seen above.

**4.7 Vibrations through different soil structures**

Shock waves from an earthquake behave differently according to the earth quality through which they travel. Loose material and steep topography accelerate the ground shaking and intensify the damage. The different soil and earth structures in El Salvador include
alluvial, tierra blanca (white earth), Tobas or coffee-coloured, and rock. The shaking through the alluvial material is seen to be higher in the following table. Rock shakes the least. The city of San Salvador is located on volcanic ash to the depth of 25 metres causing much ground shaking in the earthquake in 1986.

Table 4.1 Ground shaking and soil structures with Peak Ground Accelerations (g)

<table>
<thead>
<tr>
<th>Station</th>
<th>Depth km</th>
<th>N/S</th>
<th>V</th>
<th>E/W</th>
<th>Soil conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ULLB</td>
<td>36</td>
<td>1.113</td>
<td>0.617</td>
<td>0.575</td>
<td>Alluvium</td>
</tr>
<tr>
<td>UARM</td>
<td>50</td>
<td>0.601</td>
<td>0.454</td>
<td>0.223</td>
<td>Tobas colour cafe</td>
</tr>
<tr>
<td>HSRF</td>
<td>50</td>
<td>0.496</td>
<td>0.243</td>
<td>0.487</td>
<td>Tierra blanca</td>
</tr>
<tr>
<td>UPAN</td>
<td>50</td>
<td>0.117</td>
<td>0.089</td>
<td>0.154</td>
<td>Rock</td>
</tr>
<tr>
<td>UPSN</td>
<td>55</td>
<td>0.580</td>
<td>0.439</td>
<td>0.488</td>
<td>Tierra blanca</td>
</tr>
<tr>
<td>CSBR</td>
<td>55</td>
<td>0.157</td>
<td>0.166</td>
<td>0.199</td>
<td>Tierra blanca</td>
</tr>
<tr>
<td>ESJO</td>
<td>55</td>
<td>0.301</td>
<td>0.154</td>
<td>0.278</td>
<td>Tierra blanca</td>
</tr>
<tr>
<td>UTON</td>
<td>65</td>
<td>0.263</td>
<td>0.205</td>
<td>0.234</td>
<td>Tierra blanca</td>
</tr>
</tbody>
</table>

Table indicating the ground shaking differentials through different soil structures with recordings taken at different stations within El Salvador identified by locational coding (IC a.d.) Stations are abbreviated in the table i.e. ULLB represents the station at La Libertad.

Table 4.1 is presented to illustrate the different soil types found in El Salvador. Essentially there are four types of soil substrate all with different properties regarding ground shaking. The Tobas or brown earth is more fertile than the white earth or tierra blanca. The various stations situated throughout the country of El Salvador picked up different measurements of ground shaking according to soil type. It can be seen that the alluvial soil shakes most and the rock the least. This gives credence to the children’s song ‘Build on the rock and not upon the sand’ taken from the Scriptural reference relating to the wise and foolish builders (Matthew 7.v 24-28)
4.8 Regional ground shaking

From the previous discussion it is evident that different regions of El Salvador were more prone to ground shaking than others. The steep central ridge makes the steep topography and mountain villages and towns highly vulnerable as was observed by the researcher.

**Figure 4.8 ground shaking distribution in El Salvador earthquake 13.1.2001**

[Map illustrating the ground shaking distribution]

Figure illustrating the differential ground shaking distribution in El Salvador after the earthquake of 13.1.2001 (IC a.d.)

Figure 4.8 illustrates the distribution of the different levels of ground shaking in the earthquake of 2001. It is interesting to note that the ground shaking accelerates as the seismic waves proceed up steep slopes. The researcher noted that there was maximal damage to villages in the mountainous regions. Seismic waves also accelerate in intensity when travelling through loose material such as volcanic ash and through alluvial material, as has been stated.

4.9 Zones of maximal damage

It follows that there will be areas of damage to homes and structures where soil structure is loose or where steep topography exists. The national defence organisation is called the
Central Organisation for National Emergency (COEN) and produces maps and data regarding zones of maximal damage. An example follows. It is noted that the area close to the city of San Salvador called Santa Tecla was one zone of maximal damage where the major mudslide of Las Collinas was triggered. Other hot spots occurred in neighbouring Guatemala and Honduras.

**Figure 4.9 Zones of maximal damage**

Chart indicating the areas of maximal damage after the earthquake of 13.1.2001 in El Salvador (IC a.d.)

Figure 4.9 illustrates the area of maximal damage occurring in the El Salvador earthquake of 2001. It can be seen that the area of Santa Tecla was the area of maximal damage where the massive mud slide occurred.

**4.10 Damage to houses in El Salvador**

It is estimated that one million people were made homeless in the earthquake of 13.1.2001 with many evacuating to holding camps or fleeing across the border into Honduras. COEN has provided data concerning the damage to houses in the various parts of the
country. Homelessness renders the victims vulnerable to secondary hazards such as rock or boulder slides and problems from exposure or infection.

**Figure 4.10 Number of houses destroyed per department in El Salvador**

![Map showing the number of houses destroyed per department in El Salvador](image)

Figure illustrating the number of houses destroyed in the various departments within the country of El Salvador after the earthquake of 13.1.2001 (COEN 2001 from IC a.d.)

Figure 4.10 illustrates the vast numbers of homes destroyed in the La Paz and Usulatan regions. The total numbers of houses destroyed is overwhelmingly high.

**Figure 4.11 Number of houses destroyed by municipality (COEN 2001 IC a.d.)**

![Map showing the number of houses destroyed by municipality in El Salvador](image)

Figure illustrating the number of houses destroyed by municipality within El Salvador
4.11 Effects of the earthquake on buildings and structures

Many houses were flattened in the initial earthquake impact and others fell when rendered unstable by the ensuing aftershocks. Adobe buildings did not fare well and were liable to structural failure as were un-reinforced concrete buildings. Mid-rise un-reinforced concrete dwellings (MUMBS) are particularly vulnerable to earthquakes as was noted by the researcher during his emergency relief work. Some buildings undergo very dangerous structural failure in which the walls collapse outwards making the concrete slab fall in one piece onto the occupants. This is known as *pancake* failure. It was observed that many buildings had outside walls standing with doorways intact, giving credibility to the understanding that one of the safest places is under a lintel. Some buildings can literally be split in two when the ground topography alters substantially, giving the foundations a sudden change of level underneath the structure.

**Plate 4.1 effects on buildings**

Plate indicating the collapse of a building In El Salvador constructed from adobe bricks (IC a.d.)

Adobe structures do not withstand earthquakes well as illustrated in this picture. Adobe is still used by the poor people in El Salvador. Ground shaking causes the structures to fail.
Plate 4.2 Precarious building with further hazard potential

Plate indicating the vulnerability of earthquake-damaged houses with potential for further hazard to local residents (IC a.d.)

The above building has undergone structural failure and is liable to fall with the next aftershock. The area has been cordoned off and a soldier is guarding the area. Armed soldiers are a frequent sight after earthquakes, to prevent looting and rioting.

Plate 4.3 Further structural failure

Plate indicating the collapse of a vulnerable construction built inadequately (author 2001)

Total failure of buildings often occurs in El Salvador especially pancake failure.
Plate 4.4 Structural failure due to alteration of the topography

The above building was constructed from reinforced concrete but failed because of changes in the topography and angulations of the earth’s surface. The building was not built on a slope which now exists, causing the cracking of the proximal aspect of the building from the distal, where the Compassion project director is standing.

4.12 Rubble and debris

Rubble and debris are the consequence of structural failure and collapse of buildings and structures. This leads to obstruction and blockage of escape routes and access roads for emergency services. Additionally large amounts of flying debris and dust are observed which can cause respiratory irritation or obstruction and irritation of the eyes and temporary blurring. The large dust cloud over the epicentre has been observed by the researcher and the sky turned black. Some authorities state that rubble should be left where it is to assist in the use of hard core for further building work, but from the
researcher's observations this is unrealistic and the government paid for removal of rubble in trucks.

**Plate 4.5 Rubble and debris blocking roads**

Plate illustrating road blockage through structural building failure leading to rubble and debris (author 2001)

### 4.13 Mudslides

The mudslide at Las Collinas, Santa Tecla, was brought to the world's attention by the media. The high slope, saturated at the end of the wet season, underwent lateral spread and soil liquefaction causing it to fail dramatically. The consequences were devastating. The forces exerted by the flow of mud were unstoppable and houses in the pathway were literally swept away with occupants inside. Death was swift for most. Men at work came home to find that nothing was left and home, wife and children were lost without trace. Vehicles crushed by the mud were distorted out of all proportion demonstrating the enormous pressures exerted. The flow of mud had a width of 40 paces or approximately 120 feet as measured by the researcher. Mudsides were triggered throughout the country and the deforestation and the high seasonal rainfall rendered the slopes prone to collapse.
Plate 4.6 Mudslide at Las Collinas Santa Tecla 13.1.2001

Plate illustrating the massive slope failure through soil liquefaction giving rise to death on a major scale for the inhabitants of the modest dwellings at the foot of the slope. Location Las Collinas Santa Tecla after the earthquake of 13.1.2001. (IC a.d.)

The researcher examined the debris shortly after the event and measured forty paces across the area of the mudslide. This was one of several hundred mudslides that were triggered throughout the country. Deforestation and siting buildings on vulnerable slopes predispose to slope failure. Cutting in to a slope also weakens it. Additionally locating water tanks on the tops of slopes is also a highly dangerous practice, noted by the researcher, which if they rupture adds to the weight of soil descending in the mudslide.

4.14 Seasonal rainfall

El Salvador has a wet season between May and October with the highest rainfall being in August. Flooding can occur where land degradation and deforestation has occurred. Slopes covered by vegetation can absorb vast amounts of water to the point of saturation. If earthquakes occur the slopes are prone to fail.
Table 4.2 Water saturation and annual rainfall measurements

![Graph showing monthly rainfall variation](image)

Table indicating the monthly variation in annual rainfall within the country of El Salvador (IC a.d.)

This table illustrates the high precipitation levels between the months of May and October giving rise to super-saturation of vulnerable slopes which when shaken in an earthquake can lead to soil liquefaction and slope failure giving rise to mudslides. Mud and rubble could be regarded as RF,RR but were not presented to the disasters community in the questionnaire. They will feature in the appendix.

4.15 Boulder slides

Rocks and boulders can fall like missiles in El Salvador and cause tracts of devastation if they are sizeable. Damage to people and dwellings can occur through rock and boulder falls in earthquakes. Blockage of roads and damage to lifelines is a major hazard.
Plate 4.7 boulder slides

Plate illustrating a massive boulder blocking a road in El Salvador, caused by rock and boulder slide after displacement by seismic activity after earthquake of 13.1.2001 (IC a.d.)

Plate 4.8 boulder slides

Plate illustrating a rock fall after seismic activity in El Salvador earthquake of 13.1.2001 (IC a.d.)
4.16 Building on vulnerable slopes

Where much of the country has steep topography it is difficult to avoid vulnerable slopes. Despite that, planners in El Salvador have not taken into consideration the possibility of slope failure with some dwellings being built in highly precarious positions. Planning laws and enforcement of planning regulations are important but there is scope for serious improvement in El Salvador.

Plate 4.9 Building on vulnerable slopes

Plate indicating the dangerous building techniques adopted in El Salvador in which multi-storey dwellings are constructed on the side of a vulnerable slope (IC a.d.)

The practice of excavation of earth from the side of a slope to form a level platform for building construction weakens the slope. Not only is there increased weight from the buildings themselves impacting upon the slope but also from the water tanks that serve them. Better attention to land use planning in earthquake prone areas is still required in developing countries including El Salvador.
The earthquake of 13.1.2001 was severe, leading to extensive loss and damage. It is estimated that there were more than one thousand deaths with many more injured. One million people were made homeless after the quake and there was much infrastructural damage to roads and lifelines. There were disproportionately high recorded values for Peak Ground Accelerations making the quake the fifth most destructive event in the previous fifty years. Structural damage was limited to the most vulnerable buildings and hundreds of landslides were triggered throughout the country. There is a clear pattern of increasing seismic risk in El Salvador and the vulnerability includes housing, terrain and institutions.
CHAPTER 5 METHODOLOGICAL CONSIDERATIONS

5.0 Introduction

This chapter explores ways in which the research topic and subsequent identification of the research problem can be addressed from a theoretical and scientific standpoint. A theoretical framework is necessary on which to explore the problem and intuitive questions that are being posed. The research problem and intuitive questions are restated to remind the reader of the focus of the thesis.

The research problem is the delays encountered by the relief-providers in reaching disaster victims within the disaster management process

The intuitive questions arising from the research problem include the following:

- What are the most significant resistance factors to rapid response in the emergency disaster relief processes?
- What interventions could be made to address these resistance factors?
- What specific management decisions need to be adopted to prevent resistance factors to rapid response at the organisational level?
- Has the IDNDR had a significant impact in minimising the losses occurring from natural disaster?
- What further research work could be undertaken to address the findings and limitations of the field of study undertaken?

To achieve these objectives it is necessary to gather information from appropriate and reliable sources. Potential pathways for information gathering are considered and the underlying academic principles on which a theoretical framework is built given specific attention. The choice of accessing quantitative versus qualitative material for data collection is also given due consideration. Philosophical dimensions are kept to a minimum in an attempt to provide a more pragmatic approach to the subject material but ethical considerations are briefly discussed.
5.1 Information gathering

Information is sought to address a question or series of questions and thereby proffer possible answers or explanations to the question. Under girding this approach is the motivation behind the question. Why ask the question in the first place? Does the question have relevance and to whom? Is the intention to evoke change or to prove a point? Are there any obstacles to obtaining the information and will the process of asking questions provoke an emotional response in the seeker or the person from whom information is sought? Will asking pertinent questions catalyse change irrespective of the source of information and the intended outcome of a survey?

With regard to natural disasters, will asking questions about losses and casualty rates make any difference in the final analysis to a process that is for the most part out of ones own control? Should questions be directed towards creation and the environment or to the people that inhabit it? Should questions be directed towards victims of disasters or to the agents of relief? How will the information be gathered and processed? Who will guide one in the processes and professionalism of such an undertaking? How will the information be interpreted and how will an answer or message be conveyed back to the sources of information? All these questions are relevant to the preparation and process of undertaking a survey in the field of natural disasters.

With regard to the research undertaken into delays in rapid response to disaster victims, now abbreviated to RF.RR, the following sources of information are available for access as illustrated in the following chart:

**Table 5.1 Sources of information available to the researcher**

<table>
<thead>
<tr>
<th></th>
<th>Source of Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Literature through journals and reports</td>
</tr>
<tr>
<td>2</td>
<td>Archive data stored in institutions</td>
</tr>
<tr>
<td>3</td>
<td>Specialist centres within the research subject</td>
</tr>
<tr>
<td>4</td>
<td>Media reports and bulletins</td>
</tr>
<tr>
<td>5</td>
<td>Professional staff engaged in field of interest</td>
</tr>
<tr>
<td>6</td>
<td>Maps and charts</td>
</tr>
<tr>
<td>7</td>
<td>Internet facility through world wide web</td>
</tr>
<tr>
<td>8</td>
<td>Lectures and conferences on specific subject</td>
</tr>
<tr>
<td>9</td>
<td>Interviews and meetings with individuals either agent or victim</td>
</tr>
<tr>
<td>10</td>
<td>Travel to areas of interest including disaster zones</td>
</tr>
</tbody>
</table>
All the above sources of information have been accessed in an attempt to gather relevant information to the research problem. Information can be accessed by one of several methods including the following:

**Table 5.2 Methods of accessing information**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Letter</td>
</tr>
<tr>
<td>2</td>
<td>Telephone conversation</td>
</tr>
<tr>
<td>3</td>
<td>Face to face interview</td>
</tr>
<tr>
<td>4</td>
<td>Questionnaire survey, mail or electronic</td>
</tr>
<tr>
<td>5</td>
<td>Perusal of literature, reports and bulletins</td>
</tr>
<tr>
<td>6</td>
<td>Experiencing within operational context the event under observation</td>
</tr>
<tr>
<td>7</td>
<td>Attendance at training sessions or meetings relevant to the subject</td>
</tr>
<tr>
<td>8</td>
<td>Internet searches</td>
</tr>
</tbody>
</table>

Collection of accurate and relevant information is essential and the choice of method available to the researcher needs to be given careful thought bearing in mind the time frame in which the information is required. Information can be sought through several methods of access. Firm and consistent plans are required during the early stages of planning a research methodology. The outcome of information gathering is to provide a set of reliable data that stands up to both scrutiny and analysis thereby generating outcomes and solutions relevant to the original problem. In this way interpreted information adds to the body of knowledge.

**5.2 Setting the academic platform**

According to Blaikie (2003), all major research traditions regard data as providing information about some type of social phenomenon, and an individual datum relating to a specific area of the phenomenon. Iyavoo (2005), states that the type of relationship between the data and the phenomenon depends to a large extent on the assumptions that are made about the nature of social reality, the *ontological assumptions*. Ontology is defined as the branch of philosophy that deals with the nature of being and first principles (from the Latin ontologia). The procedures that are then considered to be appropriate for generating the data about the phenomenon depend on the assumptions that are made about how that social reality can be known, the *epistemological assumptions*.
In the preparation of a methodology appropriate to serving the research objectives there are epistemological questions which are designed to help with the exploration of the kind of epistemological stance the research expresses or implements. An epistemology according to Mason (1996) is:

... a specific theory of knowledge or, in the words of Williams and May, an answer to the question ‘Where does our knowledge come from and how reliable is it?’

(Mason, 1996:12)

5.3 Knowledge and Wisdom

From an epistemological perspective pursuing the nature and origins of knowledge finds one fathoming uncertainties and awe-inspiring mysteries. Delving into the area of life and death and the relationships of creature to creation in the form of man’s relationship to his environment is indeed framed in gravitas. Where response is concerned between those who are healthy, secure and rich towards the victims of natural disasters who are wounded, broken or homeless takes one into areas of the human spirit. To ask questions of agent or victim in these situations leads the researcher to realise that he is indeed standing on hallowed ground. The research is therefore undertaken with due regard to the sensitive and personal aspects surrounding the suffering caused by natural disasters.

Natural disasters are by their very nature overwhelming and chaotic and likewise are the information details and emotions that surround these events. Knowledge may be sought but the task should be to seek wisdom and to translate that wisdom into a power of advocacy for the vulnerable and those shattered by natural disasters. Knowledge is defined as information and skills acquired through experience or education; the sum of what is known; awareness or familiarity gained by experience of a fact or situation. Wisdom however is defined as the quality of being wise or the body of knowledge and experience that develops within a specified society or experience (Oxford 2004). T.S Eliot (1930) stated that the only wisdom we can hope to acquire is the wisdom of humility. That said it is now opportune to approach the specific task of addressing a research process capitalising on the wisdom of those who have given time and effort to this endeavour.
5.4 The Research Process

The research process is a conceptual funnel in which the cupola draws in general questions that the researcher wishes to explore. The filtration process occurring within the tapering of the funnel brings specific components for study down to the tubular end of the structure. The following illustration by Marshall and Rossman (1999) demonstrates this.

![Diagram of the Conceptual Funnel](image)

Figure 5.1 The Conceptual Funnel

According to Ivayoo (2005), in practice, researchers rarely complete one step then follow the next. Instead, the process is more interactive whereby the steps blend into each other.

It could be proposed that two funnels exist in the research process one internal and one external. The external filtration process is demonstrated above, but an internal filtering and focussing occurs within the researcher in which clarity of thought emerges when an understanding of the research processes has been grasped. Transformation and revelation can occur along the journey of research which adds a
level of mystery and uncertainty. Additionally different paths along the way can be explored within which new insights may be gained which affect the rest of the journey and the direction of the research process. Leading on from this it could be proposed that research is a journey of exploration in which the traveller carries a rucksack with a finite capacity. Objects can be placed within the sack but if too much is carried this makes movement along the way impossible. Some material has to be discarded in favour of more important material. The final stage at the journey’s end is for the traveller to examine the distillate of exploration according to his or her choice of what has been carried. He may also have been prudent and kept a record of what objects had been discarded.

5.5 The Audit cycle and the Circuit of the research process

Figure 5.2 Steps in the Research Process

Figure demonstrating the sequential steps involved in the research process with completion of the cycle (after Neuman 2000:12)

Attention is given here to the stages involved in the research process. Choice of subject material is dependent on several factors including personal interest, scientific necessity, and pressure of certain economic or promotional incentives. Whatever the motivation behind the choice of the topic it needs to be relevant and amenable to
analysis through the cycle of stages cited above. The topic may become apparent through literature searches which lead the researcher to have misgivings about a subject area or inspiration from previous work to progress and fathom deeper into a particular subject. Additionally the topic may present itself through some necessity where an identifiable need is apparent. This can be related to a problem with a system or area of public service that needs investigation to improve either service or performance.

In the figure above the steps in the research process are demonstrated. The diagram is consistent with that used for an audit cycle where an intervention is made and the influence assessed and quantified and the loop completed by feeding back to the original source or problem area. It is hoped that the process does not become a scenario as in Alice in Wonderland’s *caucus race and a long tale* (*Carroll 1865*).

In the investigation undertaken within this particular research identification of the topic for study was established through news bulletins, journal articles and personal interest in the logistical problems associated with rapid medical response to the victims of natural disasters.

### 5.6 Methodological Strategies

In the pursuit of providing a firm theoretical framework on which to build a research survey it is important to understand the purpose of the research and to decide which type of research befits the problem being addressed. The following gives guidance in this direction.

#### 5.6.1 Purpose of Research

Social research serves many purposes. The three most common and useful purposes are exploration, description and explanation whereby the researcher explores a new topic, describes a social phenomenon within the topic and then explains why something occurs. One or more of these features can be presented in a piece of research (*Babbie, 1998*). The following table illustrates the distinctive features of the different types of research. It will be noticed that the exploratory type of research develops techniques for measuring and locating future data. This is relevant to the present research being undertaken.
Table 5.3 Types of Research

<table>
<thead>
<tr>
<th>Exploratory</th>
<th>Descriptive</th>
<th>Explanatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Become familiar with the basic facts, setting and concerns.</td>
<td>• Provide detailed, highly accurate picture.</td>
<td>• Test a theory’s predictions or principle</td>
</tr>
<tr>
<td>• Create a general mental picture of conditions</td>
<td>• Locate new data that contradict past data.</td>
<td>• Elaborate and enrich a theory’s explanation.</td>
</tr>
<tr>
<td>• Formulate and focus questions for future research</td>
<td>• Create a set of categories or classify types.</td>
<td>• Extend a theory to new issues or topics.</td>
</tr>
<tr>
<td>• Generate new ideas, conjectures, or hypotheses.</td>
<td>• Clarify a sequence of steps or stages.</td>
<td>• Support or refute an explanation or prediction.</td>
</tr>
<tr>
<td>• Determine the feasibility of conducting research.</td>
<td>• Document causal process or mechanism.</td>
<td>• Link issues or tropics with a general principle.</td>
</tr>
<tr>
<td>• Develop techniques for measuring and locating future data</td>
<td>• Report on the background or context of a situation</td>
<td>• Determine which of several explanations is best.</td>
</tr>
</tbody>
</table>

Source: Neuman (2000:22)

5.6.2 Qualitative versus quantitative information and mixed paradigms
Qualitative research concentrates on understanding the thoughts and behaviours of individuals and groups in specific situations (Arksey and Knight, 1999). Such research should give authentic accounts of human thought, feelings and actions, whilst recognising that these accounts cannot be generalised for a population of people (Iyavoo 2005). It might appear obvious that qualitative research tends to be concerned with words rather than numbers but other features of importance are mentioned by Bryman (2001):

➢ An inductive view of the relationship between theory and research, whereby the former is generated out of the latter;
➢ An epistemological position described as interpretivist, the emphasis is upon the understanding participants; and
An ontological position described as constructionist which implies that social properties are outcomes of the interactions between individuals, rather than phenomena 'out there' and separate from those involved in its construction.

Qualitative research has both strengths and weaknesses which are related to its nature as an approach concerned with studying people as persons and being interested in their everyday life experiences and interpretations (Sarantakos, 1997)

**Table 5.4 Strengths and Weaknesses of qualitative research**

<table>
<thead>
<tr>
<th>Strengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Researching people in natural settings.</td>
</tr>
<tr>
<td>➢ Stressing interpretations and meanings.</td>
</tr>
<tr>
<td>➢ Achieving a deeper understanding of the respondent’s world.</td>
</tr>
<tr>
<td>➢ Humanising research process by raising the role of the researched.</td>
</tr>
<tr>
<td>➢ Allowing higher flexibility.</td>
</tr>
<tr>
<td>➢ Presenting a more realistic view of the world.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Problems of reliability caused by extreme subjectivity.</td>
</tr>
<tr>
<td>➢ Risk of collecting meaningless and useless information.</td>
</tr>
<tr>
<td>➢ It is very time-consuming.</td>
</tr>
<tr>
<td>➢ Problems of representativeness and generalisability of finding.</td>
</tr>
<tr>
<td>➢ Problems of objectivity and detachment.</td>
</tr>
<tr>
<td>➢ Problems of ethics (entering the personal sphere of subjects).</td>
</tr>
</tbody>
</table>

Cited in Sarantakos (1997:53)

It is stated that the strengths of qualitative studies should be demonstrated for research that is exploratory or descriptive and which stresses the importance of context, setting, and the participants’ frames of reference (Marshall and Rossman, 1999).

Where information is sought from people engaged in their particular field of operation a factual dialogue takes place. Additionally the content of the discussion is associated with the context of the information and the relevance to the individual from whom the information is sought. This in turn will thereby have a context-specific and relation-specific aspect. A subjective view or attitude to the information being offered provides the substrate of the qualitative value to the factual information. The texture
of the information and the way in which it is handled give further qualitative elements. Personal prejudice and bias are implicit in the qualitative method.

Qualitative research has certain distinctive features that need to be addressed and within which research work has been undertaken. Qualitative research is undertaken in natural settings (Spindler and Spindler, 1992). It relies on the researcher to perform the gathering of the information and the analysis of the data. Additionally it is concerned with what has been described as thick descriptions focussing on events and social meaning (Geertz, 1973).

5.6.3 Quantitative research

Quantitative research is a research strategy that emphasises quantification in the collection and analysis of data. It has been stated by Bryman (2001) that quantitative research work:

- Entails a deductive approach to the relationship between theory and research, in which the emphasis is placed on the testing of theories;
- Has incorporated the practices and norms of the natural scientific model and of positivism especially; and
- Embodies a view of social reality as an external objective reality.

Quantitative research is focussed on testing of specific hypotheses by producing quantified data resulting in numbers that can be analysed using statistical packages and multivariate statistics (Schofield And Anderson, 1984).

Qualitative and quantitative research differs in many ways but they also compliment each other (Veal, 1997; Neuman, 2000). In most cases, researchers will employ a methodology which requires predominantly either qualitative or quantitative but with some aspects of the other methods (Sarandakos, 1997). This research is both quantitative and qualitative from the outset and it is hoped that one will compliment the other and where contradictions occur or where there is creative tension between the two then this will be entered as a finding and given further discussion.

Integration of qualitative and quantitative research has been a subject of debate with movement progressing in this direction (Schofield and Anderson 1984). The reasoning behind this has been that integration will provide a more positive
explanation of the research problem. The elements of scientific pluralism enter the arena and the question of how to establish an epistemology of complexity has been given attention by Masulli (1990). It is reported that the renaissance and the start of the scientific revolution led to humans being secularised and viewed as machines. According to Masulli (1990) the secularised objectivism led to a quantitative science that was functional, operative and geometrical. This gave birth to the quantitative methodologies in the social sciences.

Table 5.5 Comparison of Quantitative and Qualitative Research Methodologies

<table>
<thead>
<tr>
<th>Quantitative research</th>
<th>Qualitative research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emphasis on quantification of variables</td>
<td>Emphasis on qualitative processes</td>
</tr>
<tr>
<td>Reification of social relationships and a search for natural laws</td>
<td>Humanisation of social relationships</td>
</tr>
<tr>
<td>Experimental method as the ideal way to validate knowledge</td>
<td>Praxis as the ideal way to validate knowledge</td>
</tr>
<tr>
<td>Studies behaviour from without the system</td>
<td>Studies behaviour from within the system</td>
</tr>
<tr>
<td>Structure is created by the researcher</td>
<td>Structure discovered by the researcher</td>
</tr>
<tr>
<td>Findings considered to be absolute or universal</td>
<td>Findings relative to the study</td>
</tr>
</tbody>
</table>

Table illustrating the differences that have been observed between quantitative and qualitative research. Adapted from Berry (1980:11-12)

5.6.4 Research using both strategies

The research being undertaken in this particular survey uses a mixed paradigm of quantitative and qualitative research methods. This is given substance from previous workers who give credence to this approach. Kuhn (1970) states that no single paradigm, whether quantitative or qualitative, can answer all the problems within its domain. Qualitative and quantitative methods according to Haase and Myers (1988) are not rooted in opposite and irreconcilable paradigms. This particular research process seeks both qualitative and quantitative information. The meetings,
conferences, and visits to disaster sites, including interviews with victims, provide qualitative information whereas the specific sampling using a proposed research tool seeks to harvest both quantitative and qualitative material.

5.6.5 Triangulation

Triangulation serves two main purposes: confirmation (Denzin 1970) and completeness (Jick 1983). It serves to have confirmation of a theory by using two methods or research strategies, one cross checking the other (Bryman 2001). Neuman (2000) explains the process of triangulation in terms of social research as looking at something from several angles rather than viewing it in one way only. Triangulation is employed for a number of reasons. For instance, using two methods is thought to allow the researcher to obtain a variety of information on the same issue;

- To use the strengths of each method to overcome the deficiencies of the other;
- To achieve a higher degree of validity and reliability; and
- To overcome the deficiencies of single-method studies.

(Neuman, 1997; Burgess, 1984)

In this research, the approaches towards the research topic and questions demonstrate the process of triangulation has been undertaken.

5.6.6 Types of triangulation

Denzin (1970) introduced the notion of ‘multiple triangulation,’ which refers to the several types of triangulation which can be used in a single study. Neuman (2000) states these several types of triangulation as:

- Triangulation of measures
  This is the most common type of triangulation when researchers take multiple measures of the same phenomenon. By measuring something several times, researchers are more likely to see all aspects of it.

- Triangulation of observers
  In many studies, one researcher will conduct interviews or be the sole observer of people’s behaviour. Having a single person as the observer imposes limitations on the study. Therefore, if there are multiple observers or researchers, alternative
perspectives, backgrounds and social characteristics will be added, which will reduce the limitations for the study. Combining data from a variety of observers is more likely to portray a complete picture. Most of the interviews carried out were done in the presence of an observer who was invited to contribute to the discussion towards the end of the interview. This form of triangulation has therefore been fulfilled in this particular research work. It was however noted that an observer can alter the intimacy and fluency of an interview with a suspicion of threat and reticence on the part of the interviewee if there was a ‘two on one situation.’

4. Triangulation of theory
This occurs when a researcher uses multiple theoretical perspectives early on in the planning stages of research, or when interpreting data. Neuman (2000) states that using more than one theory may be difficult but it will increase the chance of making a creative synthesis or developing new ideas.

4. Triangulation of method
This refers to mixing qualitative and quantitative styles of research and data. Since there is only some overlap, a study using both is fuller or more comprehensive (Neuman, 2000). Mixing the styles can occur in several ways (Neuman, 2000). One way is to use the methods sequentially, whilst another way is to carry out the study using the two methods in parallel or simultaneously. This research uses the methods sequentially whereby the meetings are purely broad base and qualitative, seeking to obtain a list which can then be used in a quantitative fashion. However the addition of open ended questions in the presentation of a survey gives rise to a parallel dimension.

5.6.7 Reliability and Validity
When undertaking a research process and having decided upon the methods that are going to be employed in gathering information the parameters of reliability and validity need to be addressed to give credibility to the outcomes. According to Iyavoo (2005) reliability and validity are central issues in all measurement. Both of these are important in establishing the truthfulness, credibility, or believability of the research findings (Neuman, 2000). Both qualitative and quantitative researchers have varied views on how reliability and validity occur in the research process. Validity and reliability are interrelated (Sarantakos, 1997). If an instrument is valid it is expected to be reliable too. However, if it is reliable, it is not necessarily valid.
According to Sarantakos (1997) reliability refers to the ability of an instrument to produce consistent results and that reliability is equivalent to consistency. Therefore, a method is reliable if when repeated it produces the same results even when performed by other researchers. Conventional measures of reliability are more associated with quantitative research where standardised research instruments are used than with qualitative research (Mason 1996). Mason (1996) further explains reliability as being conceptualised in terms of how reliable, accurate and precise the research tools or instruments are, and this in turn is being judged by the consistency with which known instruments produce certain measurements.

5.6.8 Scales and measurements

Certain parameters lend themselves to measurement. In climatic variations and energy surges instrumentation and the use of scales and accepted standards is highly relevant to the prediction of damage and to the genesis of natural disasters. The scales employed for hurricane forces and for the energy of a seismic event are particularly helpful in this respect. Internationally accepted scales of wind speed or earthquake force, such as the Beaufort or the Richter scales, enables research to have a common grounding between countries and institutions. Other measurements include areas of land affected by disasters, or the damage and losses within a disaster zone, including the numbers of victims or the number of houses wrecked. Other measurements can include number of displaced families or the number of children affected. Demographic measurements can give accurate background data within which to ask further questions. Measurements can be made with reference to historical or archive data in order that comparisons can be made regarding forces of nature in any one year and the amount of damage or loss compared with previous measurements from archive data. Using such measurements trends can be observed in nature and the environment and this comparative data gives information on which decisions and strategies can be made.

It is just such trends relating to an increasing frequency and intensity of natural disasters and rising losses that led the United Nations to initiate the International Decade for Natural Disaster Reduction during the 1990s. Sophisticated equipment is now available for taking precise measurements not previously available to the scientific or disaster communities. This includes satellite and radar and other
devices, e.g. pressure sensors on the ocean floor for measuring water displacement and wave genesis as employed by the Pacific tsunami watch organisation. Microscopic changes in crustal deformation of the earth’s surface can be detected using the satellite facility of Global Positioning system (GPS) thereby assessing the pressure gradient across the faults between tectonic plates. Satellite and radar technology is particularly valuable for calculating the speed and direction of storms and hurricanes. Measurements can also be made using the Geographical information system (GIS) with calculations of population density and quantity and quality of buildings. (AGI 2006).

Measuring human responses and attitudes is very different from measuring physical structures or elemental forces. One individual may have a different attitude from another based on a different level of experience or a different education. Other variables might include a gender specific attitude or opinions related to specific past events that have had a particular impact on an emotional level. Groups of individuals may hold similar views on particular subjects but even specialists in the same field of expertise can have widely divergent opinions over certain issues. Attitudes can change from one year to the next and prejudices may sway opinion if a particular strategy has not turned out well. Sometimes a particular stance is adopted regarding attitude and opinion because it is embodied within a mission statement or political party manifesto, thereby engendering a loyalty to a particular opinion despite possible reservations. Erroneous or spurious information may be submitted for deliberate reasons where resources or benefits are going to be available to an individual or community.

It is within the context of the precision/imprecision equation that a mixed paradigm of quantitative versus qualitative investigation is considered to be appropriate for this survey.

5.6.9 Approaches to Data Collection

Data collection methods are an integral part of the research process. The constraints on a researcher can include time, finance, and other priorities. Interruptions of the distribution process or world events overtaking a specialist community can adversely affect the yield from any survey in their particular field. Aaker et al, (2001) alleges that the choice of a method involves a series of compromises, matching conflicting
requirements of the situation with the strengths and limitations of the available methods.

Data collection is a process that requires diligence and efficiency and may require a relationship with a person within a target population. If personal information is sought then a relationship of trust is required. The process of data collection can be arduous and sometimes tedious, but the outcome is to obtain quality data that is acceptable for processing and further analysis and interpretation, to give explanation to the initial research problem and questions asked. Data collection can be performed using several mechanisms, personal or anonymous, electronic or by postal service. Each method has strengths and weaknesses. Table 5.6 demonstrates the advantages and disadvantages of the different methods. The data collection is set within the framework of the overall research study design and is the final pathway after distribution or searching for information. Data can be processed manually or by using the facility of computer systems and associated soft-ware systems.

Incentives are offered regarding data collection by various bodies including medical. A pen is occasionally given along with a questionnaire to assist in obtaining prompt data submission. Other incentives can include bottles of wine, financial incentives, promises of holidays etc. Smaller items of incentive can include items or objects to display on a work desk which states the name of the company or drug that is being researched. Qualitative data may be obtained in the context of a ‘social’ relaxed atmosphere possibly over a meal. Persuasion and positive incentive is sometimes required to achieve a suitable result in achieving an adequate data set.
<table>
<thead>
<tr>
<th>Mode of Data Collection</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| Personal or Face-to Face interviews | ➢ Can establish rapport and motivate respondents.  
➢ Can clarify the question, clear doubts, add new questions.  
➢ Can read non verbal cues.  
➢ Can use visual aids to clarify points.  
➢ Rich data can be obtained  
Computer assisted personal interviewing and responses entered in a portable computer | ➢ Takes personal time.  
➢ Costs more when wide geographic region  
➢ Respondent’s concern regarding confidentiality issues  
➢ Interviewers need to be trained  
➢ Can introduce interviewer biases  
➢ Respondents can terminate the interview at any time | |
| Telephone Interviews | ➢ Less costly and speedier than personal interviews.  
➢ Can reach a wide geographic area.  
➢ Greater anonymity than personal interview.  
➢ Can be done using computer assisted telephone interviews. | ➢ Non-verbal cues cannot be read.  
➢ Interviews will have to be kept short.  
➢ Obsolete telephone numbers could be contacted, and unlisted ones omitted from the sample | |
| Personally Administered Questionnaire | ➢ Can establish rapport and motivate respondent.  
➢ Doubts can be clarified.  
➢ Less expensive when administered to groups of respondents.  
➢ Almost 100% response rate assured.  
➢ Anonymity of respondent is high. | ➢ Organisations may be reluctant to give up company time for the survey with groups of employees assembled for the purpose. | |
| Mail Questionnaires | ➢ Anonymity is high.  
➢ Wide geographic regions can be reached.  
➢ Token gifts can be enclosed to seek compliance.  
➢ Respondent can take more time to respond at convenience.  
➢ Can be administered electronically, if desired. | ➢ Response rate is almost always low – a 30% rate is quite acceptable.  
➢ Cannot clarify questions.  
➢ Follow-up procedures for non-responses are necessary. | |
| Electronic Questionnaires | ➢ Easy to administer.  
➢ Can reach globally.  
➢ Very inexpensive.  
➢ Fast delivery  
➢ Respondents can answer at their convenience like the mail questionnaire | ➢ Computer literacy is a must.  
Respondents must have access to the facility.  
➢ Respondent must be willing to complete the survey. | |

Source: Sekaran (2000)
5.6.10 Ethical issues and approval

Ethical approval can be required if information is being sought from a potentially vulnerable target population. Additionally the information being sought may constitute risk for either the researcher or the interviewee. The Central Office for Research Ethics is available to the National Health Service and can be contacted where appropriate for seeking the required approval.

Ethical considerations can be gauged at the various stages of the survey process. Care needs to be taken not to exploit the respondents at all key stages including:

- Entering the field of research where it could be possible to misrepresent oneself
- Working in the field where one could exploit the subjects with whom the researcher is working
- Leaving the field with possible ‘bad grace’ or tension between researcher and subjects
- Publication of results particularly if there are confidentiality issues

Discussion with supervisors is essential prior to formulation of a research survey to ascertain whether ethical approval is required and the procedures necessary to be followed to gain approval when sensitive data is sought or in areas where politics and finance are key features.

5.7 Conclusion

This chapter has sought to present information required to assist in the construction of a theoretical framework on which to address the research problem and the arising intuitive questions. Attention has been given to the scientific tenets on which effective research is based in order to achieve academic rigour. Both quantitative and qualitative methods are given consideration to address the research problem. The practical and pragmatic aspects of the topic chosen for study have led to a favouring of a people-centred approach as opposed to a purely theoretical study.

The research topic is framed in the context of its relevance to the emergency medical community and the relief organisations and presents a logistical challenge induced by
the suffering of victims of natural disasters. The creative tension between a project focus and an academic study is accepted.
CHAPTER 6 RESEARCH DESIGN AND METHODS

6.0 Introduction

The previous chapter provided the academic and theoretical framework upon which the methodology can be undertaken. The study design and methodology seek to address the research problem and arising intuitive questions.

The research problem is the delays encountered by the relief-providers in reaching disaster victims within the disaster management process.

The intuitive questions arising from the research problem include:

- What are the most significant resistance factors to rapid response in the emergency disaster relief processes?
- What interventions could be made to address these resistance factors?
- What specific management decisions need to be adopted to prevent resistance factors to rapid response at the organisational level?
- Has the IDNDR had a significant impact in minimising the losses occurring from natural disaster?
- What further research work could be undertaken to address the findings and limitations of the field of study undertaken?

To achieve the above objectives both qualitative and quantitative data sampling is favoured together with the use of interviews and the distribution of a questionnaire. Effort will be given to achieve triangulation within the obtained data.

This chapter seeks to demonstrate the implementation of the methodology in a systematic fashion through the appropriate stages. Attention is given to the conceptual funnel of Marshall and Rossman (1999) and the model of Neuman (2000) which sets out the stages in the research process from the theoretical through empirical level and then back to the theoretical.

The stages will be presented under the headings of:

Pre-Study

- Identifying the research problem
Restating the problem in question form
Formulation of the research problem
Designing an appropriate research protocol
Designing an effective sampling tool
Testing the sampling tool
Pilot survey

Main study

Distribution of the sampling tool
Data collection
Data analysis and interpretation
Reliability of the data set

Specific attention is given to the validity of the questions presented in the survey together with the reliability of the scales used, in order to provide authenticity to the findings and outcomes of the study. Explanation is given where formulae are used to assist in the processing of the data. Shortcomings of the survey design are presented where appropriate.

6.1 Pre-Study

6.1.1 Identifying the research problem

As stated in the introduction the research problem has come to light through the substantial rise in natural disaster deaths over the last decade. Delays in reaching wounded victims have led to substantial secondary morbidity and mortality. The IDNDR was instigated to address the problem of rising losses through natural disasters seeking to encourage increasing dialogue within members of the scientific community and to suggest mitigating strategies under the heading of DMP. The issues raised within the IDNDR have triggered a particular interest in this topical dilemma resulting in identification of a specific problem within the wider problem of increased disaster losses.

The research problem is the delay time between relief-provider reaching disaster victims. This is the subject that will be pursued.

Further investigation into the research topic has been undertaken through the following avenues:
Conferences and lectures
Journal articles and organisational reports
Literature searches in libraries – post graduate medical centre, Guildford University and Royal Society of Medicine for books and journal articles.
World congresses on disaster and emergency medicine
Meetings with personnel engaged in disaster response and emergency relief aid at local and national/international levels
Web sites: United Nations departments, World Health Organisation, Department for International Development (DFID) and others
Discussions with victims of natural disasters and those attending both at the time of impact and in the recovery/rehabilitation phase
Discussions with medical colleagues engaged in disaster response
Electronic information from colleagues through e mail contact
Museums and archive data at Red Cross museums at Winchester and Geneva
Newspaper and media reports

6.1.2 Restating the problem in question form

The obvious question posed by the research problem is ‘why the delay?’ Further questions flow from this basic question and include ‘what obstacles are being encountered along the way?’ This therefore gives rise to a set of possible variables that could be presented to an appropriate target population to find data that could be analysed. Because the research problem is so broad it seemed likely that many obstacles would be encountered that could impact upon a rapid response to a disaster zone. It could be stated that certain obstacles will be more difficult to overcome than others and have a higher significance. This then leads to a possible question regarding the significance or importance of any individual obstacle or variable. ‘How significant is this particular obstacle?’ could be offered as a relevant question in order to gauge a hierarchy of problematical factors.

Delays have been given the terminology of resistance factors to rapid response or RF.RR to cover the broad spectrum of variables that are included within the research problem. Resistance is defined as any force that tends to oppose or retard motion. A factor is defined as an element that actively contributes to a result or process; a cause (Univ.
dict.). From the functional aspect the term RF.RR relates to any influence that adversely affects the prompt and efficient movement of relief-provider to a disaster victim.

The close proximity of the IDNDR and the focus of attention on DMP strategies lends itself to a question in the decade after the close of the initiatives. 'Has the IDNDR had any effect on outcomes of natural disasters with regard to reduction of losses?' becomes a highly pertinent question.

### 6.1.3 Designing a research protocol

Four stages were considered appropriate to the research protocol and the first and second stages were devoted to engagement with the disasters community and familiarisation with the problems encountered by the members of emergency relief organisations. Structured interviews were conducted in both first and second stages. Attendance at disaster zones added an important dimension enabling the researcher to experience the problems in rapid response first hand. Background reading and attendance at conferences and congresses were an integral part of the first phase.

Stage three of the research protocol was devoted to conducting a survey within members of the World Association for Disaster and Emergency Medicine (WADEM) and other disaster relief organisations. Pre-test, pilot study and full survey were an important part of phase three.

Stage four was devoted to data collation and data processing. The following table illustrates the four stages of the Research protocol.
### Table 6.1 The Research Protocol

<table>
<thead>
<tr>
<th>Phase</th>
<th>Sample</th>
<th>Methods</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1&lt;br&gt;Prolonged study&lt;br&gt;leave Jan- July 2001</td>
<td>• Engagement with disaster community including NGOs and emergency relief organisations.&lt;br&gt;• Engagement with victims of earthquake El Salvador 13.2.01</td>
<td>• Discussions and meetings with personnel from NGOs, Government departments, UN departments&lt;br&gt;• Treating victims of earthquake.&lt;br&gt;• Literature and library searches.&lt;br&gt;• Conferences and congresses</td>
<td>• Familiarisation with disaster community and academic requirements of research process.&lt;br&gt;• Learning more about the natural disaster process and response strategies.&lt;br&gt;• Establishing a network of potential contacts.&lt;br&gt;• Feeling the pain and vulnerability of an acute natural disaster.</td>
</tr>
<tr>
<td>Stage 2&lt;br&gt;Interviews with Disaster Community organisations&lt;br&gt;Jan – July 2001</td>
<td>• Key members of government agencies, NGOs and United Nations Departments</td>
<td>• Structured interviews with prior agenda and 34 questions</td>
<td>• Identifying RF.RR&lt;br&gt;Establishing relationship of trust&lt;br&gt;Establishing network</td>
</tr>
<tr>
<td>Stage 3&lt;br&gt;Surveys within WADEM and the disaster response organisations&lt;br&gt;July 2001 – July 2005</td>
<td>• Pre-test: Consultant staff from Accident and emergency departments.&lt;br&gt;• Pilot: Random sample WADEM members&lt;br&gt;• Main survey: Members of WADEM and NGOs and others engaged in disaster response</td>
<td>• Questionnaire</td>
<td>• Testing questionnaire&lt;br&gt;• Investigating the outcome of the pilot data&lt;br&gt;• Exploring the perceptions of disaster community to RF.RR regarding importance of individual factors and hierarchy&lt;br&gt;• Gaining reliable data</td>
</tr>
<tr>
<td>Stage 4&lt;br&gt;Data collation&lt;br&gt;Jan 2004 – September 2005</td>
<td>• 107 completed questionnaires</td>
<td>• Measurements and processing with use of SPSS. Statistical factor analysis and extraction.</td>
<td>• Obtaining detailed information from data processing including hierarchy or RFTRR and qualitative findings relevant to discussion chapter and final feedback to disasters community</td>
</tr>
</tbody>
</table>

Table illustrating the research protocol with four stages and relevant time frames

The construction of a survey protocol was dependent on identifying RF.RR that were hampering relief efforts within the disasters community. For this reason interviews were undertaken in the early stages of the survey in order to gain vital information from personnel familiar with the problems and open to sharing information. From these
interviews a set of variables was obtained relevant to rapid disaster response strategies within disaster management. Additionally discussions with disaster victims and experiencing the problems of delays first hand in a disaster zone gave further insights into RF.RR variables. An added benefit from interviewing key people in prominent disaster-relief organisations was the provision of qualitative material useful to the findings section of the research outcomes. The following table illustrates the people and organisations that assisted in the identification or RF.RR.

Table 6.2 Organisations and institutions assisting in identifying RF.RR variables

<table>
<thead>
<tr>
<th>Non-Government Organisations</th>
<th>Government Organisations</th>
<th>International Organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Federation of Red Cross and Red Crescent Societies (IFRCRCs) Geneva</td>
<td>Department of Health San Salvador</td>
<td>Compassion International with operational relief El Salvador earthquake</td>
</tr>
<tr>
<td>Tearfund UK rapid response section and disaster mitigation personnel Teddington</td>
<td>British Embassy San Salvador</td>
<td>United Nations Office for Coordination of Humanitarian Affairs (UNOCHA)</td>
</tr>
<tr>
<td>Medicins sans Frontieres San Salvador</td>
<td>British Consulate Istanbul Turkey</td>
<td>U.N. dept. for civil and military coordination</td>
</tr>
<tr>
<td>Oxfam team operational in disaster zone El Salvador</td>
<td>British Geological Survey (BGS) UK</td>
<td>U.N. dept for international Search and Rescue (INSARAG)</td>
</tr>
<tr>
<td>MasterServe UK and Turkey plus disaster zone appraisal Duzje and Izmir</td>
<td>Institute for Geological and Nuclear Science (IGNS) NZ</td>
<td>UN dept for On Site Operations Coordination (OSOCC)</td>
</tr>
<tr>
<td>Compassion UK Weybridge</td>
<td>British Council Wellington</td>
<td>UN dept for International Strategy for Disaster Reduction (ISDR)</td>
</tr>
<tr>
<td>Wellington City Council disaster mitigation group and hazards team</td>
<td>Wellington City Council disaster mitigation group and hazards team</td>
<td>World Health Organisation (WHO) Emergency Humanitarian Action dept (EHA)</td>
</tr>
</tbody>
</table>

Questions were presented at structured interviews in various global locations. These were particularly helpful and the presence of an observer added a positive dimension regarding data recording, objectivity and preventing bias. Travelling to various locations to conduct the interviews gave insights into different cultures and attitudes together with the opportunity of gleaning information regarding RF.RR. The interviews in general were formal and structured but a flexible approach had to be adopted depending on the organisation. A pre-amble included welcome and introductions and explanations. The
questions posed were intended to probe the organisation for efficiency in response and were not regarded as comprehensive. They did however present a good introduction to the subject with other discussions ensuing. The typical questions relating to RF.RR are presented below:

Table 6.3 List of RF.RR–related questions asked at meetings in various global locations preparatory to formulation of a research instrument

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Where in your view are the weaknesses in the Disaster Relief Process?</td>
</tr>
<tr>
<td>2</td>
<td>How does your department seek to address these weaknesses?</td>
</tr>
<tr>
<td>3</td>
<td>How quickly can your department respond to a humanitarian disaster?</td>
</tr>
<tr>
<td>4</td>
<td>What resistance factors do you meet regarding rapid response?</td>
</tr>
<tr>
<td>5</td>
<td>Have you any advice for the medical profession regarding improvements in the disaster relief efforts?</td>
</tr>
<tr>
<td>6</td>
<td>In your opinion are more medical resources required at any particular stage of the disaster cycle?</td>
</tr>
<tr>
<td>7</td>
<td>Please specify whether medical resources should be directed to search and rescue, immediate relief or to rehabilitation phase and with what priority.</td>
</tr>
<tr>
<td>8</td>
<td>From where should these resources or funds be sought?</td>
</tr>
<tr>
<td>9</td>
<td>What relationship has your department with NGOs worldwide?</td>
</tr>
<tr>
<td>10</td>
<td>What communication systems do you use with other organisations and the disaster management teams?</td>
</tr>
<tr>
<td>11</td>
<td>What networks and databases do you have at your disposal?</td>
</tr>
<tr>
<td>12</td>
<td>What is your mission statement?</td>
</tr>
<tr>
<td>13</td>
<td>How often are your policies and strategies upgraded?</td>
</tr>
<tr>
<td>14</td>
<td>What appraisal does your department have and to whom are you accountable?</td>
</tr>
<tr>
<td>15</td>
<td>Does your department have a brief for Disaster Mitigation and Preparedness?</td>
</tr>
<tr>
<td>16</td>
<td>If not does it intend to have this as a major agenda item for the future?</td>
</tr>
<tr>
<td>17</td>
<td>Have you seen any improvements in Disaster Planning or Management since the completion of the International Decade for Natural Disaster Reduction (IDNDR)?</td>
</tr>
<tr>
<td>18</td>
<td>What improvements are worthy of comment?</td>
</tr>
<tr>
<td>19</td>
<td>Do you consider that the armed forces should be involved in the disaster relief effort?</td>
</tr>
<tr>
<td>20</td>
<td>If so at which stage or stages do your consider they would best be deployed in the relief effort?</td>
</tr>
<tr>
<td>21</td>
<td>Do you consider that there should be a global, fully trained and equipped search and rescue team on 24 hour alert?</td>
</tr>
<tr>
<td>22</td>
<td>If so, should this come under a United Nations brief?</td>
</tr>
<tr>
<td>23</td>
<td>Do you consider that emergency shelter design and building reconstruction after earthquakes has received sufficient research or priority?</td>
</tr>
<tr>
<td>24</td>
<td>Do you consider that more research is indicated into the location and extraction of buried victims after earthquakes? If so which body should be approached for funds</td>
</tr>
<tr>
<td>25</td>
<td>Do you consider the possible use of fibre optic methods facilitating early ventilation and hydration of buried earthquake victims worthy of further study and funding?</td>
</tr>
<tr>
<td>26</td>
<td>How could the efficiency of individual governments be improved regarding Natural Disaster Management?</td>
</tr>
<tr>
<td>27</td>
<td>What educational resources does your department have regarding Disaster Mitigation and Preparedness?</td>
</tr>
</tbody>
</table>
28 Where are those resources directed – governments, health departments, localities or individual?
29 What priority is given by your department to Advocacy for disaster victims
30 What resources do you have regarding stress management and post-traumatic shock syndrome and is this a high priority for your department?
31 Do you feel that there is a place for consultants in Natural Disaster Management?
32 What degree of thought has been given by your department to command and control strategies in natural disaster management?
33 What pre-emptive strategies are in place in the event of a mega disaster, e.g. a magnitude 8 earthquake under a highly populated city such as Istanbul?
34 Who would command the search and rescue effort?

Table illustrating the quality and quantity of questions directed to the disaster relief community prior to formulation of the research tool (personal compilation pc).

From the discussions and background reading together with conference and congress attendances a list of 46 variables were obtained for inclusion into a sampling tool.

6.1.4 Designing an effective sampling tool

In conjunction with advice from supervisors the appropriate sampling tool was considered to be a questionnaire. The decision was taken in order to provide a vehicle within which the large quantity of variables could be scrutinised and the perceptions of the respondents measured. Attention was given to questionnaire design with appropriate scales and measurements giving special attention to reliability of the scale. Information was sought regarding questionnaire design from background reading.

6.1.4.1 Background information to questionnaire design

Questionnaires are often used to conduct surveys within which scales are included to measure responses. Much work has been done in this field regarding questionnaire design and the literature gives scope for obtaining important facts needed to be taken into consideration prior to final formatting of a questionnaire. (Oppenheim 1992). In the design process the importance of reliability and validity of the scale employed needs to be given specific attention. Regarding reliability Nunnally (1978) recommends the use of the Cronbach’s coefficient alpha statistic using ranges from 0-1 with higher values indicating greater reliability. Regarding validity of the intended scale, attention was given to content validity, criterion validity and construct validity as background focus in planning the
questionnaire design (Pallant 2005). Closed and open-ended questions can be employed when undertaking a survey and both will evoke different responses. Open-ended questions lend themselves to qualitative analysis whereas closed questions can be used to provide numerical measures and assessments. Sound documentation of demographic detail is required where further exploration of correlation between groups of individuals and processing of data is required. The Likert scale can be used for formatting specific responses to closed questions.

The Likert technique presents a set of attitude statements. Subjects are asked to express agreement or disagreement on a point scale. Each degree of agreement is given a numerical value from one to five or more, thus enabling a total numerical value to be calculated from the responses. In the Likert scale decision needs to be undertaken as to how many response steps should be included. A one to ten scale gives a wider range of possible scores and increases the statistical analyses available to the surveyor. DeVellis (1991) provides a good discussion regarding the advantages and disadvantages of different response scales. Pallant (2005) stresses the need for clear instructions for the potential respondents within the target population. Minimising ambiguity and confusion is a vital part of sound questionnaire function in order to obtain satisfactory data suitable for statistical analysis. Oppenheim (1992) gives suggestions regarding presentation and wording of statements within a questionnaire including the avoidance of long, complex questions, double negatives, jargon or abbreviations, culture-specific terms and leading questions.

Piloting of questionnaires to assess the user effectiveness and efficiency of achieving the desired outcomes is essential and this can be done either as a single entity pilot survey or two-stage with initial trialling of the questionnaire within a small group of specialists. The latter pilot programme was thought to be of interest and relevance regarding the development of the sampling tool/questionnaire to be used in this study.

Attention needs to be given to sample size. Tabachnick and Fidell (2001) review this issue and suggest that it is comforting to have a sample size of 300 cases if statistical factor analysis is going to be undertaken. Smaller sample sizes are conceded as being valid if certain criteria are fulfilled including high loading marker variables (above 0.8). Stevens (1996) suggests that the sample size requirements have been reducing over the years as more research has been undertaken on the topic. A substantial sample size was
sought with the intention of performing factor extraction using principal component analysis, and thereafter factor rotation using the Varimax method to obtain data reduction of a large number of variables to a workable factor grouping. A comparison of the characteristics of the different rotation methods has been described including that using Varimax rotation. Tabachnick and Fidell (2001 p 615).

6.1.4.2 Development of the Sampling Tool

Taking into consideration the information ascertained from experts in the field of questionnaire design the initial construction of the sampling tool was undertaken. Having successfully identified 46 variables from discussions and interviews with the disasters community it was possible to give attention to the construction and formatting of a questionnaire. The first draft attempt was subjected to scrutiny from supervisors and a statistician with expertise in questionnaire design. Some of the initial assumptions made were naïve and had a singular lack of awareness of what would be expected to produce reliable data suitable for statistical analysis. Guidance was readily accepted from those familiar with the task. The first draft did however give attention to both qualitative and quantitative aspects but a modification and refining was necessary.

6.1.4.3 The draft questionnaire

The initial document contained four sections:
1 Demographic detail, name and organization only
2 A list of 46 variables or resistance factors, seeking agreement within the spectrum of significance using the Likert scale from 0-10
3 A question concerning the perception of effectiveness of the International Decade for Natural Disaster Reduction (IDNDR)
4 An open-ended question seeking opinion regarding resistance factors to rapid response and DMP.

The latter question was necessary in order to obtain qualitative data for thematic observations and discussions. In the first instance no advice or consultation was sought regarding the construction or the format of the questionnaire as a research tool. The original questionnaire prior to modification and specialist advice can be viewed in Appendix B.
6.1.5.4 Progression and modification of the questionnaire

Discussions took place with a recognized statistician concerning the functionality of the questionnaire in the above format. Constructive alterations were made including the addition of ten demographic variables. Additionally an extra section was inserted inviting the respondents to present their five most significant RF.RRs on a one to five ranking scale. Finally a question was inserted regarding whether each respondent had received training in disaster management.

Discussion concerning the grammatical accuracy of a different presentation of the Likert scale took place regarding the possible use of the terminology of 'extremely insignificant' and 'extremely significant' at the boundaries of a ten point response scale. Additionally the presentation of questions in the neutral was a discussion point that needed clarification and understanding from the statistical validity aspect. The problem of presenting biased questions was understood, leading to modification of the questions to the neutral. The questionnaire in modified form is available in Appendix B. Initially the variables were not numbered and this led to difficulties in data processing and hence numbering was adopted early in the survey duration.

6.1.5.5 The Questionnaire 'Resistance Factors to Rapid Response in Natural Disaster Scenarios'

This can be viewed in full in Appendix B but the structure consists essentially of the following format:

**Section 1 – demographic questions:**
- Age
- Gender
- Nationality
- Organisation
- Geographical location of organisation (city and country)
- Professional status
- Qualifications
- Number of years in disaster management
Number of incidents attended

**Section 2 – RF.RRs**

- Presentation of 46 variables constituting resistance factors offered for measure of perception on a scale of 1-10 from extremely insignificant to extremely significant (Likert scale method).

**Section 3- combination of direct and open ended questions**

- Further scaled choice seeking the top five, in rank order, from the 46 factors offered in section 2. 1-5 scale offered, with 1 the highest ranking factor
- Direct question re.whether training received in disaster management
- Direct question re.whether responder considered that there had been improvement in response times through the influence of the IDNDR
- Open-ended question inviting comment on RF.RRs and DMP.

6.1.5.6 Pre-test of Questionnaire

A pre-test of the questionnaire was undertaken using contacts within the Accident and Emergency fraternity of the United Kingdom, to assess whether the sampling tool was workable. Five very helpful responses were received with completed questionnaire and appropriate comments. This being the case, and the construction of the questionnaire having met with approval from the supervisors and specialist in questionnaire design, a pilot project was launched using members of the World Association for Disaster and Emergency Medicine (WADEM).

6.1.6 The World Association for Disaster and Emergency Medicine (WADEM)

WADEM is an international organisation of medical personnel with a specialist interest in disaster medicine. It was established by a group of American anaesthetists with an interest in pre-hospital and disaster medicine in 1978. One of the founder members was Dr Peter Safar (1924-2003), an internationally acclaimed specialist in anaesthesia and emergency medicine who pioneered the technique of mouth-to-mouth resuscitation. Many of the members are operational in disaster response and the armed forces are represented. Their scope of operation is not limited to natural disasters but engages on all potential mass casualty scenarios, including terrorism and human-generated disasters. Some members are from academic institutions, providing education in the field of disaster management,
and many have membership and affiliation to other organisations devoted to the problems
of mass casualty events. WADEM circulates a quarterly journal of Pre-hospital and
Disaster Medicine to its members. Additionally international congresses are held bi-
annually at different locations around the world, at which papers are presented on topics
relevant to the disasters community including crises attended within the preceding two
years. Membership of this organisation made the approach to its members seem
appropriate.

6.1.7 Pilot Project using WADEM

- The directory of members of WADEM (2000) was used to select names and
contact details for the pilot study. The directory contained 320 names. This was
considered at the time to be sufficiently up-to-date to give a good degree of accuracy
regarding content and contact details.
- 41 members of WADEM were selected at random from the directory and contact
was sought through the postal service. A covering letter accompanied the questionnaire.
The details of the contact letter and subsequent contact can be viewed in Appendix B.
There were 4 returns from this process.
- It was decided to send a more personalised letter to the 37 members who had not
replied using less formal language and appealing to their sense of loyalty to a fellow
member whom they had met at the Annual Congress in 2001. (Appendix B). This method
yielded a return of five more questionnaires, plus one letter from a member who had
retired eight years previously and did not feel able to answer the questionnaire
adequately.
- The 10 responses in total gave a 24.4% response which was deemed adequate.

The details of the pilot study can be viewed with clarity in the following Table 6.4
Table 6.4 Details of the Pilot Study

<table>
<thead>
<tr>
<th>Source</th>
<th>No. of entries</th>
<th>No. of returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>WADEM directory of members</td>
<td>320</td>
<td></td>
</tr>
<tr>
<td>Selection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) random plus letter of invitation</td>
<td>41</td>
<td>4</td>
</tr>
<tr>
<td>b) specific plus informal ‘warm’ letter</td>
<td>37</td>
<td>6</td>
</tr>
<tr>
<td>Circulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postal service, national/international</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>Returns/sent %</td>
<td>10/41 x 100</td>
</tr>
</tbody>
</table>

Table indicating the details of circulation of the research questionnaire to the target group and numbers returned within the pilot study (pc)

6.2 Main Study

6.2.1 Full Survey using Questionnaire

With adequate responses to the pilot project a full survey was conducted using four main sources namely:-

- WADEM members
- Non Government Organisations (NGOs)
- Members of Search and Rescue teams (SAR)
- United Nations departments engaged in disaster response and humanitarian aid

The approaches were made chiefly electronically via e-mail and some by post. Responses were received by both routes. The circulation included members of the medical profession but did not restrict itself entirely to the medical fraternity as emergency response covers both the movement of personnel and resources to a disaster zone of medical and non-medical equipment and supplies.

WADEM members were the main target population but contacts within NGOs and Government Departments were also approached to gain completed questionnaires. The circulation was performed in groups of ten and the distribution continued over several months.
Table 6.5 Details of numbers and routes of dissemination of the main study

<table>
<thead>
<tr>
<th>Source</th>
<th>No. of Questionnaires sent</th>
<th>Response numbers</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>WADEM</td>
<td>279 (Oct. 2002)</td>
<td>33</td>
<td>Use of WADEM 2000 directory</td>
</tr>
<tr>
<td></td>
<td>20 (July 2003)</td>
<td>6</td>
<td>New membership of WADEM</td>
</tr>
<tr>
<td></td>
<td>24 (Jan 2005)</td>
<td>9</td>
<td>Congress committee</td>
</tr>
<tr>
<td></td>
<td>311 (May 2005)</td>
<td>28</td>
<td>Targeted members – delegates on 14th World Congress</td>
</tr>
<tr>
<td>NGOs</td>
<td>23</td>
<td>10</td>
<td>Tearfund main source with others recommended by them</td>
</tr>
<tr>
<td>UN depts</td>
<td>6</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>SAR</td>
<td>54</td>
<td>8</td>
<td>Details from OCHA website</td>
</tr>
<tr>
<td>Totals</td>
<td>717</td>
<td>98</td>
<td>Percentage yield 13.7</td>
</tr>
</tbody>
</table>

Table indicating the numbers of questionnaires circulated to the various target groups with details of responses (pc)

Addition of the nine returned questionnaires from the pilot survey to the main study made a grand total of 107 questionnaires for data analysis. The total number of questionnaires sent was 758.

6.2.1.1 Comments on the responses from the main questionnaire survey

The difficulties encountered included out-dated WADEM directory and returned mail un-opened as a consequence. This made the process of distribution and returns longer than anticipated and led to some discouragement in the early stages.

The tsunami disaster in S. E. Asia highlighted the deficiencies in rapid response strategies and this galvanised the researcher and members of WADEM to participate more fully in the research programme, hence the comparative surge in responses in 2005. A further ‘push’ was made with ‘fresh’ contact details from the delegates of the 14th World Congress for Disaster and Emergency Medicine 2005.
Electronic contact became the favoured method as the survey period progressed as the postal service appeared unreliable with such a global ambit.

6.2.1.2 Summary of difficulties encountered with the survey

Certain difficulties were encountered regarding circulation and return of the questionnaire. Several factors impacted upon this including the following:

Difficulties:

- Out of date WADEM directory
- Inefficiency of distribution process
- Low initial return rate
- Some members unwilling to participate
- The need for further ‘encouragement’ to participate in the study increasing the time frame of the survey
- Resistance to Rapid Response RF.RR affecting process! The Hydra could be regarded as a pernicious presence detracting from identification of itself.
- Other life pressures impacting on the survey process namely WADEM members being extremely busy with possible engagement in emergency relief efforts globally

In total 758 questionnaires were distributed with an overall return of 107 completed questionnaires. For the sample size this was considered adequate response for proceeding to the next stage of data analysis including factor extraction and qualitative assessment.

6.2.2 Data Collection process

The returned questionnaires were collected and examined for content and completeness. The numeric scores were computer-entered using Windows Excel facility. Each individual completed questionnaire was given the same attention and
entry. The entries were performed methodically and accurately. The sample size accumulated in this way resulting over an approximate three year period of 107 completed entries onto the computer system. No acknowledgement of receipt of the questionnaire was given unless specific questions were asked needing clarification over a practical point relating to the survey process.

The numeric values were logged appropriately on the computerised system in a format consistent with the format of the questionnaire namely:

- Demographic
- 46 variables (RF.RR)
- Top 5 RF.RR.
- Training y/n
- IDNDR y/n

The comments section relating to the topic of RF.RR were filed manually initially and transferred to computer at a later date.

Secretarial assistance was utilised for the data entry process and for filing and maintaining cohesion of the information within an office setting.

No problems were encountered at the data collection stage of the survey.

6.3.0 Data processing

6.3.1 Introduction

Having achieved an adequate sample of responses from the disaster community regarding the perceived importance of individual RF.RR and a hierarchy of the top five choices of the most significant from the 46 presented, together with demographic details, it was possible to proceed to the next stage of analysing the data and seeking meaning from the information. At the outset of the research programme it was not anticipated that in-depth statistical analysis would be featuring due to the high content of qualitative input. It was however decided that a statistical approach could be adopted because of the 'good quality' of data sampling achieved. This demanded an understanding of the principles and processes involved in statistical data analysis and factor extraction.

6.3.2 Systems and data entry
Data processing was undertaken using the SPSS system version 13 for Windows. The questionnaires provided material for computer entry using SPSS and the data was loaded in a systematic, albeit laborious, fashion. Variables were provided from sections one and two of the questionnaire providing:

- 7 Demographic variables
- 46 RF.RR variables

Section 3 details were not deemed appropriate for data analysis in this way and were assessed manually.

Data processing was undertaken employing the SPSS system in conjunction with professional advice. Additionally the utilisation of the SPSS survival manual (Pallant 2005) was necessary.

The data was tested for reliability as demonstrated below and factor extraction undertaken with the intention of producing groupings of factors relevant to interpretation, and providing material for the discussion section. This process sought to reduce the large number of variables to manageable proportion for further assessment and interpretation.

6.3.3 Introduction to data processing towards factor analysis

This section provides guidance into the way that the data obtained from the questionnaire was subjected to statistical evaluation and interpretation using the SPSS data processing software.

6.3.4 Assessment of the suitability of the data for factor analysis

The sample size was comparatively small and it is recommended that the larger the sample size the more reliable the correlation coefficients among the variables (Pallant 2005). Factors obtained from small data sets do not tend to generalise as well as those obtained from larger samples. After discussion with a highly competent statistician the sample size of 107/734 was considered to be sufficient for proceeding with factor analysis. Tabachnick and Fidell (2001) suggest that it is comforting to have a sample size of at least 300 cases. However Stevens (1996) points out that sample size requirements advocated by researchers has been reducing over the years. In the data set obtained from the questionnaires several items had high loading marker variables above 0.80 which gave a positive thrust towards suitability of the sample size.
6.3.5 Reliability of the scale

The internal consistency of the scale being employed using the 46 variables obtained from the questionnaires in section 2 was tested using the Cronbach's alpha coefficient. It is recommended that the coefficient value should be above 0.7. In the scale of variables obtained from the questionnaire the Cronbach's Alpha score was 0.903 giving ample evidence of reliability of the scale.

6.3.6 Factor Extraction

This process involves determining the smallest number of factors that can be used to best represent the interrelations among the set of variables (Pallant 2005). The approach employed was 'principal components' analysis. The recommendation of Tabachnick and Fidell (2001) was taken regarding adopting an exploratory approach, experimenting with different numbers of factors, until a satisfactory solution was obtained. In this exploratory process use was made of the three recommended techniques including:

- Kaiser criterion (Kaiser 1974)
- Scree test (Catell 1966)
- Parallel analysis (Watkins 2000)

In the Kaiser criterion only factors with eigenvalues of 1.0 or more are retained for further investigation where the eigenvalue represents the amount of total variance explained.

Catell's Scree test was employed which involves plotting each of the eigenvalues of the factors and inspecting the plot to find a point at which the shape of the curve changes direction and becomes horizontal. The recommendations of Catell were followed retaining all factors above the elbow.

Parallel analysis

This technique was employed which involves comparing the size of eigenvalues with those obtained from a randomly generated data set. The Monte Carlo software package was installed and utilised for this purpose to achieve the parallel analysis.
Factor rotation
This step was undertaken using the SPSS facility and choosing the Varimax technique as advocated (Pallant 2005). This technique presents the pattern of loadings in a fashion that is easier to interpret.

6.3.7 Summary of the data processing

Data entry and processing was undertaken producing an adequate sample size with reliable scale, with Cronbach’s alpha coefficient of 0.9 making the data variables suitable for factor extraction. The analysis undertaken was principal component analysis employing the Kaiser criteria and the Catell Scree plot with subsequent Varimax rotation technique. The process was successfully achieved providing four factors which represented the interrelations among the set of variables. The interpretation of these extracted factors will be discussed in the findings chapter.

6.4 Conclusion

This chapter has presented comprehensive information regarding the methods used to examine the research problem by the design of a survey and through the use of a questionnaire as the research tool. Details of the data collection process and the statistical evaluation of the material are summarised. The methods employed were considered to be reliable in addressing the research problem and intuitive questions. Despite a comparatively small sample size reassurance was gained that the quality of the data measurements and scales proved reliable from the statistical tests applied as outlined above.
CHAPTER 7 FINDINGS 1- QUANTITATIVE RESULTS

7.1.0 Introduction

The findings chapters present quantitative and qualitative analysis of the survey material using a semi-structured questionnaire as the research instrument. Of the 734 questionnaires, 107 responses constitute the body of the sample which was used for further analysis. Demographic findings are presented first, followed by a statistical appraisal of the 46 variables, with examination using the SPSS software. From the comment section of the questionnaire various themes arise and these are documented for inclusion in the discussion section. The findings will be presented in two chapter sections 1 and 2, the present chapter dealing with the quantitative findings. Both the quantitative and qualitative investigations seek to satisfy the original mixed paradigm relating to the perception of the disasters community to RF.RR and addressing the hypothesis and intuitive questions.

7.1.1. Demographics of the Sample

Figure 7.1: Gender of the respondents (n = 107)

Chart illustrating the percentage distribution between male and female respondents
The gender division of responses at 86% male and 14% female is an interesting feature and possibly reflects the male career-bias towards disaster and danger, or may simply reflect that there are more doctors globally of male gender. This is conjecture and gives grounds for further study particularly if male attributes are required selectively in the disaster arena. Cultural factors may come into the equation regarding the preponderance of males in the sample. WADEM has a male preponderance and this is more likely to be the relevant factor in the gender discrepancy. WADEM does have some female nurse members and the need for nursing staff in disaster scenarios outweighs the need for doctors regarding attention to wound care and follow up after injury. This will be given further comment in the recommendations and conclusions.

Figure 7.2 Age Groups of respondents

![Figure 7.2 Age Groups of respondents](image)

Figure illustrating the age groups of the respondents to the questionnaire (n=107)

The majority of the respondents fell in the age category 41-60 with the largest group between 51-60 years of age. There is no comment or conclusion to make from these groupings only that this probably reflects the age of the WADEM organisation and the profile is now getting a little top heavy. A substantial number of responders were present in the 61-70 grouping. This is encouraging showing that there has been no early demise from disaster or early retirement from burn out. Operational responders need to be fit and
mobile but being a member of WADEM does not necessarily mean that one is an operational responder. One may be purely within the membership for academic and research purposes. Organisations such as WADEM need to give attention to recruitment of new members otherwise the whole organisation ages and loses potency. 30.8% of the respondents were between 41 and 50 years of age, and 33.6% were between 51 and 60 years. Table 7.1 shows the nationalities of respondents who participated in the survey.

Table 7.1 the nationalities of those who responded to the questionnaire

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of returned QAs</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>22</td>
<td>20.6</td>
</tr>
<tr>
<td>USA</td>
<td>19</td>
<td>17.8</td>
</tr>
<tr>
<td>Australia</td>
<td>11</td>
<td>10.3</td>
</tr>
<tr>
<td>Sweden</td>
<td>6</td>
<td>5.6</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>5</td>
<td>4.7</td>
</tr>
<tr>
<td>Japan</td>
<td>5</td>
<td>4.7</td>
</tr>
<tr>
<td>Norway</td>
<td>4</td>
<td>3.7</td>
</tr>
<tr>
<td>Austria</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>Canada</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>Denmark</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>India</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Israel</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>New Zealand</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Portugal</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Singapore</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Taiwan</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Turkey</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Belgium</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>China</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Egypt</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Finland</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Germany</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Greece</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Holland</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Malta</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Mexico</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Nigeria</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Poland</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Romania</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Russia</td>
<td>1</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Table illustrating the nationalities of the respondents to the questionnaire including absolute numbers and percentages

30 different nationalities responded to the questionnaire, predominantly from the developed world. 20.6% of the response came from people within the United Kingdom, 17.8% from colleagues in the United States of America and 10.3% from those in Australia. 50% of respondents to the questionnaire were from UK, USA and Australia.
where English is the first language It is easier for people whose first language is English to respond to a detailed questionnaire, and this may account for there being less response from other parts of the world.

There is a preponderance of British and American respondents which reflects the membership of WADEM organisation itself. It may also reflect a willingness to respond to a fellow countryman with regard to the British contingent. The high number of Australians may reflect the links that have been forged with Australian members of WADEM on previous occasions. The language issue and the understanding of the questionnaire may figure in the low input from the African states and Indian subcontinent. Sweden and Norway are particularly skilled in rapid response strategies and this may indicate their willingness to participate in the survey. Japan is highly vulnerable to earthquakes and other natural disasters including tsunami. This could possibly be reflected in their reasonable response to the survey. Norway and Sweden are well represented in WADEM and the journal of Pre-Hospital and Disaster Medicine is shared with the Nordic Society of Disaster Medicine. The present director is Norwegian. There is a growing need for attention to disaster and emergency medicine and it is hoped that there will be ongoing development of disaster medicine as an international speciality within the normal medical curriculum.

**Figure 7.3 Global locations of the respondent group by geographical regions**

![Pie chart showing distribution of respondents by region](image)

Figure illustrating the locations of the respondents to the questionnaire based on geography, continents and regions (n =107)
Figure 7.4: North Americans (n = 26)

Figure demonstrating the preponderance of respondents from the United States of America in the North American group

Figure 7.5: Australasians (n = 13)

Figure illustrating the preponderance of the Australian respondents to the questionnaire within the Australasian region
Figure 7.6: Scandinavians (n = 13)

Figure illustrating the distribution of the Scandinavian respondents by country

Figure 7.7: Far East (n = 12)

Figure illustrating the distribution of the Far Eastern respondents by country
Figure 7.8: East European (n = 12)

Figure illustrating the distribution of the Eastern European respondents by country

Figure 7.9: West European (n = 10)

Figure illustrating the distribution of West European respondents by country
Figure 7.10: African (n = 2)

Figure illustrating the distribution of the African respondents by country

Table 7.2 Organisations represented by respondents to the questionnaire

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>University and medical school</td>
<td>19</td>
</tr>
<tr>
<td>Hospital</td>
<td>15</td>
</tr>
<tr>
<td>Non government Organisation</td>
<td>12</td>
</tr>
<tr>
<td>Fire or ambulance service, police</td>
<td>10</td>
</tr>
<tr>
<td>Emergency medicine (EM)</td>
<td>10</td>
</tr>
<tr>
<td>Government</td>
<td>8</td>
</tr>
<tr>
<td>Public health</td>
<td>8</td>
</tr>
<tr>
<td>Defence forces</td>
<td>7</td>
</tr>
<tr>
<td>EM management</td>
<td>7</td>
</tr>
<tr>
<td>WADEM</td>
<td>4</td>
</tr>
<tr>
<td>Search and Rescue (SAR)</td>
<td>4</td>
</tr>
<tr>
<td>United Nations</td>
<td>2</td>
</tr>
<tr>
<td>Save Accident Victims Association of Nigeria SAVAN</td>
<td>1</td>
</tr>
</tbody>
</table>

Table illustrating the representation by organisation of the respondents of the questionnaire
There was a medical bias in the target population for the questionnaire and 50% of those who responded worked in a medical environment.

The distribution of the organisations represented is interesting and represents a wide cross section of participants in the survey across the spectrum of disaster response. It is particularly encouraging to see the engagement of universities and medical schools and hospitals. The operational thrust is seen in the representatives from the fire and rescue services, search and rescue and emergency medicine contingent. Public health representation is appropriate and encouraging as so many public health issues emerge in disasters from epidemiology to emergency needs assessment and issues relating to clean water and sanitation. It is somewhat incongruous that there is such a small number stating that they represent WADEM. This highlights a problem relating to questionnaire completion and many of the responders are in fact members of WADEM but have chosen to state their *day job*. The high representation from university and medical school may indicate the growing level of interest and profile afforded to disaster medicine.

**Table 7.3 the professional status of respondents to questionnaire (n =132)**

<table>
<thead>
<tr>
<th>Professional status</th>
<th>Number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical doctor</td>
<td>65</td>
</tr>
<tr>
<td>Search and Rescue</td>
<td>15</td>
</tr>
<tr>
<td>Academic</td>
<td>14</td>
</tr>
<tr>
<td>Manager/administrator</td>
<td>14</td>
</tr>
<tr>
<td>Co-ordinator for disaster management</td>
<td>7</td>
</tr>
<tr>
<td>Ambulance service</td>
<td>5</td>
</tr>
<tr>
<td>Nurse</td>
<td>4</td>
</tr>
<tr>
<td>Fire service</td>
<td>2</td>
</tr>
<tr>
<td>Engineer and logistics</td>
<td>2</td>
</tr>
<tr>
<td>Psychologist</td>
<td>2</td>
</tr>
<tr>
<td>Dental surgeon</td>
<td>1</td>
</tr>
<tr>
<td>Clinical pharmacologist</td>
<td>1</td>
</tr>
</tbody>
</table>

Table illustrating the professional status of the respondents to the questionnaire with high preponderance of doctors

Several people listed more than one category/job in their response.
Figure 7.11: Specialities of medical respondents to questionnaire (n = 65)

Chart illustrating the professional specialities of the respondents to the questionnaire

These categories are rather general. The format of the questionnaire did not lend itself to more detail. 33.3% of those replying did specialise in Emergency and Disaster medicine. As seen from the chart there were three times more physicians than surgeons in the responding group and a large proportion of emergency medicine specialists which may include physicians, surgeons and anaesthetists. Description of role can vary from country to country and a specialist in emergency medicine in the United States of America may be regarded as an Accident and Emergency consultant in the United Kingdom. The input regarding the survey was welcomed from all quarters. The presence of all the specialities represented in the acute disaster situation is of vital importance. The team approach is the strongest source of containment of a disaster. (Yelland 1998).
Figure 7.12 The number of years worked in Disaster Medicine by respondents to questionnaire (n = 107)

Figure illustrating the number of years that the respondents of the questionnaire have been engaged in disaster medicine.

50% of those targeted have worked in the field for less than 10 years. Almost 37% of the respondents to the questionnaire reported that they had attended 10 or more incidents.

The figures here are self-explanatory but the majority of respondents have had a substantial number of years in disaster medicine with 30% having been in the profession for between 11 and 20 years. The respondents therefore represented many years of experience in disaster and emergency medicine which adds to the weight of reliability of the responses. It would appear that there are long-stay members of this particular profession. The parameter of age of respondent between the groups was given statistical evaluation using the SPSS system but there was found to be no statistically significant variation between the different years of experience if using the age parameter.
The experience of respondents in different parts of the world means that the incidents which they have attended will be different in nature, but the RF.RR which they encounter could well have similarity. This dimension reveals that 54% had been to less than ten incidents whereas a hard core of 27% had attended between 10 and 49 events. 9% had attended even greater numbers. The encouraging aspect is that here is a responding group with much operational experience and who know what they are talking about. This adds to the validity of the sample material. Mention has been made in the findings chapter that the RF.RR may have common threads for each disaster event attended. It has however been stated by one responder that each disaster has different aspects and that RF.RR is context-specific. This statement carries weight and will be discussed further in the appropriate section.

7.1.2 Validity of the Measurement RF.RR Scales

The construct validity of the RF.RR scale, consisting of 46 items, was tested using exploratory factor analysis (Stangor 1998). To achieve this 46 items representing RF.RR were subjected to principal components analysis (PCA) using the SPSS version 13. Initially the suitability of the data for factor analysis was considered with inspection of the correlation matrix. This demonstrated the presences of several coefficients of 0.3 and
higher. The Kaiser-Meyer-Olkin value was 0.799 which was in excess of the recommended value of 0.6 (Kaiser, 1970, 1974) and the Test of Sphericity (Bartlett, 1954) reached statistical significance, giving support to the factorability of the correlation matrix.

The following presentation exhibits the procedural steps performed to substantiate the adequacy of the sampling, the reliability of the data and the factor analysis using PCA and Varimax rotation method with Kaiser normalisation.

### Table 7.4 the Kaiser-Meyer-Olkin (KMO) and Bartlett’s Test of Sphericity

<table>
<thead>
<tr>
<th>Kaiser-Meyer-Olking measure of sampling adequacy</th>
<th>0.799</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartlett’s test of Sphericity</td>
<td></td>
</tr>
<tr>
<td>Approximate Chi-Square</td>
<td>3129.946</td>
</tr>
<tr>
<td>df</td>
<td>1035</td>
</tr>
<tr>
<td>Sig</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table illustrating the KMO and Bartlett’s test of sphericity utilised to test the adequacy of the sample obtained

The adequacy of the sampling using the KMO was found to be greater than 0.6 and the Bartlett’s test of sphericity significant at 0.000. This being the case, factor analysis was deemed to be appropriate to the sample (Tabachnick & Fidell, 2001)

PCA was used as the extraction method and the rotation method Varimax with Kaiser Normalisation. Using the Kaiser criterion components with eigenvalues above 1 were considered suitable for factor extraction. Attention was given to the Total Variance Explained table to assist in this process. This gave an initial number of 11 components with eigenvalues above 1. This is illustrated in Table 7.5.
Table 7.5 Total variance explained table

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
</tr>
<tr>
<td>2</td>
<td>4.084</td>
<td>8.878</td>
</tr>
<tr>
<td>3</td>
<td>2.976</td>
<td>6.469</td>
</tr>
<tr>
<td>4</td>
<td>2.219</td>
<td>4.823</td>
</tr>
<tr>
<td>5</td>
<td>1.848</td>
<td>4.017</td>
</tr>
<tr>
<td>6</td>
<td>1.522</td>
<td>3.309</td>
</tr>
<tr>
<td>8</td>
<td>1.330</td>
<td>2.891</td>
</tr>
<tr>
<td>9</td>
<td>1.163</td>
<td>2.527</td>
</tr>
<tr>
<td>10</td>
<td>1.105</td>
<td>2.402</td>
</tr>
<tr>
<td>11</td>
<td>1.046</td>
<td>2.275</td>
</tr>
<tr>
<td>12</td>
<td>0.972</td>
<td>2.114</td>
</tr>
<tr>
<td>13</td>
<td>0.948</td>
<td>2.060</td>
</tr>
<tr>
<td>14</td>
<td>0.897</td>
<td>1.950</td>
</tr>
<tr>
<td>15</td>
<td>0.737</td>
<td>1.602</td>
</tr>
<tr>
<td>16</td>
<td>0.720</td>
<td>1.566</td>
</tr>
<tr>
<td>17</td>
<td>0.690</td>
<td>1.499</td>
</tr>
<tr>
<td>18</td>
<td>0.616</td>
<td>1.340</td>
</tr>
<tr>
<td>19</td>
<td>0.578</td>
<td>1.257</td>
</tr>
<tr>
<td>20</td>
<td>0.531</td>
<td>1.155</td>
</tr>
<tr>
<td>21</td>
<td>0.490</td>
<td>1.064</td>
</tr>
<tr>
<td>22</td>
<td>0.482</td>
<td>1.047</td>
</tr>
<tr>
<td>23</td>
<td>0.445</td>
<td>0.967</td>
</tr>
<tr>
<td>24</td>
<td>0.427</td>
<td>0.927</td>
</tr>
<tr>
<td>25</td>
<td>0.408</td>
<td>0.887</td>
</tr>
<tr>
<td>26</td>
<td>0.374</td>
<td>0.812</td>
</tr>
<tr>
<td>27</td>
<td>0.365</td>
<td>0.793</td>
</tr>
<tr>
<td>28</td>
<td>0.306</td>
<td>0.665</td>
</tr>
<tr>
<td>29</td>
<td>0.289</td>
<td>0.629</td>
</tr>
<tr>
<td>30</td>
<td>0.278</td>
<td>0.604</td>
</tr>
<tr>
<td>31</td>
<td>0.260</td>
<td>0.566</td>
</tr>
<tr>
<td>32</td>
<td>0.224</td>
<td>0.486</td>
</tr>
<tr>
<td>33</td>
<td>0.201</td>
<td>0.436</td>
</tr>
<tr>
<td>34</td>
<td>0.182</td>
<td>0.397</td>
</tr>
<tr>
<td>35</td>
<td>0.165</td>
<td>0.358</td>
</tr>
<tr>
<td>36</td>
<td>0.161</td>
<td>0.350</td>
</tr>
<tr>
<td>37</td>
<td>0.139</td>
<td>0.302</td>
</tr>
<tr>
<td>38</td>
<td>0.122</td>
<td>0.264</td>
</tr>
<tr>
<td>39</td>
<td>0.114</td>
<td>0.247</td>
</tr>
<tr>
<td>40</td>
<td>0.100</td>
<td>0.218</td>
</tr>
<tr>
<td>41</td>
<td>0.093</td>
<td>0.203</td>
</tr>
<tr>
<td>42</td>
<td>0.082</td>
<td>0.177</td>
</tr>
<tr>
<td>43</td>
<td>0.079</td>
<td>0.172</td>
</tr>
<tr>
<td>44</td>
<td>0.067</td>
<td>0.146</td>
</tr>
<tr>
<td>45</td>
<td>0.058</td>
<td>0.125</td>
</tr>
<tr>
<td>46</td>
<td>0.036</td>
<td>0.078</td>
</tr>
</tbody>
</table>

Table illustrating factor extraction with total variance explained with eigenvalues (SPSS)
As can be seen from Table 7.5 PCA revealed the existence of eleven components with eigenvalues exceeding 1. This represented a cumulative percentage variance of 72.5. The number of factors suitable for retention was deemed to be excessive and therefore Catell’s (1966) scree test, available from the SPSS data, was utilised with attention given to the change in the shape of the plot (the elbow). Only components above this point were deemed suitable for retention and there appeared to be delineation after the fourth component as demonstrated in Table 7.6.

This was given further support using Parallel Analysis showing only four components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same proportion (46 variables and 107 respondents).

To aid the interpretation of the four components, Varimax rotation was performed. The rotated solution revealed the presence of simple structure (Thurstone 1947), with the four components showing a number of strong loadings. The four component solution explained a total of 52 per cent of the variance with components one to four contributing 17, 13, 12 and 11 percent respectively. The names attributed to the four components extracted were denoted as follows: (1) preparation, (2) capacity and dimension, (3) aggravation, (4) attitude and evaluation.

Reliability of the RF.RR Scale was tested using the Cronbach’s alpha statistic and the results of this are illustrated (Table 7.9). This mechanism was considered to be highly important, giving weight to the results obtained and the meaning for further discussion. The extracted factors are deemed to be reliable on the criteria stated.
Table 7.6 Catell Scree Plot

Scree Plot

Table illustrating the Catell's scree test in which can be seen a delineation after the fourth component on the plot
Table 7.7 Principal component Analysis (PCA) with Varimax Rotation

<table>
<thead>
<tr>
<th>RF.RR Questions</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preparation</td>
</tr>
<tr>
<td>Disaster Mitigation Prep</td>
<td>.816</td>
</tr>
<tr>
<td>Education local pop</td>
<td>.803</td>
</tr>
<tr>
<td>Training within civil def</td>
<td>.777</td>
</tr>
<tr>
<td>Training of A/E staff</td>
<td>.759</td>
</tr>
<tr>
<td>Early warning system</td>
<td>.755</td>
</tr>
<tr>
<td>affected country</td>
<td>.743</td>
</tr>
<tr>
<td>Civil Defence in affected country</td>
<td>.702</td>
</tr>
<tr>
<td>Cooperation between CD and relief orgs.</td>
<td>.481</td>
</tr>
<tr>
<td>Motivation of host country</td>
<td>.732</td>
</tr>
<tr>
<td>Capacity loc. hospitals</td>
<td>.732</td>
</tr>
<tr>
<td>Medical equipment</td>
<td>.619</td>
</tr>
<tr>
<td>Shock confusion</td>
<td>.617</td>
</tr>
<tr>
<td>State of buildings</td>
<td>.579</td>
</tr>
<tr>
<td>Population density disaster zone</td>
<td>.550</td>
</tr>
<tr>
<td>Magnitude of disaster</td>
<td>.536</td>
</tr>
<tr>
<td>Climatic factors</td>
<td>.512</td>
</tr>
<tr>
<td>Financial resource</td>
<td>.501</td>
</tr>
<tr>
<td>SAR</td>
<td>.496</td>
</tr>
<tr>
<td>Distance and location</td>
<td>.496</td>
</tr>
<tr>
<td>Corruption</td>
<td>.733</td>
</tr>
<tr>
<td>Host gov. bureaucracy</td>
<td>.665</td>
</tr>
<tr>
<td>Cultural differences</td>
<td>.662</td>
</tr>
<tr>
<td>Looting &amp; rioting</td>
<td>.646</td>
</tr>
<tr>
<td>Religious differences</td>
<td>.592</td>
</tr>
<tr>
<td>Complexity betw. orgs.</td>
<td>.510</td>
</tr>
<tr>
<td>Customs and border pb</td>
<td>.487</td>
</tr>
<tr>
<td>Conflict between ngos.</td>
<td>.480</td>
</tr>
<tr>
<td>Attitude of mdc.</td>
<td>.837</td>
</tr>
<tr>
<td>Financial relief orgs.</td>
<td>.706</td>
</tr>
<tr>
<td>Attitude of ngos.</td>
<td>.704</td>
</tr>
<tr>
<td>UN involvement</td>
<td>.559</td>
</tr>
<tr>
<td>Evaluation proceed diff.</td>
<td>.540</td>
</tr>
<tr>
<td>Crisis verification cas. disaster zone</td>
<td>.524</td>
</tr>
</tbody>
</table>
It was noted that the highest loading variables in each factor extracted may give a clue to the underlying latent variable represented by each component.

Table 7.8 Total Variance Explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Rotation Sums of Loadings</th>
<th>Squared Variance</th>
<th>Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5.278</td>
<td>17.027</td>
<td>17.027</td>
</tr>
<tr>
<td>2</td>
<td>4.072</td>
<td>13.135</td>
<td>30.162</td>
</tr>
<tr>
<td>3</td>
<td>3.667</td>
<td>11.828</td>
<td>41.990</td>
</tr>
<tr>
<td>4</td>
<td>3.410</td>
<td>11.000</td>
<td>52.989</td>
</tr>
</tbody>
</table>

Table illustrating the variance between the four component groups using the extraction method of PCA using appropriate percentages
Table 7.9 Reliability of the RF.RR.Scale

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Item to total correlation</th>
<th>Mean</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1 Preparation Items</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. 36 DMP</td>
<td>0.739</td>
<td>7.04</td>
<td>0.886</td>
</tr>
<tr>
<td>2. 35 education local pop</td>
<td>0.788</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 31 training within cd.</td>
<td>0.725</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 32 training of A/E staff</td>
<td>0.758</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. 33 early warning syst.</td>
<td>0.790</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. 34 CD in affected country</td>
<td>0.657</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. 39 coop between cd/relief orgs</td>
<td>0.331</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. 41 motivation of host country</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 2 Capacity/Dimension Items</td>
<td></td>
<td></td>
<td>0.815</td>
</tr>
<tr>
<td>1. 3 capacity loc hosp</td>
<td>0.600</td>
<td>6.53</td>
<td></td>
</tr>
<tr>
<td>2. 5 shock confusion</td>
<td>0.610</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 4 state of buildings</td>
<td>0.603</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 22 medical equipment</td>
<td>0.634</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. 46 population dens. disaster zone</td>
<td>0.352</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. 1 magnitude of disaster</td>
<td>0.597</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. 44 climatic factors SAR</td>
<td>0.547</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. 24 financial resource</td>
<td>0.418</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. 10 distance and location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factor 3 Aggravation Items</td>
<td></td>
<td></td>
<td>0.766</td>
</tr>
<tr>
<td>1. 7 corruption</td>
<td>0.626</td>
<td>5.55</td>
<td></td>
</tr>
<tr>
<td>2. 19 cultural differences</td>
<td>0.601</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 15 host gov bureau. looting rioting</td>
<td>0.407</td>
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Table illustrating the reliability of the RF.RR scale using the Cronbach’s Alpha test
### Table 7.10 Overall Evaluations of the Respondents

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Table illustrating the overall evaluation for the respondent group from the questionnaire demonstrating the item groupings of extracted factors with mean scores and standard deviation.
7.1.3 Mean averages for the four component factor items

The mean averages for the four component factor items extracted are now considered to ascertain whether there is any form of relationship or hierarchy between the groupings.

Table 7.11 mean averages of the component factor groups

<table>
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<tr>
<th>Rank order</th>
<th>Component Factors</th>
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<td>Aggravation</td>
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</table>

Table illustrating the relationship between the four extracted component factors regarding the mean average scores for each group of RF.RR from questionnaire responses. The relationships within the group are seen to assign Preparation in rank order 1. It will also be noticed that the differential between the component groups is comparatively small. Further discussion will take place regarding the importance of preparation with regard to the main topic of RF.RR.

Figure 7.14 Mean average of component factor items

Table illustrating the percentage relationship between the four groupings obtained by factor extraction and rotation using pie chart presentation.
It can be seen from the above analysis that detailed information has been gleaned relevant to the research problem and evaluation. It has produced groupings of component factors, and also data analysis in such a way that hierarchical observations can be made in the component groups. It is now possible to concentrate on the meaning of the data regarding the operational significance for the emergency disaster teams. The relational commonality of the various extracted factors provides groups and hierarchy, which gives a focus for discussion and critical appraisal of emergency systems within disaster relief organisations. This could be considered as an important starting point for a focussed approach within each organisation. Discussion will take place regarding this.

7.1.4 Male versus Female responders

The variation in responses between genders regarding RF.RR was considered to be worth exploring. What one person regards as an important resistance factor might not be considered to be the case by a member of the opposite sex. This facet was explored using the SPSS data processor and the frequencies analysed. There was no statistical significance between the groups.

The only discussion point regarding the comparatively small number of female respondents could be that the membership of the organisations engaged in rapid response and disaster relief may engage more men because of the danger aspects or traumatic sights and experiences encountered. This could however be seen as a contentious argument. It could have been expected that the older the respondent the more experience and possibly wisdom might alter the opinions and perceptions given in questionnaire responses. This was however found not to be the case.

7.1.5 Variation in responses regarding the age group of the respondents 45yrs and under versus 45yrs and over

The variation in responses between a younger and older age group was considered to be an aspect for statistical exploration. Using the SPSS data processor this was undertaken with the result that there is no statistical significance between an age group of 45 years and under and 45 years and above.
7.1.6 Average Significance Value ranking for comparison with SPSS data

Details are presented in appendix A concerning a manual system for establishing the average significance factors for the 46 variables from Section 2 of the questionnaire. It could be argued that the validity of this scale does not adequately meet the level of precision generated in the SPSS data processing system. It is however used as peripheral data for illustration and comparison where thought to be appropriate.

7.1.7.0 Section 3 Findings

This section presents the findings from Section three of the questionnaire which posed the following four questions:

a) The five most important resistance factors in rank order with comment

b) Have you received training in disaster management?

c) Improvement in response times through the influence of the IDNDR?

d) Have you any other comments to make regarding RF.RR or DMP?

This latter open-ended question will receive attention in the Chapter 8.2 covering qualitative findings

7.1.7.1. a) Analysis of the Table listing the Five Most Important Rapid Response Resistance Factors

Of the 107 questionnaires returned, 5 did not fill in this table at all.

102 questionnaires were analyzed and the number of times each Resistance Factor was mentioned in the Table was noted. The results are recorded in Table 9. The reason that some of the columns have decimals in them is because some respondents just put eg ‘bureaucracy’ as an important RF.RR. This could refer to 3 of the questions on the questionnaire i.e. questions 15, 16 and 17, so each of those scored 0.33 of a point.
Table 7.12 The number of times each question on the questionnaire featured in the table in Section 3

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Table illustrating the specific questions from the 46 presented on the questionnaire that featured within the 'top five' significance box in section 3

The 12 questions from the questionnaire which occurred most often are shown in Table 7.13. It was noted that the 5 factors listed by respondents in this table did not always correspond with the way they had scored the significance values in Section 2 of the questionnaire. Occasionally it was difficult to marry up what the respondent had written
in this Table with an appropriate question in Section 2, but in these cases the question which was closest in meaning to the respondent’s reply was selected.

Table 7.13 Rank order of the most important Resistance Factors to Rapid Response identified in Section 3 of the 102 questionnaires analysed

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<th>QUESTION</th>
<th>QUESTION NO ON QA</th>
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<td>State of readiness of Civil Defence and local emergency services</td>
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</tr>
<tr>
<td>2</td>
<td>40</td>
<td>Magnitude of disaster</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
<td>Attention to disaster mitigation and preparedness strategies at government and local level</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>19.33</td>
<td>Political resolve from the country affected by disaster</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>19.25</td>
<td>Transportation of personnel &amp; equipment to disaster zone</td>
<td>11</td>
</tr>
<tr>
<td>6</td>
<td>18.25</td>
<td>Capacity of local hospitals</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>17.75</td>
<td>Communication equipment generally</td>
<td>27</td>
</tr>
<tr>
<td>8</td>
<td>16</td>
<td>Timing of response e.g. declaration of national emergency by affected country</td>
<td>37</td>
</tr>
<tr>
<td>9</td>
<td>14.5</td>
<td>Early warning systems in affected country</td>
<td>33</td>
</tr>
<tr>
<td>10</td>
<td>14.16</td>
<td>Bureaucracy on behalf of host government</td>
<td>15</td>
</tr>
<tr>
<td>11</td>
<td>14</td>
<td>Distance and location of disaster zone</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>13.66</td>
<td>Bureaucracy of total emergency response process</td>
<td>17</td>
</tr>
</tbody>
</table>

Table illustrating the rank order of twelve questions that featured in the ‘top five’ significance box in section 3 of the questionnaire with state of readiness narrowly ahead of magnitude of disaster
Figure illustrating the percentage variations from the highest ten ranking questions appearing in the ‘top five’ significance box in section three of the questionnaire.

From this Chart it can be seen that ‘state of readiness of Civil Defence and local emergency services’, ‘magnitude of disaster’ and ‘attention to DMP strategies at government and local level’ were considered by far the most important ‘resistance factors to rapid response’ (RF.RR) in natural disaster scenarios. The highest ten scoring were entered into the chart for comparison with the output from the SPSS data.

7.1.7.2 Comparison of analyses Sections 2 and 3

Comparing this with the analysis of Section 2 of the questionnaire, ‘CD readiness’ and ‘Magnitude of Disaster’ topped the list significantly (average significance values of 7.9), but 14 other factors were considered more important than ‘disaster mitigation and preparedness’.

A comparison table was produced using the data entries on the SPSS system using the 46 variables. As can be seen from the following table there is a remarkable similarity in the outcomes regarding rank order of the higher variables.
Table 7.14 Rank order of RF.RR from Section 2 using the SPSS data entry system for comparison with data entered manually from the Section 3 a)

<table>
<thead>
<tr>
<th>Rank order</th>
<th>Q no.</th>
<th>Item</th>
<th>Mean</th>
<th>Std</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Magnitude of Disaster</td>
<td>7.9340</td>
<td>2.23924</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>State of readiness of CD and local med serv</td>
<td>7.8785</td>
<td>2.14437</td>
</tr>
<tr>
<td>3</td>
<td>36</td>
<td>DMP</td>
<td>7.5607</td>
<td>2.40388</td>
</tr>
<tr>
<td>4</td>
<td>37</td>
<td>Timing of declaration of national emergenc</td>
<td>7.4272</td>
<td>2.4035</td>
</tr>
<tr>
<td>5</td>
<td>41</td>
<td>Motivation of host country</td>
<td>7.3249</td>
<td>2.06541</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
<td>Host gov bureau.</td>
<td>7.2642</td>
<td>1.97268</td>
</tr>
<tr>
<td>7</td>
<td>11</td>
<td>Transport</td>
<td>7.2547</td>
<td>2.21278</td>
</tr>
<tr>
<td>8</td>
<td>27</td>
<td>Communication equip</td>
<td>7.1415</td>
<td>2.45119</td>
</tr>
<tr>
<td>9</td>
<td>40</td>
<td>Political resolve host</td>
<td>7.0943</td>
<td>1.96410</td>
</tr>
<tr>
<td>10</td>
<td>35</td>
<td>Education of local pop</td>
<td>7.0566</td>
<td>2.51786</td>
</tr>
</tbody>
</table>

Table illustrating the rank order of the questions on significance of RF.RR from the questionnaire section 2 in which 46 variables were presented.

This table is presented as a pie chart for clarity and comparison with the analysis of the top 5 choices from section 3 of the questionnaire.

Figure 7.16 Hierarchy of RF.RR from SPSS analysis section 2

![Hierarchy of RF.RR from SPSS analysis section 2](image)

Figure demonstrating hierarchy of RF.RR from the SPSS data analysis with first three being: Magnitude of disaster, State of readiness of the Civil Defence and local emergency services, and DMP.
Although there is consistency between the analysis of the SPSS analysis from Section 2 and the top 5 choices from Section 3 of the questionnaire regarding the most important three factors, it will be noted that the magnitude of disaster changes from first place in the SPSS graph to second place in the top 5 choice graph. Although this is a 1-2% alteration in rank it is nevertheless a creative tension between the outputs and will be given further attention in the discussion within Chapter 8.

### 7.1.7.3 Comparison of SPSS findings for first of the top five in section 3

From section three question regarding the top five choices, if the top one (first choice) in the ranking is taken and analysed then the following chart is achieved for comparison with that from the overall analysis of the top 5. This may be a better indication of hierarchy than amalgamating the total of the five choices. Further discussion on this point will be made. The percentage gap between magnitude of disaster and the state of readiness of the disaster and local emergency services widens considerably compared with the two preceding pie charts which compare the top five choices using the manual system compared with the SPSS analysis of the 46 variables.

**Figure 7.17 Hierarchy of first choice in section 3 from SPSS analysis**

![Pie chart showing the analysis of the first choices in the 'top five' significance box in Section 3 of the questionnaire using SPSS data processing](image-url)

Figure illustrating the analysis of the first choices in the 'top five' significance box in Section 3 of the questionnaire using SPSS data processing.
The above chart demonstrates the consistency of the analysis with the output from the analysis of the 46 variables regarding the top three RF.RR.

7.1.7.4 Further analysis of the 5 most important RF.RR was done as follows

Each of the questions shown in Table 8.13 was taken, and the number of times it was cited as the most important RF.RR counted. The number of times each question was considered the second most important RF.RR was counted. This was repeated with each question to see how many times each was considered to be the third, fourth and fifth most important RF.RR. The results were presented as bar charts in Figure 7.18.
Figures 7.18 Distribution of importance of the 12 most cited 'resistance factors to rapid response' from Table 7.13
Figures 7.18 The distribution of importance of the 12 most cited ‘resistance factors to rapid response’ from Table 7.13 (cont’d)

- Communication equipment
- Timing of response
- Early warning systems
- Bureaucracy by host govt
- Distance and location
- Bureaucracy of total emergency response process
Figures 7.18 illustrates the analysis of 12 highest ranking questions from section 3

The tables illustrate an analysis of the 12 highest ranking questions from section 3 of the questionnaire giving attention to the number of times each question was cited in the positions one to five within the box presented. The outstanding feature from these charts was the fact that 24 respondents listed 'magnitude of disaster' as the most important factor to rapid response.

Table 7.15 Comparison of top ten RF.RR using SPSS section 2 v manual section 3 hierarchical rankings

<table>
<thead>
<tr>
<th>RF.RR SPSS 2</th>
<th>RF.RR Man 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnitude of Disaster</td>
<td>State of readiness of civil defence and local emergency medical services</td>
</tr>
<tr>
<td>State of readiness of civil defence and local emergency medical services</td>
<td>Magnitude of disaster</td>
</tr>
<tr>
<td>Disaster mitigation and preparedness</td>
<td>Disaster mitigation and preparedness</td>
</tr>
<tr>
<td>Timing of declaration of national emergency</td>
<td>Political resolve from the country affected by the disaster</td>
</tr>
<tr>
<td>Motivation of host country</td>
<td>Transportation of personnel and equipment to disaster zone</td>
</tr>
<tr>
<td>Host government bureaucracy</td>
<td>Capacity of local hospitals</td>
</tr>
<tr>
<td>Transportation of personnel and equipment to disaster zone</td>
<td>Communication equipment generally</td>
</tr>
<tr>
<td>Communication equipment generally</td>
<td>Timing of declaration of national emergency by affected country</td>
</tr>
<tr>
<td>Political resolve</td>
<td>Early warning systems in affected country</td>
</tr>
<tr>
<td>Education of local population</td>
<td>Bureaucracy on behalf of host government</td>
</tr>
</tbody>
</table>

Table illustrating the similarities in the rankings between two methods of analysis regarding RF.RR

There are close similarities and some differences with validation over the highest ranking three variables and concurrence regarding transport, communication, political resolve, timing of declaration of the national emergency and bureaucracy. So 8 of the 10 top choices are represented in both analyses with differences regarding education of local population, early warning systems, capacity of local hospitals and motivation of host country.
The strong concurrence over these other 5 RF.RR adds weight to the methodological attempt to gain a hierarchy and to have material to give back to the responders regarding their consensus over the higher significance factors. The methodology has produced the big three and the secondary big five regarding consensus of significance of the most important RF.RR. This is ground for encouragement. If for arguments sake it was thought appropriate to have a ninth RF.RR within the hierarchy, this gives scope for lateral thinking regarding the possibility of identification of a factor that has been overlooked from the outset. It could be argued that an insidious RF.RR is encapsulated within each individual (the ego factor). This argument will be developed when more of the qualitative findings have been addressed.

7.1.8 Section 3 b) Training in disaster management

The responses to the direct question concerning whether the respondent had received training in disaster management was analysed using a simple manual calculation. The results are shown below.

**Figure 7.19 training in disaster management within the responding group %**

![Figure illustrating whether the respondents to the questionnaire had received training in disaster management](image)

Figure illustrating whether the respondents to the questionnaire had received training in disaster management
From the 107 questionnaires returned, 79.4% of the respondents had received training in Disaster Management, 16.8% had not and 3.7% did not answer the question. This is a notable finding and gives substance to the weight of evidence that the responding group are professional. This will be given further attention in the discussion section Chapter 8.

7.1.9 Section 3 c) Influence of the IDNDR on response times

The data from the direct question relating to the influence of the IDNDR on response times was evaluated using simple manual calculation without statistical processing. The results are illustrated below

Figure 7.20 Responses regarding the Influence of the IDNDR on response times from the 107 questionnaires.

Table illustrating the perceptions of the respondent group as to the influence of the IDNDR on response times

44.9% of the questionnaire respondents felt that the influence of the IDNDR had improved response times to natural disasters, but 35.5% felt it had not. 15.9% did not comment and 3.7% were not sure. This shows that the ‘disasters community’ is divided over this issue regarding the effectiveness of the IDNDR. This is a point for further discussion in Chapter 8.
The final enquiry within Section 3 of the questionnaire, relating to other comments on the subject of RF.RR and DMP is dealt with in Chapter 8 Findings 2, as it is regarded that this material fulfils the qualitative aspects of the survey.

7.1.10 Conclusion

Presentation of the quantitative aspects of the survey has been performed with particular attention to reliability of the scales and suitability for factor analysis. Graphs and tables illustrate these quantitative findings. The data analysis using the SPSS system has assisted in producing groups of resistance factors to rapid response that have been interpreted and assigned component names to describe the underlying nature of the variables in each of four particular categories. The data from both the computer-assisted SPSS analysis and that produced from simple additions and collations is compared regarding the highest considered RF.RR. The direction of the section 3 aspect of the questionnaire relating to the five most important RF.RR is followed in trying to answer the question of which are the most important RF.RR. Presentation of the quantitative findings produces a sizeable amount of interesting data with few conflicts. The analysis of the section 3 findings relating to training and the influence of the International Decade for Natural Disaster Reduction has been presented. Discussion will take place regarding both the quantitative and qualitative findings in Chapter 8.
CHAPTER 7 FINDINGS 2 – QUALITATIVE RESULTS

Introduction 7.2.0

The previous chapter set out the quantitative findings from the survey regarding RF.RR. This chapter seeks to explore the qualitative findings from both the enquiry used in the questionnaire and also from interviews with those engaged in disaster response. Additionally findings from El Salvador, as seen as a vulnerable country, having suffered a major earthquake in 2001 in which the researcher was engaged in the emergency response, will be presented. The presentation will therefore be made in four sections namely:

- Qualitative findings from the questionnaire
- Qualitative findings from interviews with those engaged in disaster response
- Qualitative findings from disaster victims in acute and non-acute situations
- Qualitative findings during a five year rehabilitation phase post earthquake in El Salvador 2001-2006

Qualitative findings from the questionnaire

7.2.1 Comments section (d) regarding resistance factors to rapid response and disaster mitigation and preparedness (n=42)

42/107 responders completed this section, providing comments which have been scrutinised and ordered into a series of issues or themes. These are now presented and provide robust qualitative material for further discussion. No statistical analysis has been undertaken regarding the numbers or responses in each theme group.

Table 7.2.1 Themes emerging from the question in section 3 relating to the subject of RF.RR and DMP

<table>
<thead>
<tr>
<th></th>
<th>Themes related to the questionnaire itself</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Political factors</td>
</tr>
<tr>
<td>3</td>
<td>References to local preparedness</td>
</tr>
<tr>
<td>4</td>
<td>Bureaucracy</td>
</tr>
<tr>
<td>5</td>
<td>Factors relating to professionalism within the disaster relief process</td>
</tr>
<tr>
<td>6</td>
<td>Matters relating to NGOs</td>
</tr>
<tr>
<td>7</td>
<td>Coordination problems</td>
</tr>
<tr>
<td>8</td>
<td>Training issues</td>
</tr>
<tr>
<td>9</td>
<td>International dynamics</td>
</tr>
<tr>
<td>10</td>
<td>Other factors</td>
</tr>
</tbody>
</table>

Table illustrating the themes and issues raised in the comments section of the questionnaire
21% of the respondents had comments to make regarding the questionnaire itself.

There were some difficulties experienced in completing the questionnaire and some felt that there was ambiguity attached to some of the questions. The language aspect was also mentioned and if English was not the first language there would be difficulty in understanding some of the terminology particularly the word ‘resistance’. The need for a clearer definition at the start of the questionnaire was mentioned relating to RF.RR. One respondent felt that the subject should have been dealt with qualitatively rather than attempting a quantitative analysis. The relative merits of quantitative versus qualitative have been cited (Table 5.5). The respondent from the United Nations felt that the question on the IDNDR was redundant as it was to do with disaster mitigation rather than response to disasters. It could be argued that DMP has an inverse relationship to RF.RR and that if local preparation and International intent and readiness exist then responses will be made quickly and efficiently.
One very interesting response, regarding the attempt to establish a hierarchy of RF.RR through the questionnaire, referred to the fact that RF.RR were context specific and related to combinations of factors within any particular disaster. This is highly plausible and expresses an informed viewpoint. It casts a shadow of possible naivety across the subject of measuring individual RF.RR and trying to identify the most and least significant. The context specificity stated by the respondent gives ground for further discussion and possible research. Disasters are compared, despite them being context-specific and outcome-specific, with regard to losses. Comparisons and use of lessons learned from the shortcomings of disaster response to any given disaster enables development and improvement of the disaster relief process. Further research could be directed towards assessing combinations of RF.RR within the context of natural disasters. For instance attention to transport/customs problems/fuel and coordination would be a relevant combination. Other combinations could include transport/terrain/cultural and weather-related factors. Additionally the analysis of any given disaster could be done trying to identify these context specific RF.RR and combinations that have compounded the resistance.

The strengths and weaknesses of the questionnaire are further discussed in Chapter 8 and an appraisal of the overall survey presented.

7.2.1.2 Political factors (n=10)

23.8% of the respondents cited political issues. These were variable and included attitudes, managerial systems and priorities, attention to DMP. Apathy on the part of governments was a comment relating to attitude. Customs and border controls relating to the entry of relief agencies were mentioned, with delays occurring at this point. Relationships within a country between NGOs and voluntary organisations were regarded as an internal political situation causing confusion and lack of coordination of the relief effort. One commentator stated the view that local preparedness was far more effective than at NGO or government level. Another commentator voiced an important opinion relating to famine as a natural disaster and went so far as to say that all disasters arise from political decisions. This view resonates with comments by Redmond (2005) (2.1.9). The commentator’s statement is profound but arguably correct. If people were not forced to live in vulnerable locations or were adequately housed in safe buildings, losses would be minimised. Additionally if attention is given
to subsistence farming and encouraging good land use, rather than soil degradation through cash cropping, peasant farmers would not be forced to seek labour in cities thereby causing the shanty town urbanisation with settlements located in vulnerable positions (2.2.1). The whole issue of advocacy for the poor and marginalisation within society is potentially the largest appropriate discussion regarding political issues relating to natural disasters (Atkins 2006).

One respondent did not complete the questionnaire but gave useful comments regarding the political aspects within a natural disaster scenario. It was reported that much depends on the political/cultural standing of a given country. Earthquake scenarios were cited in countries where help was not called for because of the need to 'save face' within the international community and this issue has been given attention (2.4.7). Kobe disaster in Japan was mentioned as was New Delhi after the tsunami. From the internal political dimension in Australia it was reported that too many players in the decision-making equation was a significant RF. RR in the tsunami disaster in S E Asia. Within that situation three dimensions were cited including Commonwealth, State and the military.

One commentator brought in five dimensions to the political factor discussion including the need for invitation from the host country before a response, the location relating to sphere of influence, the political will to get involved, whether significant numbers of citizens from the affected country are living in the potentially responding country, and whether significant media coverage of the disaster. The need for understanding and respect for other cultures and the importance of invitation from the host country was mentioned by a member of a leading NGO.

It could be argued that the political forces involved in natural disaster response scenarios are proportional to the forces that caused the disaster in the first place! This is clearly a huge area which the research survey has identified. On the ranking scale of average significance RF. RR political resolve came at position 7/46 indicating the high level of consensus over this within the respondent group.

According to one respondent, relationships within a country between NGOs and voluntary organisations were regarded as an internal political situation causing
confusion and lack of coordination of the relief effort. This dilemma has been given attention (Smillie 2003). This is a highly valid point and it behoves a vulnerable country to give attention to these relationships prior to a disaster. It could be stated that NGOs engaged on development work within a disaster-prone country should have, as part of their mandate, to work alongside other voluntary organisations and civil defence services so that an understanding of roles develops, and a working relationship beneficial to all parties in the event of a disaster.

Mention was made regarding political prioritisation relating to DMP. This is an important issue as limited public expenditure budget may categorise disaster mitigation or relief strategies as low priority on an agenda (2.6.3). Sadly defence budgets or war efforts can squeeze out available funding for disaster-related issues. (Oxfam 2003).

Apathy towards disaster response was mentioned by one commentator, which could be the case. Indifference to the plight of the vulnerable could be regarded as both a political RF.RR and also a personal one. It could also be stated that there may also be a national apathy and indifference towards LDCs. Apathy is a major issue regarding RF.RR and has many facets to the problem. (Auf der Heide, 2004).

One commentator stated the view that local preparedness was far more effective than at NGO or government level. This may be a sweeping generalisation but carries the argument that local preparedness bypasses all the political shenanigans and bureaucracy, and furthermore negates the responses from outside agencies. The United Nations World Food Programme department are working on capacity building within vulnerable countries to address this problem (Stanhope 2006)

One respondent commented on the political/cultural standing of any given country particularly with regard to the need to save face within the international community. This was mentioned with regard to the Gujarat disaster (Nobhojit 2002). The commentator cited Kobe disaster in Japan and New Delhi after the tsunami. Additionally within this need to save face the New Orleans hurricane Katrina disaster exhibited the political stance of independence and ‘we have the capacity’ approach. (Bush, 2005).
It would appear that this commentator has both a realistic but somewhat cynical view regarding the political factors. The politics of disaster management is an area where an intrepid researcher may care to venture. The political gains from responding efficiently to a disaster are potentially enormous both in the perception of the electorate and also in possible goodwill for future negotiations or trade agreements with the host country. It could be argued that the politics behind disaster response is a potential minefield and is clearly a significant aspect to RF.RR within the ambit of the research undertaken in this survey.

7.2.1.3 Local preparedness (n=9)

21.4% of the respondents cited issues relating to local preparedness. This is a validation of the quantitative findings where preparation was the most prominent grouping of factors extracted from the statistical process (Table 8.8). Additionally 'Civil Defence readiness' scored second position on the average significance ranking and was only surpassed by 'the magnitude of disaster.'

One commentator made a connection between development work being an integral part of local preparedness and DMP. This has been given attention in the literature review 2.6.2. (Christoplos 2001).

One commentator stated that local preparation was the most important resistance factor to rapid response. This view from the medical perspective is cited by Furbee (2006) who states that local disaster preparedness is an area of major concern for the medical community that has been reinforced by recent world events. Additionally it was stated that maintaining viable, rural, emergency response capabilities and developing a community-wide response to natural or man-made events is crucial to mitigate long-term effects of disaster on a local healthcare system.

Another gauged this aspect to be more important than government or political level activity. It is interesting that the United Nations humanitarian departments have undertaken capacity building as part of their strategy for DMP (Stanhope 2006). It could be argued that local preparedness is akin to building a fence at the top of the hill rather than funding an ambulance at the bottom of the hill (anon 1895).
One commentator made the criticism that most response is local but most of the resources go to national and international response systems. More effort should be put into building local preparedness and response capacity. Early warning systems and early accurate needs assessment was mentioned as important to the local preparedness equation. (2.4.24).

One commentator suggested that even though local preparedness may exist there can be a resistance to calling for outside help because of cultural issues. Poor attention to longer term primary care was stated as an issue relating to local preparedness, adding that too many field hospitals were deployed in disaster scenarios.

One responder prioritised the importance as being higher than government or political level activity. This stance may have credibility but the two are not necessarily mutually exclusive. A government could make appropriate prioritisation for capacity building within areas of known vulnerability or act to strengthen levees or flood defences in vulnerable low lying areas. So much will depend on the relationships and cohesion within any given society. Much can be done regarding local preparedness and some countries deal specifically with this in their educational policies, such as New Zealand, which gives attention to earthquake drills and documentary advice as to how to protect the home and what to do in the event of a disaster. Here is government policy affecting the local preparedness. (2.6.13).

Mention was made of the need for early warning systems as part of the local capacity building and preparedness. This is highly relevant with regard to tsunami scenarios and hurricane landfalls. Earthquakes are more difficult to predict but the vulnerability of particular global locations has been demonstrated with increasing accuracy regarding identification of strain patterns across plate boundaries using satellite technology and GPS networks providing real-time data. (2.4.17). It could be argued that all vulnerable coasts should have adequate early warning systems regarding tidal surges and storm warnings. (2.4.24). Coast guard and life guard stations could be equipped with suitable mechanisms to bring this into effect.

It was stated by one WADEM council member that local populations often cope very well with disasters and are not in a state of shock. Additionally it was stated that implementation of simple steps to be taken in the early stages of a disaster is what is
needed. It could be argued that the state of shock and confusion is dependent on the severity of the disaster and from the researcher's experience after earthquakes there is a high level of shock and confusion. Simple steps regarding the ABC of life support and basic resuscitation skills would however be very effective in saving lives after natural disasters and first aid training has a universal relevance.

Lack of coordination between local and outside agencies was cited as an important issue in the relief effort in the Andaman and Nicobar islands after the tsunami disaster of 2004. This is an extremely important area and, regarding DMP, communication channels could be instigated prior to a disaster or even while a relief team is in transit if sufficient preparation and contact details are known at a central database. This begs the question of whether such a central database exists and, if not, why not, and how could this be implemented. Improving links between local defence services and international response efforts is a systems equation where definite intervention could be made.

Poor attention to longer term primary care was stated as an issue relating to local preparedness adding that too many field hospitals were deployed in disaster scenarios. This statement raises several issues. Primary care is often overwhelmed in disaster scenarios and the relief agencies give attention to reinforcing the compromised primary care. Emergency relief is two-fold in this respect with initial attention to the casualties damaged by the disaster, but secondly, giving attention to the acute and non-acute problems peculiar to any given community. If adequate preparedness at the local level is in place then outside field hospitals will not be necessary. If however the local medical and emergency services are vastly overwhelmed then a mobile field hospital may be appropriate. Clearly local preparedness is a key feature to successful disaster response and absence of preparedness is one of the most significant RF.RR.

One respondent made the connection between development work and local preparedness/disaster mitigation. This aspect demonstrates how relief work in a lesser developed country can accommodate the vulnerability to natural disasters and make provision for the local population regarding preparedness strategies or increasing local capacity and resilience to withstand a hazardous event. Additionally NGOs working in vulnerable countries are in an ideal position to give emergency assistance as they
are familiar with local customs and language and have knowledge of safe buildings, local emergency services and potential access and evacuation routes (2.4.25). The quantitative findings within the survey have substantiated and re-inforced the qualitative findings. Further attention will be given to this in the conclusion.

7.2.1.4. Bureaucracy (n=2)

4.8% of the respondents cited issues relating to bureaucracy. Interestingly bureaucracy received comparatively little attention from the respondents. However red tape and misinformation bringing endless problems was an important issue according to one respondent. Too many decision-makers were cited as an important issue relating to political influence of different countries, particularly where the Commonwealth is involved. This criticism is levelled by Hildreth (2002) regarding effective disaster management and security systems. Bureaucracy was mentioned as a factor that could complicate the operational response of the larger organisations. The Australian commentator discussed the problems of having to engage three parties to make a decision, namely representatives from commonwealth, state and the military. Such problems have been cited in the flooding in Mozambique (Young 2000). Misinformation in natural disasters constitutes a major RF.RR and an internet search on the subject produced 391,000 references. Misinformation was not presented as one of the 46 variables within the questionnaire and this could be regarded as an important oversight. Morgan (2006) discusses the problems of misinformation regarding the logistics of handling corpses in mass casualty scenarios such as the tsunami disaster of 2004.

Within the set of 46 variables or RF.RR offered for scaling by the respondents in section 2 of the questionnaire there were three questions relating to bureaucracy namely:

1. host govt. bureaucracy- average significance value (ASV) 7.3, rank 5/46
2. total bureaucracy of the disaster relief effort .......... ASV 6.8, rank 15/46
3. NGO bureaucracy.......................................... ASV 6.1, rank 26/46

The discrepancy between the section 2 and section 3 responses in which bureaucracy is ranked comparatively highly in section 2 and given only a small amount of attention in 3 is interesting. It could be considered that bureaucracy should be given a higher priority regarding status as a high ranking RF.RR but the section 3 findings do
not substantiate this. It could be that the systems and organisations within which the respondents are engaged are not beset with the problem of bureaucracy and that there is some bias in the responses. The survey has raised several issues that will be discussed in the final chapter regarding bureaucracy.

The topic of bureaucracy in natural disasters has been subjected to an internet search and the results extend into the thousands (search 21.6.06).

7.2.1.5 Professionalism (n=3)

7.1 % reported statements relating to this area. The theme relates to the need for professionals within disaster management as opposed to disaster ‘tourists’ or well meaning but unprepared ‘helpers’. ‘Disaster tourists’ have been described as either ‘voyeurs,’ often from the press, or ‘saviours’ from aid agencies wanting to be photographed to demonstrate that they care (Appleton 2005). The need for experienced and competent personnel was mentioned by one commentator. The United Nations respondent went to lengths to convey the high level of experience achieved within UNOCHA through disaster-response operations since 1971. The various departments committed to disaster response within the United Nations highlights the ‘large player’ versus the smaller NGO dynamic. A member of a leading NGO, namely the Finnish Red Cross, stated that well-trained professionals are the most important resource to send to a disaster zone. Professionalism engages on areas such as training, standards and competent levels of service delivery. There is therefore some overlap in the comments section with those relating to training issues. The big player/small player issue comes into the frame for discussion and engages the debate of the NGO ‘circus’ and the threat of amateurs and well-meaning individuals complicating the disaster relief process. This is a relevant and topical issue with input available from personal involvement in disaster relief and will feature within the discussion section. A larger sample size from the questionnaire and a wider circulation to disaster relief agencies regarding this issue could give greater definition on this.

7.2.1.6 NGOs (n = 4)
9.5% of the respondents mentioned Non-Government Organisations. One commentator stated that there was very little communication between operational responders and NGOs and voluntary organisations within a host country. NGOs were considered to be a lower priority by one responder who stated that community level mitigation was preferable to government/NGO. Coordination of the efforts of NGOs was stated by one commentator of being of particular importance. A general comment about relief organisations, which was considered to probably include NGOs, was made in a derogatory tone relating to 4-wheel-drive relief vehicles roaming around aimlessly in the crisis in Albania and Kosovo. Most of the comments from the respondents were on the critical side including:

- paucity of communication between operational responders, NGOs and voluntary organisations within a host country
- community mitigation better than government/NGO
- aimless driving of four wheel drive vehicles, NGO circus
- Lack of coordination between NGOs

Criticism of NGOs is an immense area and an internet search relating to this important subject produced over five million references. Additionally even the United Nations Secretary General, Mr Koffi Annan (2003), had this to say: ‘it is clear that global public opinion has been engaged increasingly with the issue of the global people-power (NGOs). Amid the praise some criticisms: NGOs are the world’s largest unregulated industry- that is to say they often operate without minimum standards, are insufficiently transparent, act like corporations, and are accountable to no one but themselves.’

It could however be stated that NGOs have a very important part to play within disaster response strategies and that many have combined operational forces such as in the Disasters Emergency Committee in which communication, coordination and collaboration occurs (2.3.12). Additionally the longstanding and effective contribution made by the larger NGOs has prompted governments to use them for disaster response in order to provide a better service delivery than could be offered by the government itself. The researcher has found that the functioning of the NGOs has been generally impressive with the minor exception of the IFRCRC societies needing some systems modification (8.2.1.6). Communication and coordination of the efforts
of NGOs is essential and the DEC gives particular attention to this in the planning of emergency disaster response. Communication and coordination in the field of operation between NGOs is a subject for further research and this will be proposed in the conclusion section. The 'NGO circus' is an unfortunate term, but one that has been born out of observation and organisational difficulties. (2.3.12).

7.2.1.7 Coordination (n = 7)

16.7% gave coordination issues a comment within the section. This would appear to have struck an important chord within the responding group.

Within this category a comment has been included relating to cooperation between doctor/chemist/engineer and skilled leader with PR experience. Another commentator alluded to the waste of time regarding response if there was poor coordination between the United Nations departments and the military assets. One commentator highlighted the importance of coordination and addressed the need for helicopters and early accurate needs assessment in the early stages of a disaster. Another stated that he had experienced lack of coordination at national, international and local levels during a seven month relief operation.

Coordination between organisations in disaster relief is a key issue to which many players give special attention. Mention has been made of the United Nations stance over coordination in major disasters (8.2.3.2). The United Nations respondent pointed out that the United Nations Department for Assessment and Coordination (UNDAC) is committed to coordination of responses within a disaster area. The On Site Operations Coordination Centre (OSOCC) and virtual OSOCC, to which organisations can subscribe, are measures that have been taken to improve the coordination of aid agencies and NGOs in the field of disaster operation. Information is available regarding ongoing needs assessments with suggestions as to where efforts should be directed. Daily briefings occur in line with the unfolding nature of the disaster sequence and reference to who is present in the field. Coordination can take place within organisations, between organisations, pre-disaster response and during response efforts. Mention has been made regarding the coordination that could possibly take place while in transit to a disaster zone as set out by the United Nations
humanitarian organisations, but more work needs to be done in this direction particularly regarding cooperation with NGOs (8.2.3.2) Coordination relies on efficient communications systems and this has been presented in the literature review under the use of IT (2.4.17).

7.2.1.8 Training (n = 6)

14.3 % of responders mentioned this theme. An interesting issue was mentioned by one commentator regarding training. The definition of disaster training was brought into question as the commentator considered this to be a variable concept. What training makes one qualified for disaster relief service? This is a relevant issue that will be given more attention in the discussion section. Experience and competence has been stated as important by one commentator. Training and coordination have been cited, raising the question of combined agency training. Lack of training was mentioned as being a hallmark of those who make an emotional response and ‘jump off’ to all parts of the world. This is another area worthy of discussion relating to rapid response:- emotional and impulsive, rather than trained and coordinated. A commentator from Romania considered that lack of financial allocation to disaster management and training activities was the second most important RF. RR with lack of knowledge about disaster management first. The commentator from the Finnish Red Cross stressed the need to send out trained professionals to help in a disaster scenario.

The questionnaire presented three variable items relating to training issues within organisations including SAR teams, Accident and Emergency staff and Civil Defence service training. The relative importance of this issue to the respondents from the disasters community is reflected in the average significance value for each of the three items.

- SAR training, ASV: 16/46
- Accident and Emergency staff training ASV: 19/46
- Civil Defence Training ASV: 28/46

On aggregate the training issue within the questionnaire responses scored ASV 20/46 giving the training aspects a substantial position of importance.
Training is linked to professionalism and competence, all of which are vital in disaster and emergency responses. The questionnaire also asked the specific question as to whether the respondent had received training in disaster management. A specific medical training may be of little use if disaster medicine has not received attention within the training programme. Additionally anyone can assist if the victims are out of reach under a trapped building or in a flood zone with no training at all. Training and coordination have been cited by one commentator as an important double dynamic to which attention should be given. This begs the question of all training taking into consideration the need for cooperation and coordination aspects. Additionally the possibility of combined training between organisations and agencies could be given attention. INSARAG hosts combined training courses (8.2.3.2) for search and rescue agencies.

Training in situ has been undertaken in El Salvador by the Sphere project in which medical personnel spent time within emergency shelters erected by MSF. This field project gave insights from a hands-on perspective and enabled deeper understanding into the needs of victims and humanitarian suffering.

7.2.1.9 International (n = 10)

23% of the respondents mentioned international issues. The perspective of 'how the world views the disaster' was highlighted by one commentator. He related this to the prompt implementation of international assistance. This is worthy of further discussion. One commentator alluded to the need for quick response assets at the international level. An operational responder stated that international factors relating to customs and border controls were an issue. Quarantine regulations for canines, food and fuel/petrol restrictions were all cited as international factors relevant to the subject. The United Nations organisations represent the international community and are extremely active in disaster response. One commentator felt that effort should be directed to the local response rather than to the national and international organisations.
Comments about the IDNDR were made as being a patchy undertaking. Lack of coordination at every level was mentioned for the tsunami by one commentator including at the international level. International implications were cited relating to citizens from the affected country residing within the host country. This is an important international consideration. The Finnish Red Cross respondent gave the comment that their organisation only responds by invitation from the government of an affected country. This is another important international consideration.

It could be argued that the international response regarding efficiency, timing and appropriateness of response is a key feature within disaster management. The high level of priority given within the comments section would appear to reinforce this stance. Where the local capacities and national resources are overwhelmed the international community is invited to assist when there has been a Declaration of a State of National Emergency. In an ideal situation, where there is careful identification of the extent of the disaster zone and numbers of homes and families affected, the international response could be tailored to provide sufficient extra capacity to deal with the emergency and aftermath of the disaster (2.4.13). Sadly this precision of response from the international community rarely happens. This begs further questions including the politics within the country and international relationships. Set against this is the disaster history within the host country and the history of aid provision in the past. Rapid transmission of information though the media affects the perception of the international community regarding implementation of rapid response (2.4.15). Other factors influencing how the world views the disaster centre on arguments such as ‘How will the world view the response of any individual nation?’ Also ‘How will the response of one country regarding provision of money or resources compare to that sent by another country?’ The whole equation of duty versus service touches on these issues of the world’s view of a disaster. It could be argued that the response of the international community to a country affected by a natural disaster is dependent on many factors encompassed by the term ‘relationships.’ Much will depend on the present and historic connections with any given country and into the context of that relationship the aid is directed in a proportion seen to be appropriate by the donor country.
International responses to natural disaster zones are considered important by the responding group within the survey and the IDNDR has been given special attention. Comments from the responders demonstrate the complexity of the international response within disaster management.

7.2.1.10 Other issues (n = 40)

95% made contribution to this section. The comments and issues raised were many but mentioned once only and not replicated in other responses, and are thus classified as 'other issues'. They included the following:

- Safety issues for health workers
- Advocacy issues for female victims
- Cultural implications
- Media reporting
- Definition of disaster
- Education
- Transport
- Communication
- Disaster history of a given country
- History of aid and organisations hosted by affected country
- Language
- Context-specific factors
- Combinations of factors causing RF.RR.

7.2.1.10.1 Safety issues for health workers

Any discussion on RF.RR will need to accommodate the safety needs of the aid workers or emergency medical teams. Where there is civil unrest or political instability a natural disaster within such a country is known as a complex emergency. Other safety issues can include ongoing natural hazards such as aftershocks in earthquake scenarios, or gaseous emissions from volcanoes, to name but a few. Where delays have occurred in providing rapid response the affected community can be in a state of high anxiety or even outrage. This scenario has been observed in the New Orleans disaster of 29.8.05 (Appx E4) where the helicopter relief teams dared only touch down for a few seconds for fear of being mobbed by crowds of victims. Early
needs assessments must take into consideration safety factors relating to both possible hostilities and also ongoing natural hazards or secondary hazards e.g. mud slides or boulder and rock falls. It could be argued that this is not a common RF.RR otherwise more respondents would have cited the issue. It was not included as one of the 46 RF.RR variables used within the questionnaire.

7.2.1.10.2 Advocacy issues for female victims

This issue comes into the mission statement of several NGOs engaged in disaster relief and development work in developing countries. Within some cultures women have no rights and no voice or vote. This has relevance to RF.RR in countries where women are marginalised or given little status. Women in lower social groups can be the last to receive food aid or clothing because of their diminished status and place in the pecking order. Issues relating to female health and dignity are important within a disaster scenario where privacy may be compromised when communities are displaced. Here is a topic that could be used for further research within the disaster management ambit. Advocacy issues were not included among the 46 variables used in the questionnaire. It has been stated that women and children are the most seriously affected in earthquake disasters. (Noji 1993).

7.2.1.10.3 Cultural issues

Cultural issues were one of the 46 items on RF.RR in section 2 of the questionnaire. Reluctance to accept help from an outside country where different faith or belief structures exist, can occur. Equally where there has been previous hostility or enmity between countries on a historical level, then the giving and receiving of assistance in a natural disaster can be compromised. Some of the larger world religions may find it difficult to accept help from a super-power where there is tension or outright hostility between them. Interestingly in the story of the Good Samaritan the wounded victim received help from not only a foreigner but one who belonged to a social group that was held in disdain by the social order to which the victim belonged. (6.10) The 'saving face' issue has already received attention (9.15.2) and is not confined to oriental nations or Indian culture but has been observed in the response strategies to recent MDC disasters. (9.15.2).
7.2.1.10.4 Media issues

It is difficult to regard media issues as RF.RR. It could be argued that the converse is the case with media bringing prompt attention to the world stage the scale of an individual disaster and the losses incurred. Gruesome images of disaster victims have received many adverse comments, as has the short duration of coverage of some disasters when the rehabilitation after a disaster can continue for many months or years. What can be said is that reporters are able to reach a disaster zone with startling rapidity. This rapid response, irrespective of motive, enables the message to be transmitted to the world stage. It could be stated that this is a key factor in catalysing rapid response and bringing the brotherhood of man issue to the domestic sitting room. The media, however, have a definite part to play in disaster relief especially with regard to communication and disaster aid response. Attention could be given to less gruesome imagery in the acute phase and longer coverage into the rehabilitation phase in the after-math of the disaster.

Media issues were not included within the 46 variables identified as RF.RR from either the literature or the series of interviews with the disaster relief community.

7.2.1.10.5 Definition of disaster

This has received considerable attention in the introductory chapter (2.1.10). The overwhelming nature of a climatic or geo-seismic hazard compounded by little or no warning characterise disaster situations. The reference to a disaster being a challenge to various modalities both within the country and from outside aid agencies is also given much attention. Standard definitions and terminology are being encouraged by WADEM. (7.8.5). This enables common understanding and discussions within an academic framework and is to be encouraged. In the critical appraisal of the questionnaire mention has been made of the need to have given more definition in the accompanying letter or in the questionnaire itself. It could however be argued that despite the different meanings and implications of the word ‘disaster,’ there is still a general acknowledgement that a disaster is a ‘disaster regarding natural hazards’ and all relief workers understand exactly what is meant. What is more important is the nature and intensity of the event and the measurements of loss and damage regarding relief strategies.
7.2.1.10.6 Education

Education of the local population to vulnerability and hazard is a vital part of DMP. Many countries have specific programmes within the national education system to inform children and parents what to do in the event of an environmental hazard. (2.6.5) The researcher has also taken part in an educational programme in giving literature to each child attending for medical attention at clinics in El Salvador, explaining the measures to be taken in the event of an earthquake.

The survey recognised that education, or the lack of it, regarding natural disasters constituted a potential RF.RR. It was item number 35 on the questionnaire, stating: ‘Education regarding measures to be taken by the population affected in the event of a disaster.’ From the findings (App. F table 7) it can be seen that education had an ASV of 7.0 and shared position 10/46 with early warning systems. This reflects the opinion of the respondents in having a high priority as RF.RR. Additionally it will be seen that education had the second highest loading in preparation, the highest factor extraction grouping. It was in fact the second highest in the factor extraction process using the SPSS data processor with loading of 0.788 and only superceded by Civil Defence systems in the affected country at 0.790. This is a significant finding and point of discussion. It could be argued that this is the most important area regarding people, as opposed to systems, in DMP, and its absence being a RF.RR. Therefore following this argument, ‘lack of education regarding measures to be taken in the event of a natural disaster’ is the single most remediable resistance factor to address in order to accelerate response times to victims. This statement is founded on the responses of the disasters community respondents to the questionnaire. This in the opinion of the researcher is of enormous significance regarding the way forward for the development of disaster management. This is akin to putting a fence at the top of the hill as opposed to paying for the ambulance at the bottom of the hill. (anon 1895).

7.2.1.10.7 Transport

Transport was one of the 46 variables used in the questionnaire and produced an ASV
of 7.3 and ranked 4/46. Additionally it was not one of the factors extracted in the rotational method used by the SPSS data processing. This produces a creative tension regarding the apparent very high importance within the average significance and yet not appearing of sufficient status to be highly factor loaded and then extracted into a grouping. It could be argued that transport could possibly be included in a grouping of preparation or dimension if distance and transport were regarded somewhat loosely. The ranking of transportation within the RF.RR top 5 choices from section 3 of the questionnaire gave a rank order of 5/10 of the most important RF.RR. This is also an interesting finding that supports the high position demonstrated within the ASV ranking from the 46 variables. The very high position within the average significance ranking clearly reflects the importance of getting the transport equation right in order to effect a rapid response. It seems somewhat obvious that if there is no car, or a decrepit vehicle, then rapid response is not going to occur. Absence of helicopters has been cited as a definite RF.RR in the qualitative findings in the earthquake in El Salvador. (8.2.4.3). Additionally in the S E Asia disaster the presence of the aircraft carrier, Abraham Lincoln, was of enormous value regarding capacity to provide transport of victims via helicopters and supplies to remote areas. (Appx E 4).
It could be stated that transport is a vital aspect of rapid response strategies within the disaster management framework. It would appear that the respondents from the questionnaire concur with this view. In the literature review it was regarded of sufficient relevance to the debate on RF.RR to have a section devoted to it, including all the different forms of transport available and necessary within the disaster relief process (2.4.8).

7.2.1.10.8 Communication

Communication is a key issue in rapid response strategies. It is also of vital importance in producing a definition of what is going to be needed in any given disaster scenario. It has relevance to the need for regular accurate needs assessments (2.5.10.1) as the disaster unfolds, informing potential sources of personnel and equipment when they are required for the disaster relief programme. A section is devoted to communication in the systems modelling with documentation of all the forms of communication (3.6). Communication was included in the 46 variables of the questionnaire and on the Average Significance Score ranking was in position 7/46.
This is indeed a high scoring. It also figured in the top 5 scoring of 102 questionnaires analysed and gave a rank order of 7/10. The researcher was not comfortable with the modification which led to only one question relating to communication being included in the questionnaire, and considered that ‘communication equipment generally’ did not do justice to the enormity of the relevance within natural disaster response strategies. It could be argued however that if all the different levels of communication had been included then the questionnaire would have been even more unwieldy and un-‘user friendly.’ However even the mention of the word communication in rapid response scenarios evokes an immediate sense of relevance and raises issues such as the need for REA (2.5.10.2) and safety aspects for first responders. It could be stated that communication could have been given three questions within the list of RF.RR presented in the questionnaire including communication between NGOs, Communication between NGOs and civil defence services, Communication between United Nations organisations and NGOs. This was the original intent prior to even the construction of the first questionnaire. Communication within natural disaster scenarios could be the subject of further research. Some work has already been undertaken with regard to the use of IT within disaster relief operations (Harris 2005).

7.2.1.10.9 Disaster history of a given country

This did not appear on the list of variables presented to the disasters community on the questionnaire. It is however a highly relevant issue regarding vulnerability. Work has been done on this area and given attention and documentation within the literature review (2.2.2). If a given country has a high frequency of natural disasters then this needs to be addressed regarding DMP and potential rapid response strategies. El Salvador has a very high frequency of natural disasters including earthquakes, hurricanes, floods, mud and boulder slides and volcanic eruptions. This high level of vulnerability should lead not only the Salvadorian government but also neighbouring countries to have some form of strategy in place for when the next disaster strikes. Return times of earthquakes can be calculated on a statistical probability or mathematical formulation (Smith 2001) although the prediction is still far from accurate. Some countries such as Japan have government departments employed to predict the location and potential disaster zone for each year (Geller 2006). Capacity
building in vulnerable countries is part of the recent strategy of the United Nations humanitarian aid programme. This strategy is clearly factoring in the disaster history of the countries supplied. Latin American countries, including El Salvador, are receiving attention during 2006.

DMP should take into consideration the disaster history of each country and also the vulnerable locations within the vulnerable country. Certain locations such as low lying coastal areas and flood plains are highly vulnerable to tidal surges or rises in river levels from storm surges. The researcher considers that greater attention could be given to precision vulnerability and precision capacity building. Failure of attention to this level of precision leads to scenarios such as occurred with hurricane Katrina in 2005, in which levees were breached by tidal surges and swollen rivers thereby caused massive destruction. Japan is prone to tsunami and therefore has given attention to this regarding coastal defences, and also the Pacific tsunami watch early warning system. The S E Asia countries share a vulnerability to tsunami but had not given attention to either early warning systems or coastal defences leading to the tragic loss of thousands of lives. Sadly there is disaster amnesia (Steinberg 2000) within vulnerable countries and vital daily mitigation procedures are often ignored, particularly regarding building in vulnerable locations or building with inadequate reinforcement in earthquake prone areas. The disastrous loss of children in the Pakistani earthquake of 2005 occurred through neglect of the disaster history of that country and region. Almost all the schools collapsed with devastating consequences and deaths of thousands of children and teachers. A model emerges for one of the concluding statements to this thesis regarding effective rapid response strategies, which embraces disaster history of a given country, precision vulnerability, precision capacity building, precision DMP and targeted education for vulnerable communities. Clearly disaster history is a topic of fundamental importance to the debate of RF.RR and could possibly provide material for future research.
It is possible that the aid history within a given country affected by a disaster could influence the response strategies of the international community. If a country has had a comparatively successful relief operation over one particular climatic or geo-seismic hazard within its territory, it will be well disposed to seeking future assistance from the aid organisations and NGOs that provided service to the country previously. Conversely, if the previous relief operation has been fraught with problems, including the NGO circus, or difficulties with coordination between the local civil defence organisations and the donor aid agencies, a host government may forbid entry of all but a few aid organisations to assist. This is a very important discussion regarding the selection of aid agencies to assist or whether there are any checks or restraints that can be made on NGOs. The IFRCRC, as stated, will only attend if invited (8.2.1.6) The United Nations Humanitarian departments have the mandate to go irrespective of invitation from the host government. (2.4.3.) This selection process or power of a host government to refuse entry to aid organisations is a dilemma and would constitute a topic for further research and would provide useful survey material.

Many LDCs have NGOs already present within the country that can be called upon in times of disaster and adversity. This has been mentioned within the literature review (2.3.12) as well as within the systems modelling chapter. (3.9). These NGOs have developed relationships on many levels, including with the local communities that they serve, with local civil defence services and with schools. There may also be positive relationships with the local mayor or even with the government itself. In times of crisis within the country the community-based NGO can begin to function within the remit of rapid response strategy immediately. Additionally they have the knowledge of the local safe buildings, access and evacuation routes, centres for first aid or medical care and many other attributes including absence of language barriers. It could therefore be argued that community-based NGOs hold the key to absence of RF,RR and would score highly as potentially first or second organisation on the scene to assist. A creative suggestion would be for community-based NGOs in vulnerable countries to receive training in first aid, basic or advanced life support, basic search and rescue principles and the psychological wherewithal to give comfort and psychological support for displaced or grieving families. A disaster-torn country
requires many months or years to rehabilitate and the history of an organisation being prepared to stop and stay for a generous amount of time is very different from a NGO that does a quick hit and run type of operation leaving others to pick up the pieces. This scenario has occurred in the Indian earthquake of December 2004 (Appx E) in which medical teams provided surgical assistance but using techniques that were inappropriate to the needs of the local population thus providing difficulties with post operative care. The whole debate concerning host country and the process of invitation or otherwise to aid agencies and relief workers hinges on relationships. If the past history is a difficult and soured relationship then it is going to produce difficulties for future relief operations. The debate concerning reluctance of a host government to declare a State of National Emergency through not wanting to ‘lose face’ in the eyes of the international community has been discussed under cultural issues. (9.15.2).

Host government relationships with aid agencies and NGOs will either prejudice rapid response or enhance it depending on previous experience over disaster aid.

7.2.1.10.11 Language

Language barriers appeared as item no 9 on the list of 46 variables presented to the disaster community. In the ranking of Average Significance Values it scored very low down the scale at position 44/46. Additionally it did not appear within the four major groupings of factors extracted within the SPSS system. Language problems were mentioned relating to the use of the questionnaire, in which it was stated that if English were not the first language it would be difficult for respondents to understand some of the terminology particularly the wording of resistance factor.

From the experience of the researcher there is a creative tension here in that language barriers have proved a substantial difficulty during the acute relief operation in El Salvador in the earthquakes of 2001, as well as during subsequent missions to the country during the five year rehabilitation programme. It is true to say that it is possible to manage on limited fluency in the native tongue but, medically, history-taking is particularly difficult regarding the frequency or periodicity of symptoms. Multiple pathology invariably exists for many deprived and poverty-stricken families.
Without a translator the task is onerous in the extreme. It has therefore been the policy of the researcher to always have a Spanish-speaking translator of high calibre to assist in the management of earthquake victims, or attending families and children during the rehabilitation programme. It could therefore be argued that, despite the low scoring on the part of the respondent disaster community, language barriers are a significant RF.RR, from the qualitative findings and pragmatic factors relating to patient care, from the researcher’s standpoint. The possession of letters of introduction and identity written in Spanish including from the Salvadorian Embassy in London has assisted greatly with customs and border controls particularly with the passage of large quantities of medicines and medical equipment.

7.2.1.10.12 Context specific factors and combinations of factors

These present a discussion that had not been considered by the researcher in the vain and possibly naïve attempt to obtain a hierarchy of RF.RR hydra heads. This valid area of debate has clearly been presented by a member of WADEM of some considerable experience. The line of argument is that it is not one single RF.RR that is the causative factor in delays in rapid response strategies but context-specific idiosyncrasies of a particular natural disaster. Additionally, combinations of factors may in a synergistic way bring about further chaos, over and above the natural disaster itself, by a fragmented and uncoordinated relief operation. An example of this is in the relief operation in Pakistan on 8.10.2005 (Appx E6) in which steep topography, adverse weather conditions and blocked roads made relief operations very difficult. Equally in the tsunami disaster of 26.12.2004 (Appx E4) in SE Asia the lack of early warning and the massive expanse of the disaster zone with poor communication systems made for huge losses of life and property and highly significant RF.RR. It could be argued that combinations of factors are more important than trying to assess the hierarchy of the individual ranking RF.RR. It could however be argued that using the statistical framework of factor analysis the combinations of RF.RR are identified, whereby the reflection of the nature of the underlying variables within the group is highlighted, thereby providing a useful tool for identification of the serious underlying issues that need to be addressed in disaster management and rapid response strategies. (7.2.2.3). It is however easy to understand that in a country such as India where cultural differences exist and where Declaration of a National
State of Emergency is delayed, then this context-specific set of factors will lead to a significant delay in response from the international community. Further research could be recommended on this topic of combinations of RF.RR or context-specific archive data relating to groups of factors that have seriously delayed prompt and effective rapid response.

7.2.1.10.13 Early Warning Systems

The researcher is aware that early warning systems have not been mentioned in the open-ended question relating to comments on RF.RR and DMP. This absence of comment would appear to be somewhat bizarre particularly in the light of the high frequency of natural disasters over the research period. Most of the questionnaires were received prior to the tsunami disaster in S. E. Asia although that particular event was used as a lever to extract further completed questionnaires from WADEM. Scrutinising the findings over the item of early warning systems, it scored position 9 within the top 5 choices from section 3 a) substantiating its importance. On the Average Significance Value scale it occupied joint tenth position along with 'education of the local population'. It did not appear within the top ten from the SPSS evaluation of factor analysis. It could be argued that early warning systems are part and parcel of DMP strategies and this would account for the absence of comment from Section 3 c). It would appear that early warning systems are of extreme importance in providing a window of opportunity to move to a safer location or to evacuate completely from a potential climatic or geo-seismic hazard. The tsunami disaster of 26.12.04 affected ten countries and conservative estimates state that the loss of life was in the order of 125,000 people and the extent of the disaster zone 5,000 miles. The chief RF.RR in this disaster was the absence of early warning with no tsunami watch organisation operational in the Indian Ocean at that time and there being inadequate local education and no communication links from the Pacific tsunami watch organisation. Many lessons have been learnt over this disaster and the imperative is to improve communication links with coast guard and life-guard stations and to improve education within the local communities and tourist resorts. Where there is a known disaster history to a region such as the Indian Ocean early warning systems have to be given a high priority within the framework of DMP. Early warning systems have received special attention in the literature review. (2.5.9.3).
It will be noted that some of the above issues have been included in the section 2 questionnaire enquiry regarding RF.RR. Education, transport and communication are included in this. It may be that the 46 questions have triggered further thoughts evoking additional comment. The opportunity for responders to share their 'hobby horses,' including the United Kingdom WADEM official, has provided useful information as to the climate of thought within the disasters community. Some of the issues raised are given further attention within the discussion section, including the important issue of language which has thrown up some creative tensions regarding the perception of the respondent group and that of personal experience in the field of disaster relief.

7.2.1.11 Overlap areas with quantitative and qualitative aspects

The rotated factor analysis (7.10.2.3.) and the examination of the higher ranking resistance factors (8.1.7.3) in both the manual and SPSS data analyser methods gives much information of value that has both quantitative and qualitative aspects. The themes and issues raised by the open-ended question regarding comments on the subject of RF.RR and DMP likewise give material for discussion, add a qualitative component to the survey and are considered to be of substantial importance. The questions relating to the IDNDR and to whether there had been training in disaster management have been presented in the quantitative section of chapter 7. The questions are regarded, however, from both a quantitative and qualitative aspect and provide material for further reflection in the discussion chapter 8.

7.2.2. Qualitative findings from interviews with those engaged in disaster response

7.2.2.0 Introduction

Many interviews took place over the five year period from January 2001. (7.6). The interviews were both formal and informal and sought to ascertain detailed information about the role of each particular organisation within the disaster relief process and also the position and role of the interviewee within that organisation. A deeper
understanding of the disaster relief process was one of the main findings from all the interviews, together with a more informed perspective on RF.RR from a global and organisation-specific viewpoint. The list of organisations within which the interviews took place is cited in chapter 7 ‘Methods and Techniques.’

7.2.2.1 Interviews with NGOs

Interviews took place with several NGOs including Oxfam, Tearfund, Compassion and Medicin sans Frontieres (MSF) and Red Cross (IFRCRCs).

Overall findings included the following:

- Well organised
- Trained
- Enthusiastic
- Clear sense of role and direction
- Well supported
- Well funded
- Willingness to coordinate with other organisations and NGO’s
- Willing to assist in the context of the research survey

7.2.2.1.1 Oxfam

Oxfam was engaged in the relief operation after the earthquake in El Salvador in 2001. The interview was conducted with a field worker specifically trained in water engineering and aid provision. A résumé of the interview is included as an important qualitative finding.

The field officer explained the operational strategy in bringing clean water to a fragmented and damaged water system within a traumatised and dislocated society. There were many different methods at their disposal, including cleaning wells, hiring water tankers for distribution, reconnecting to mains supplies or placing water tanks for displaced communities. Each method had value for different situations and the flexible response was seen as a great advantage.
The operational strategy included an early needs assessment and cooperation with the emergency services. The main relief organisation in El Salvador is C.O.E.N (the Comite de Emergencia Nacional) which had been overwhelmed in the earthquake emergency prompting a call for international assistance after the Declaration of a State of National Emergency. Oxfam worked in cooperation with the Red Cross in providing water tanks as a cheaper option than hiring water tankers. The tanks consisted of rigid plastic containers, capacity of 10-11,000 litres of water and set on a concrete base. Local labour was utilised in procedures of tank installation or well clearing. A tank could be put in place within six hours, but if a flat base already existed, the operation could be achieved within 2 hours. The tanks used a gravity-feed system for distribution. Each installation required maintenance and some training of the local population for its usage. It took three people to install a tank. In addition to water provision the Oxfam team in El Salvador gave attention to a sanitation programme with one member dedicated to teaching the local population about health and hygiene measures. This dual role regarding water provision and health was noted to be a particularly worthwhile finding. Discussions took place regarding other fields of operation of Oxfam which included emergency shelter provision and emergency buildings. The Oxfam worker gave useful information on his personal involvement in the organisation and his presence in Kosovo and Mozambique in 1999 as an engineer. He also gave useful information regarding Oxfam as a world wide organisation with 13 member countries. It is a member of the Disaster's Emergency Committee in the United Kingdom. Oxfam had been much involved in shelter solutions after hurricane Mitch and had thrown in a massive effort, according to the field worker. Fears were raised concerning the oncoming rainy season for El Salvador and the amount of displaced people, many in temporary accommodation under plastic, or in tents. The worker pointed out that the infrastructure within the country of El Salvador was weak and this had implications within relief operations. Cholera was endemic and the need for urgent attention to providing clean water was emphasised.

Information was gained on the political status of the country and the relationships between organisations. Samaritan's Purse was another international NGO that was providing water aid. Additionally MSF was using the 'giant water bottle' system in the acute emergency scenario.
Findings

- Enthusiastic and cooperative
- Informed regarding context of role and capacity of the organisation
- Excellent operational skills and understanding of the overall picture of need in natural disasters
- Experienced with proven track record
- Working with local labour, (important feature)
- Absence of competitive attitude and no mention of NGO circus
- Cooperation with other NGOs
- Dual role of organisation a distinctive finding regarding water provision and sanitation
- No major RF.RR apart from early difficulties with COEN as overwhelmed by the scale of the earthquake and extent of the disaster zone

7.2.2.1.2 Tearfund UK

Tearfund is another prominent NGO in disaster relief and has expertise and resources regarding rapid response and emergency provision. Interview took place at the UK headquarters in Twickenham. Additionally informal meetings took place with one staff member committed to the aspect of food security and famine scenarios in African states. The findings within these interviews were equally encouraging with a vibrant sense of purpose and direction. Clear thinking and good planning were evident as was an excellent team spirit and code of conduct within a firm organisational mandate and statement of intent. The member of staff interviewed at the headquarters was leading the rapid response unit and gave information concerning the equipment needed for attending a natural disaster. The military background of the particular staff member enabled a highly organised operation approach to natural disaster response. The findings regarding RF.RR within this particular interview included the complexity of the workings of the total disaster relief operation and the large numbers of organisations engaged in disaster relief. Additionally the jargon and abbreviations within the disasters community was another interesting finding. It was ascertained that the organisation of Tearfund UK has a DMP department within which research had been undertaken into vulnerability, specifically identifying vulnerable countries and
ranking these into hierarchical position. This double aspect of giving attention to
development issues and prevention, together with efficient rapid response personnel
and equipment was a notable finding.

Findings

- Military approach
- Rapid response speciality with good equipment
- Disaster relief a main focus of project-based charity
- Christian organisation
- Research into natural disasters and vulnerability
- Attention to disaster mitigation and preparedness and development issues.
- Hot on food aid
- Good level of partner projects
- Informed regarding complexity of aid community, nationally and globally
- No major RF.RR apart from distance

7.2.2.1.3 Medicin sans Frontieres (MSF)

This interview took place in El Salvador during the operational presence after the
earthquakes of January and February of 2001. The organisation had hired suitable
offices in the city and worked using this as an operational coordination centre. The
warmth of welcome was a notable finding and their position as a highly accredited
NGO was evident by their plaque denoting their award of the Nobel Peace Prize. The
efficiency of the organisation was a positive finding and the willingness to engage in
advocacy issues for the poor people affected by the earthquake was of particular
interest. An event was recounted in which the poor people within the earthquake zone
were being neglected with regard to provision of blankets compared to those in
another part of the city which had a different political affiliation through the local
mayor. Confrontation and advocacy for the poorer people was exercised with positive
effect. Information was gained from the medical aspects of the organisation which
gave special interest. The findings of special relevance included the ability of the
organisation to provide surgeons at short notice and also their ability to provide
mobile field hospitals and isolation units in the case of epidemics. It was reported that
an isolation unit had been installed within a camp for displaced victims of the earthquake as a precautionary measure against a possible cholera outbreak. A giant ‘water bottle’ tank was observed on the lawn of the garden at the MSF headquarters which had been used for emergency water provision at the outset of the earthquake emergency.

Findings:

➢ Medical priority with provision of doctors and surgeons for each world disaster and the ability to erect mobile isolation units to deal with epidemic scenarios
➢ International recognition and strong credibility from having received the Nobel Peace Prize
➢ Highly professional in all their dealings and efficient and positive team spirit
➢ Fearless in tackling local injustice and very strong on advocacy issues for the poor or marginalised within the country in which they provide rapid emergency medical services
➢ Have the ability to provided emergency water supplies using the ‘giant water bottle’ container

7.2.2.1.4 Compassion

Compassion is an international NGO with headquarters in Weybridge UK and offices in the United States. Many interviews have taken place with this particular NGO both at their UK office and in the Salvadorian office in San Salvador. The interviews and contacts runs into dozens. The findings from this particular organisation are steeped in an operational significance both working alongside their team members in the emergency in El Salvador in 2001 and also performing medical clinics for the Compassion organisation in El Salvador in the five years after the earthquakes at various locations, visiting their projects. Constraint will be exercised within this findings chapter. The interviews and informal conversations together with working alongside the project workers has given a deep understanding of the needs of the country of El Salvador and a deep respect for the organisation in its work amongst the poor communities and particularly project work with children. The essential findings regarding this NGO include it being an international organisation with worldwide
field of operation. It is a child sponsorship organisation in which invitation is sought for people residing in MDCs to sponsor a child in an LDC. For a modest monthly commitment each sponsored child is given medical care, education and spiritual guidance.

In El Salvador the number of projects has been growing and at the outset in 2001 there were approximately ninety projects within the country. This has now grown and now stands in excess of one hundred. Each project is situated in a poverty-stricken community and provides a structured level of care and protection. Each sponsored child is given access to emergency medical care and six monthly routine medical screening. This finding was an encouragement within a country in which the medical infrastructure is so limited.

Other findings included a very positive and enthusiastic team spirit amongst the workers with enormous sense of humour and commitment to the work. The structure of the organisation was hierarchical but each team member respected the other. Each year since the earthquakes of 2001 three Compassion projects have been visited and additional medical services have been offered for the children and relatives. This has given rise to the highly important finding that the elderly are sadly neglected by the health care provision in El Salvador. Findings regarding the endemic medical problems in El Salvador have been ascertained from working alongside Compassion in rural locations.

Findings

➢ A big player in international aid for children through sponsorship
➢ Dedicated team
➢ Enthusiastic and well organised
➢ Growing organisation with increasing number of projects year on year
➢ Welcomed the assistance of the researcher on a long term project basis with use as a link between UK and El Salvador offices
➢ Christian organisation with much prayer
➢ Advocates for the poor of El Salvador
➢ Non-confrontational and seek to serve
Well organised and well funded
Good partner project links
Good office and administration
Progressive organisation on every level
Organisational logo ‘Rescuing Children from Poverty’
Able to respond rapidly to emergencies within the country through network of its projects and partnerships
Very few RF.RR but transport an issue within the steep topography and limited number of vehicles.

7.2.2.1.5 Red Cross

The Red Cross interview was undertaken in Geneva at the International headquarters 2001. A friendly reception was given and detailed information produced regarding the operational status of the organisation and the role on the international stage. The history and the regard in which the organisation was held was a substantial finding with key position over many years as the first structured NGO with a global ambit (2.3.1) The numbers of countries with an ongoing presence was enormous and each country had an autonomy regarding operation. The history of the combination with Christian and other faith persuasions was discussed regarding the change for the emblem from a red cross to accommodate a red crescent. (2.3.2). The history of the formation of the International Federation for Red Cross and Red Crescent Societies was explained. Links with partner organisations was explained, including cooperation with the United Nations departments and the World Health Organisation. Information was given about the Red Cross being engaged in both development work in vulnerable countries and emergency relief strategies. In many cases the Red Cross would remain for many months after an emergency disaster scenario. On deep probing there were areas on which the Red Cross had to concentrate effort regarding organisation and finance. These findings, in context, related to a vast organisation with massive bureaucracy and administrative complexity. The shadow side of aid was discussed, relating to the media and the race for organisations to reach a disaster zone first and be seen in front of the cameras, thereby achieving higher profile and funding for the particular organisation. The difficulties of unilateral versus bilateral engagement within a disaster area were clearly an organisational issue that was being
addressed within the organisation. A sense of there being a time of change and challenge within the organisation was detected.

**Findings**

- Longstanding big player in field of disaster relief and development
- Engaged in Relief and Development
- Combination of emblem to accommodate other world religions
- Massive infrastructure
- Good working relationships and cooperation with other NGOs and the United Nations departments for humanitarian affairs and the World Health Organisation
- Need to address financial infrastructure and possible administration overhaul
- A dedicated world leader in NGO status with proven track record.
- RF.RR bureaucracy and coordination and possibly financial management constraints

**7.2.2.2 Findings at meetings with United Nations departments in Geneva**

Meetings were held at the United Nations headquarters in Geneva in the first half of 2001. Arrangements had been made through personal contacts with the World Council of Churches headquarters and the head of the United Nations office for the coordination of humanitarian affairs. (UNOCHA) (2.3.11). Four officers in various departments were interviewed and gave helpful and informative discussions. The findings of particular note, from the general perspective, included the massive scale of the departments and buildings with very high security levels. There was a sense of the awesome responsibilities that are carried within the stately buildings and an air of clockwork efficiency. The reception was courteous but formal, and a generosity of time and explanation. It had not been appropriate to send lists of exhaustive questions as the main purpose of the visit was to try to understand the workings of the United Nations disaster response strategies and to attempt to detect any RF.RR within the strategies, systems and protocols.
7.2.2.2.1 Department 1

Department 1 gave an overview of the work of the United Nations departments regarding disaster relief, including the recently-opened depot in Brindisi, Italy managed by the World Food Programme (WFP). This had been opened in the year 2000 by the secretary general Mr Kofi Annan. Explanation was given concerning the contents and dynamics of the depot and its ability to respond very quickly in the event of natural disasters. Movement towards a disaster area can begin within thirty minutes. At the time of the interview the United Nations WFP was receiving 10 million dollars annually from donor countries but the UK had discontinued its donations. Norway, Denmark and Italy were reported to be very good donor countries with Norway giving the most. Certain donor countries put conditions on how the money should be spent, Norway specifying transport. Details of the equipment and resources within the depot in Brindisi were given which included blankets, tents, plastic sheeting and cooking equipment.

Explanation was given regarding the many departments within the United Nations and the part that each played in disaster response. The World Health Organisation (WHO) dealt with the health emergencies including disease patterns and epidemics. UNOCHA engaged in the emergency relief process in conjunction with the WFP. There is a United Nations resident coordinator on call for emergencies within the Geneva offices. It was pointed out that there is a gap in the coordination process with NGOs. The response to an emergency was instant and the capacity and state of readiness of the teams appeared excellent. The incongruous finding was the smartly suited UN staff converting into response personnel in appropriate operational clothing for disaster scenarios. The staff were confident in the capacity to respond quickly and stated that the systems work well. One delay or RF.RR was the time lost in seeking donor approval to spend money to a particular emergency. They pointed out that they usually got over this within 24 hours.

7.2.2.2.2 Department 2

Department 2 was engaged in civil and military cooperation, coordinating the sharing of assets for disaster scenarios. (2.4.19). This was an important finding with excellent
explanation and cooperation from the team fulfilling this role. The tool that they used for this was the Military and Civil Defence Unit (MCDU). The word ‘tool’ was mentioned many times in the course of the interviews. The MCDU were responsible for mobilising military assets during times of disaster. It was explained that much prior work needs to be done to have an informed understanding of ‘what and where’ regarding possible assets to be employed in disaster scenarios. Additionally this required a relationship of trust and a sense of partnership. Political problems were not mentioned, but clearly the ambassadorial approach was used in relation to use of another country’s assets in peacetime. The United Nations Civil and Military committee (UNCIMIC) had policy guidelines, as had all departments. Additionally they ran a training programme. The UNCIMIC had been in existence for five years at the time of the interviews. Exercises also took place but this was United States orientated and did involve NATO, and there were 4 regional courses per year. The word ‘war’ is not used in the UNCIMIC office. It is referred to as ‘a complex emergency’ or ‘conflict.’ UNCIMIC also works with the humanitarian agencies. It was explained that the military are becoming involved with increasing frequency in natural disaster scenarios and ten air forces have submitted resources for the disposal of CIMIC. The motto within the CIMIC office was ‘you don’t have to be crazy but it helps’.

7.2.2.2.3 Department 3

The United Nations Disaster Aid Committee (UNDAC) was responsible for DMP and employed consultants in planning responses to emergencies. Pre-emptive planning was the strategy adopted, and the committee knew where the stockpiles of emergency equipment were located. Mention was made of these stockpiles in Africa and the attention given to food security.

The UNOCHA field coordination department was responsible for rapid response strategies. This consisted of a rapid response team, an operational coordination centre and a SAR organisation propounding a structured approach with operational standards and guidelines. This branch of the United Nations response team is known as the International Search and Rescue Agency (INSARAG.) The organisation was brought into being after the chaos at the Armenian earthquake where the search and
rescue operation had been apparently shambolic. INSARAG has three regions of coverage namely Europe/Africa Asia/Pacific and the Americas. The international search and rescue teams (SAR) meet annually from these regions to share lessons learnt from the previous year. Training is part of the remit of INSARAG and they are 'hot' on procedures, language, grid searches, surveying in earthquakes, internationally approved code of marking buildings as to occupants and whether searched or not. Coordination was a key issue regarding the training. The coordination of the search and rescue operation in Turkey was bad and it was mentioned that in-transit coordination is needed. It was mentioned that 25 countries are interested in SAR and conventions are held. It was pointed out that there is a healthy competition between different nationality SAR teams, particularly between Japan, South Korea and the United States. Could this be a RF.RR? Equipment used included thermal imaging and scanning.

A highly interesting tool was the On Site Operations Coordination Centre (OSOCC). This comes under the responsibility of the International Humanitarian Partnership (IHP). The members included Denmark, Sweden, Finland, UK and Norway. UNDAC has the overall responsibility and the initial response to any natural disaster occurs very quickly by UNDAC. The OSOCC is installed when and where appropriate and seeks to coordinate the relief operation from the heart of the disaster zone. The centre has all the coordination and communication equipment including satellite phone system and back-up materials for the teams, including showers, transport and sanitation. They do not have any helicopter disposal. It was explained that the OSOCC works well and was a great success in the Turkey earthquakes in Duzje and Izmir in 1999. The teams provide daily briefings for the NGOs in an attempt to coordinate the disaster relief effort. They pointed out that in the earthquakes in Afghanistan in 1978/9 they were unable to use the OSOCC because of looting from local people. Virtual OSOCC is a system whereby users are able to log in to their organisational computer systems to receive real time data concerning a disaster. 600 users were registered at the time of the interviews and 170 users logged in at the El Salvador emergency. This is a definite RF.RR. UNDAC is described as one of the United Nations tools, will work on site for twelve hours and aims to work with the government in the host country. The United Nations departments explained that they can 'change hats' in non-emergency times and UNOCHA becomes the structured
United Nations Development Programme (UNDP). Discussion took place concerning invitation from host governments and any resistance from particular countries or quarters. In earthquake scenarios UNOCHA tends to send assistance quickly despite some resistance from the UNDP department. Information was presented concerning resistance from India and China regarding receiving assistance from the international community. This was the case in the Gujarat disaster of 2001. The RF.RR in these situations was thought to be pride and ‘losing face.’ The United Nations Disaster Aid Committee is able to scramble at short notice and also has three regional teams. The team members are fully vaccinated and have had special training. Their bags are packed and ready to leave at very short notice. Finances and insurance needs are covered and money for use is deposited in the country to which the teams go. The organisation has a field handbook which the team members have at their disposal and the teams will have had at least two weeks induction course prior to standby. The organisation seeks to do early rapid needs assessment and to provide information and coordination in the field. They do not carry out any medical interventions. It was mentioned that in the El Salvador emergency in January 2001 they had a clear message of invitation on day one of the emergency but on day two were told to stand down. This confused message constituted a RF.RR. They pointed out that there were many grey areas in the coordination of the appeal process and difficulties with the intervention points. This is another RF.RR.

UNDAC perform aerial surveys in the early stages of a natural disaster but have to hire the helicopters. UNDAC always perform a handover of the coordination in a disaster zone before pulling out. They mentioned that it is vital not to leave a vacuum scenario on exiting a country. UNDAC is responsible for the initial disaster relief and on average will remain in a country for 2-3 weeks. If the operation is taking longer then team members are rotated. Debriefing is seen as part of the learning process with lessons learned shared.

Mention was made of the offices in New York which are responsible for policy and advocacy issues. The Geneva office has the mandate for emergency response.

7.2.2.2.4 Department 4

Department 4 was located at a distance from the main United Nations buildings. This department was giving specific attention to the International Strategy for Disaster
Reduction (ISDR). The activities of the staff included commitment to ongoing DMP, capitalising on the momentum of the IDNDR (2.5.11). Inefficiency was observed in this department regarding the attention to diary commitments and the prior arrangements made for the interview. RF.RR was observed regarding the ad hoc arrangements to accommodate a forgotten meeting at short notice. The outcome was a very convivial meeting with the director himself, Mr Dennis Ben, availing himself to give helpful insights and detail of the activities of the department. The department ran a sub-committee named the Inter-Agency Task Force (IATF) advising the main United Nations forum on current strategies and policies within disaster reduction, and making recommendations (2.5.12). The ISDR also provided excellent resource material through literature to give advice on the subject of disaster mitigation. This was in the form of a newsletter for wide distribution to interested parties.

Findings

- Highly professional major player in field of disaster response
- International organisation with credibility on the global scale
- Committed to emergency response particularly communication and coordination of response
- OSOCC and virtual OSOCC excellent use of technology
- Provide a high quality service to the disaster community
- Good relationships with the military and shared assets and training
- Commitment to SAR with professional standards and handbooks
- Excellent state of readiness to respond
- Good links with other countries regarding donors and stockpiles/depots of available emergency equipment and food.
- WFP working well.
- RF.RR admitted to and addressing some of these. Some inevitable i.e. looting of OSOCC kit in Afghanistan.
- RF.RR massive organisation run on Whitehall lines. Huge infrastructure with vast buildings. Exhaustive number of committees, departments, offices and acronyms. Possible RF.RR regarding vast numbers of committees with weighty bureaucracy.
RF.RR: relationships with NGOs need addressing prior to disaster response operations. In transit communication and coordination between SAR teams a confessed RF.RR and needs addressing.

RF.RR in hosting one departmental meeting out of four with the researcher

7.2.2.3 Qualitative findings from victims in non-acute and acute situations

7.2.2.3.0 Introduction

Interviews were undertaken semi-formally or informally according to the location and circumstances and are described under non-acute and acute status. A small number are presented out of the many ‘face to face’ scenarios with victims in the acute situation.

7.2.2.3.1 Non-acute interviews

7.2.2.3.1.1 Interviews at displacement camp Santa Tecla, El Salvador

The interview took place in a displacement camp which was a disused coffee factory requisitioned as a temporary settlement after the massive mud slide of Santa Tecla in El Salvador. A translator was employed because of language and communication difficulties. The findings from this interview included the following:

- Very low morale and sense of loss of dignity in the evacuation camp
- Having to queue for food and essential supplies compounding the loss of dignity
- Not able to participate in the running of the camp or doing own cooking, compounding the sense of low self worth
- Anger and frustration within the camp and palpable sense of fear and danger
- Depression and sadness through loss of family with minimal consolation in the evacuation situation
- Medical care from the Red Cross NGO on a temporary basis and not adequate for many conditions
- Overcrowding and lack of privacy
- Fear of uncertainty and loss of contact with the outside world
Penned in by security fence and armed guards causing atmosphere of internment/prison scenario
No cholera outbreak had occurred as was feared so the isolation hospital tents were not being used and this caused anger/frustration regarding the overcrowding

7.2.2.3.1.2 Interview with Compassion project team in town of Berlin, El Salvador

Findings included the following:
- There were delays in receiving assistance
- Most of the search and rescue was done by locals including family and friends
- Delays caused by high altitude location and blocked roads
- Helicopters were not in evidence
- Assistance arrived from the Red Cross in small quantity after two days
- Blankets and plastic sheeting were provided and basic dressings
- Casualty rates were low and most ran out into the streets at the time of the two earthquakes

7.2.2.3.1.3 Interview close to San Carlos evacuation camp erected by the Red Cross

- Morale good
- Regular attendance from the Red Cross
- Tents adequate and no overcrowding
- Buoyant atmosphere and evacuees able to participate in the running of the camp
- Positive feelings and children adapting with sense of ‘strange holiday’
- Concerns regarding the future and getting back home
- No major RF.RR and assistance within 48 hours
7.2.2.3.2 Interviews in acute situations

These were not formal interviews and the findings are confined to responses and observations from several victims during the earthquake of 13.2.2001 in El Salvador at the towns of Santa Maria Oustuma and Jerusalem and include the following:

- Acutely shocked and communication often highly emotionally-charged
- Asking for comfort and prayer and wanting to be held
- Expressed enormous gratitude for practical assistance
- Accepted treatment with fortitude and often praised God despite the severity of injury or degree of loss to home and possessions
- No threats or violence from acute victims only a passive resignation to situation
- Anxiety concerning further ground shaking expressed
- Expressed grief for loss of family members
- Anxious to salvage possessions despite fear of further ground shaking
- Expressed amazement that medical assistance present within minutes after the quake and regarded team as ‘angels’
- Patience and silence when procedures being carried out e.g. suturing of wounds
- Thankful for mutual support of family and friends and not wanting to leave the town despite devastation and masses of rubble and debris

7.2.3.0 Qualitative findings from those engaged in emergency response to earthquake in El Salvador 13.2.2001 including those of the researcher.

The devastation caused through the massive mud slide in Santa Tecla was a potent indicator of the magnitude of the seismic event (6.8 on Richter scale) that caused such devastation and brought the suffering of Salvadorians to international attention with front-page photographs and graphic details. The event was distinctive in that the whole country had been affected and many other mud and boulder slides had caused significant loss and damage to people and property. The needs of the country at the time were for emergency shelter material and for medical assistance, particularly the provision of drugs for emergency use, e.g. antibiotics. The fact that this major world earthquake had happened within two weeks of having started a period of prolonged study leave devoted to rapid response strategies and DMP, was a strong incentive to be present and observe the consequences of a major earthquake and to assess the needs of the population in relation to the event. Other incentives to travel to the
earthquake zone included the possibility of being of actual use in the provision of emergency medical service, shelter material and drugs. The disincentives to travel to El Salvador included the lack of contacts in the country and the absence of an understanding of the Spanish language. Added to this was the knowledge that this is a dangerous country still recovering from the effects of the civil war even though this had come to an end in 1992. (2.8.2).

The trip was undertaken with the assistance of a paramedic possessing skills in logistic and major incident scenarios. His background was an inspector in the police force in the United Kingdom and also qualified in physiotherapy. His contribution to the effectiveness of the trip was enormous.

7.2.3.1 Initial findings

On arrival in El Salvador the findings relating to the country included the following:

- A country gripped with fear and uncertainty
- A palpable sense of unease and danger
- The wealthy people living in secure buildings seemingly unmoved by the plight of the poor people
- A hot and dusty country with chaotic transport and danger on public highways
- A willingness of the local population to assist us in our efforts to provide emergency medical services
- An openness by NGOs present in El Salvador to share their role and contribution to the earthquake relief effort
- Massive devastation was observed at the disaster site at Santa Tecla where the slope failure and vast mud slide had occurred.
- At the major disaster site the ground was covered in disinfectant (constituent unknown) as many bodies were still buried and there was a perceived risk of infection to the neighbourhood
- Evacuation of the survivors had taken place and the relocation site was observed on the grounds of a disused coffee factory
- Medicin sans Frontieres had erected an emergency isolation field hospital in the event of a cholera outbreak
The morale of the displaced community within the evacuation camp was exceedingly low and queues of people were observed waiting for food.

Many health problems were observed and many families were given treatment for intercurrent illnesses.

The effects of civil unrest and violence from machete wounds were observed.

Many access roads were blocked through mud and boulder slides which made transport difficult.

Temporary shelters were observed in the form of tents or bivouac erections covered with plastic sheeting (2.7.11). In the village of San Carlos tents provided by the Red Cross were observed.

The NGO Oxfam was highly efficient in the provision of emergency water supplies and were engaged in a reconnection programme and a water sanitation and education programme (8.2.3.1).

The NGO MSF was being highly effective in the provision of emergency water supplies and blankets for the displaced victims of the earthquake. They were also observed to be using their powers of advocacy regarding fair distribution to different parts of the city that had different political persuasions.

The NGO Compassion was observed to be doing a splendid work with 90 projects in the country and the provision of health care, education and spiritual direction for the children within each project (8.2.3.1).

The United Nations were only seen as a low profile presence but may have been more active at an earlier date in the immediate aftermath of the earthquake.

Buildings in the poor communities had suffered major damage and the casualty rates were high.

Some villages were severely disrupted by near total collapse of buildings and blockage of roads. These included Santa Maria Oustuma and Jerusalem.

7.2.3.2 Findings from the second earthquake of 13.2.2001

The author was part of an emergency relief team with the NGO Compassion driving in two vehicles to remote mountain communities when the second earthquake struck. The force of the ground movement was extraordinary and the effects on the vehicles intense. The duration of the shock wave was brief but sufficient to cause substantial
displacement of trees, rocks and damage to the road. The vehicles were undamaged as were the occupants. Emergency medical equipment was being carried and decision was made to proceed to the surrounding villages to provide emergency assistance. The Salvadorian members of the relief team were particularly distressed over the uncertainty concerning their own families living in the capital, San Salvador and the lack of communication available with the mobile phone network compromised. The sense of fear was palpable and locals were observed running from remote locations back to villages. A somewhat perverse response within the team was that of excitement and danger. Physiological changes were noted within one’s own body including adrenergic responses such as rapid pulse rate, deep respiration, heightened awareness and clammy skin. Comfort and mutual team support was a strong factor to galvanise an emergency relief effort which was undertaken in conditions of chaos and mayhem.

7.2.3.3 Findings in the emergency situation

The following findings are listed regarding the acute emergency scenario of 13.2.2001. A list has been employed to give clarity of evaluation for the reader.

- Observed injuries included fractures, crush injuries and lacerations.
- Many of the victims were in shock and had lost all their possessions and one or more family members
- Medical assistance was absent for the remote and poor mountain communities
- First aid skills and basic life support training were singularly absent
- Poor coordination of the relief effort was noted and the absence of helicopter assistance and the military
- The resilience of the survivors was noted and their strong faith in God despite the devastation. Prayer was seen to be occurring spontaneously
- Several buildings had undergone ‘pancake’ failure with a fallen in roof and walls bursting out laterally (4.11)
- The only surviving part of many buildings was the lintel giving substance to the argument that this is a comparatively safe place within a building in the event of an earthquake
- The sky became rather dark due to the inordinate amount of dust in the air
- Rubble was noted in vast quantities and some buildings literally snapped in half
- Victims sustaining injuries were grateful to receive emergency medical assistance and comfort from our team.
- Much of the relief effort was hampered by blockage of roads from rock and boulder slides and this presented a significant RF.RR.
- The hotels in the city of San Salvador had only sustained minor structural damage compared to the rural communities.
- The safety of the hotel Terraza where lodging was taken was most welcome.

7.2.3.4 Findings in the aftermath of the earthquake

In the aftermath of the second earthquake, aftershocks and fear pervaded the country. Much assistance was given by the international community during this stage but according to the British Ambassador at the time, Mr Patrick Morgan, there was a competitive attitude amongst the various participating NGOs in the relief effort which was somewhat distasteful. Financial aid was given in substantial quantities by the international community and the British Embassy was used by various NGOs in coordination of the relief effort. Oxfam was a prominent British NGO which performed a vital service regarding reconnection of water supplies and giving education to local people regarding sanitation and health issues. Informal meetings took place with the Oxfam team. MSF was another prominent NGO performing exceptional work for the displaced communities. Findings in the aftermath of the earthquake included the following:

- The hotel where the author and paramedic were staying was observed to shake violently in an aftershock of approximately force 5.5 on the Richter scale but did not collapse or sustain major structural damage. Plasterwork previously repaired after the earthquake of 13.1.2001 had to be re-repaired.
- Much begging was observed within the city of San Salvador, but only on one or two occasions did it occur within the rural communities.
- Armed guards were observed in many situations including the displaced community from Santa Tecla, shops, hotels and private houses.
- The medical resources of the country were hopelessly inadequate to deal with the extra casualty rate from the earthquake and assistance from the international community was essential.
Large boulders were observed in the roads making progress to damaged villages dangerous and slow (4.13)

Power cables had been brought down by falling trees

The days were hot and dry but the nights were cold and nightfall came early

Relatives from the United States of America travelled back to their roots in El Salvador to assist in the relief effort and to provide comfort and support. This included Hector Hernandez, who provided vital support to our personal relief effort and directed us to the village of San Carlos, where medical relief was undertaken with Hector acting as translator and providing transport

During the provision of emergency medical relief within villages such as San Carlos many people suffering from chronic medical conditions attended for treatment. The conditions included chest diseases, skin problems, gastro-intestinal infections and arthritis

Children regarded the doctor as a novelty and were very keen to be examined or photographed

The generosity of the poor people was observed consistently and their optimism in the face of danger and loss remarkable

The water supply to the poorer communities including San Carlos was sadly lacking in quantity and quality with disruption by the earthquake

Houses in San Carlos and in other areas on the sides of steep slopes had succumbed to major structural damage

The major hospital at Santa Tecla had been damaged to the extent of being unsafe to operate. The maternity unit had collapsed and the house officers (interns) had performed a splendid job in overseeing the evacuation. Emergency accident and emergency facilities were in place under canvas.

Orthopaedic expertise and equipment were noted to be basic and joint replacements a rarity for the poor people. Arthroscopy was not available for the general orthopaedic staff

Orthopaedic out patients clinics were being undertaken in the grounds of the building for Coordination of Emergency Response (COEN) in San Salvador and medical students were in attendance. Mr Francisco Melchior, the consultant, was anxious that we should inform doctors in the United Kingdom of the difficulties that their hospital and staff were facing
A public health campaign had been given high profile relating to the prevention of Dengue fever

Cholera and Chaga's disease was noted to be endemic

In the village of San Carlos 2 brick homes had collapsed and 3 'mud' houses (adobe) had collapsed. There were no deaths in the village and no injuries despite the very steep topography on which the village is located. Strong vegetation and ground stabilisation acted as a protection against slope failure. All the emergency work was done by family members and members of the village.

7.2.3.5 Conclusions from the findings of the first tour to El Salvador in the wake of the earthquakes of 2001

El Salvador was observed to be a developing country with high vulnerability from natural disasters, chiefly earthquakes and mudslides, together with risk of morbidity and mortality from endemic illness and road accidents (2.8.2). The poor and dilapidated conditions in which the majority of the people existed was evident and the buildings in which they lived highly vulnerable to earthquake damage, thereby contributing to much loss of life and injuries. The people were resilient but grateful for assistance in the face of extreme emergency conditions. The severe deforestation appeared to be a major contributory factor to the slope failure leading to mud and boulder slides. The poor people appeared to be living in vulnerable locations and buildings with limited access to medical resources and little knowledge of first aid measures. Clearly the capacity of the emergency services had been overwhelmed and transport of casualties to hospitals was a major difficulty, with the uncertainty of poor capacity of local hospitals some damaged by the earthquake. Blocked roads and steep topography added to the difficulties regarding transport of casualties and air ambulance services were non-existent. The severity of the earthquake was compounded by limited national DMP strategies and a singular lack of adequate health care within the country. The prompt declaration of a national emergency by the President had triggered a substantial international relief effort including the modest contribution of the team represented by the author of this research.
7.2.4 Qualitative findings during a five year rehabilitation phase post earthquake in El Salvador 2001-2006

7.2.4.0 Introduction

Annual visits have been made to the disaster zone in El Salvador seeking to provide further assistance to the disaster victims and to observe the rehabilitation stage after the major world earthquake affecting the country during 2001. Each year visits have been made to three Compassion childrens’ projects providing medical services to the sponsored children and other members of the local communities. Additionally visits have been made to one particular village named San Carlos on the outskirts of San Salvador city. Work has also been undertaken in the North East of the country in the area of Morazan in association with a project named Doctors for Global Health (DGH). Each year a needs assessment has been undertaken in order to provide suitable medications and equipment for the rural communities and supply links have been established to send necessary items to needy communities. The findings are presented under the three headings of medical, political and vulnerability to future hazard.

7.2.4.1 Epidemiological findings

Poverty and malnutrition are ongoing problems, with ongoing infective issues resulting from contaminated water supplies, lack of hygiene and proper sanitation (2.8.3). Poverty and water-related issues are still the most significant finding. Intestinal parasitic infestation is universal amongst the children of the poor and rural communities. Fungal skin infestation is prevalent and leads to de-pigmentation leaving unsightly blemishes. Cataracts and pterygia are seen frequently among the middle-aged to elderly population and this is related to the high levels of ultraviolet light exposure and weather damage. Orthopaedic problems are rife and there is very little opportunity for joint replacements. Gross osteo-arthritis is observed with compromise to mobility. Cancer is frequent including malignant melanoma through sun exposure. Chest conditions are seen frequently as much of the cooking for the rural communities is done over wood fires. Additionally many peasant workers roast coffee beans for their living and spend much time in smoke polluted atmospheres. The
highest mortality comes through road accidents and this is related to poor traffic laws and very little enforcement. Additionally the motor vehicles are poorly maintained and there is no MOT ruling. Many of the vehicles are open with overcrowded standing rear compartments, lending themselves to severe injury on impact through no restraint or seat belt law enforcement. Stabbings and shootings continue to be the second highest cause of death within the country, often perpetrated by gangs of tattooed hooligans known as Pandillas. Laws relating to gun and ammunition controls are poorly enforced. Renal failure is seen frequently within the country and the facilities for treating this are very limited. It is thought that pollution is a main factor regarding the high incidence of kidney disease. Cancer is frequent and the facilities for treatment restricted. There is a singular lack of palliative care available for the poorer members of society and the government does not allow opiates within the country. The strongest analgesic available is Tramadol. Hospital facilities are overcrowded and inefficient with out-patient departments struggling to meet the demands. It is not uncommon for a patient to have to wait all day just to sort out the paper work and administrative aspects and then have to return the next day to see the doctor.

The health service is a three tier arrangement with private at the top for the wealthy members of the country chiefly found in San Salvador. The social security system is unlike that in UK and is the medical service available for the white collar workers. This is more akin to the NHS in the UK. The national health service in El Salvador is barely adequate and provides health care for all. Consultations cost one dollar but medication or investigations may cost more. This financial implication deters many Salvadorians from seeking medical advice. Child health surveillance is basic and immunisation programmes adequate. Drugs are extremely expensive including over the-counter preparations, hence the poorer people struggle with minor aches and pains particularly headaches and back problems. HIV Aids is a small problem (1%) within the country in 2005, but the number of cases is rising. Dental caries are universal and many children are badly affected.

Low levels of cardio-vascular problems were found amongst the rural communities which may be related to the general high-fibre and fruit diet of the populace together with low level of smoking because of poverty. Alcohol problems are present but in
most of the rural communities visited this has not been an issue, and cases of cirrhosis were found to be minimal. The handicapped do not appear to have any structured programme of management within the rural communities and makeshift wheelchairs have been observed. Contractures through poorly managed spasticity are common. Untreated facial skin cancers have been observed in the peasant population. Blood pressure for those that suffer from it are treated with ACE inhibitors. Enalapril appears to be the drug of first choice. Mental illness is seen only infrequently and chiefly through loss and damage after the earthquake of 2001. The rich/poor divide is very apparent with the poor people suffering from higher levels of parasitic and infectious illness. Chaga's disease is common and affects people living in poor housing conditions. Dengue fever is endemic and is caused by the day-time feeding mosquito, Aedops Egypti, but the Ministry of Health have invested much effort to curb the infection rate through publicity and campaigns. This has been highly successful as has the eradication of Malaria. Cholera is endemic but seen only infrequently. The fears of epidemics after disasters are unfounded. TB is very common within the country.

The staple diet of the country is beans, corn, and tortillas, locally grown coffee and sugar cane. The American influence is growing with fast food outlets and Campero chicken which is very popular. Obesity in the children has been observed through drinking sugared drinks (sodas) and the increase of junk foodstuffs. Intestinal parasites include *entamoeba histolytica, giardia lambli, blastocystis hominis* and *campylobacter*. Rotavirus epidemics occur yearly around February time and cause the death of many infants through dehydration. Public campaigns occur informing the populace how to avoid dehydration.

In conclusion, the country has many interesting medical findings but the main problem for the Health Service is lack of resources for the common people. Additionally the rich/poor divide brings many health issues through poverty and malnutrition. Danger from violence and road traffic accidents continues. Clean water is necessary together with improved hygiene to diminish the high level of parasitic intestinal infestation.
Political stability is now becoming a reality with the ARENA party under the presidency of Antonio (Tony) Saca. The opposition party is the Farabundo Marti Liberacion Nacionale (FMLN) which constitutes the remnant of the guerrilla party. Most of the poor people belong to the FMLN. Presidential and congress elections are colourful affairs with all the curb stones and lamp posts painted with party colours. The elections are now democratic and without violence or corruption. The present stability, concentration of good trade partnerships and improving the economy through increasing the focus from coffee to utilities and financial services seems to be making progress. The level of inflation is zero and the dollarisation programme has been achieved successfully, but the poor people have suffered through the price increases. The black market and market trading generally seem to be the place where the poor people buy their essential goods. Future areas for political focus include the ongoing vulnerability to natural disasters and the need for good planning and building policies. Improvement in the health care provision needs to be given serious investment. The savage civil war in El Salvador ending in 1992 is a reminder of the level of mortality and displacement that can occur with internal conflict (2.8.9).

Recommendations and findings from an interview (Hernandez 2005) with a Salvadorian included the following prescription:

1. Organise a pension scheme for everybody.
2. A thorough ‘clean-up’ needed by local government and the local mayors to improve the standards and hygiene within the country.
3. Issue traffic/parking tickets and use the money to improve the environment particularly tackling pollution.
4. Increase job opportunities to deal with the unemployment problem in the country.
5. Make the country safer by having more police and having better gun laws and control of violence.
6. Have emergency funds to deal with natural disasters.
7. Improve education and teaching
8. Provide more opportunities for children.
7.2.4.3 Vulnerability findings

The six million inhabitants of El Salvador are highly vulnerable to death through two or more natural disasters (2.8.1). These include earthquakes, hurricanes, floods, volcanic eruptions and mudslides. Added to this is the vulnerability from violence and road accident and from infectious illnesses. Poverty and pollution are still substantial problems, causing vulnerability to disease and death. The country is highly vulnerable from geo-seismic natural disasters because of the proximity to three tectonic plates namely Pacific, Nazca and Cocos plates with an active subduction trench extending along the coast line. Vulnerability from earthquakes and ground shaking is an ongoing problem and unsafe buildings and poorly sited structures compound the vulnerability.

7.2.5 Conclusions regarding findings in El Salvador

The findings in El Salvador are many and varied. Regarding RF.RR the main issues are steep topography causing blocked roads in the event of ground shaking. The wet season compounds the risk of mudslides which have caused untold devastation in 2001 throughout the country. Transport issues and the lack of helicopters was a serious RF.RR in 2001 but this has been rectified. Other RF.RR include remote rural communities and fear of approach for threat of possible violence. Other RF.RR is on the medical front with a poorly structured health service that is barely able to cope with present demand, and unable to cope with surge capacity issues in disaster scenarios. On the positive side there are good relationships with neighbouring countries which are willing to help in times of crisis, and the President is open to receiving outside assistance should the need arise. The closure of the British Embassy in 2003 is a source of contention relating to this very vulnerable country.

More details regarding the vulnerability and history of El Salvador is to be found in the literature review Chapter 2. In the face of the findings in this vulnerable country, particularly that of the children, the researcher has, with others, established a Charitable Trust, to assist in meeting the ongoing needs, known as the Salvadorian Children’s Earthquake Trust (SALCET) charity number 1111287.
7.2.6 Conclusion for qualitative findings

Considerable effort has been invested to gain qualitative dimensions to the nature of RF.RR from interviews and meetings. Additionally, the researcher has put himself into the emergency situations to assess first-hand the resistance factors and attempted to be an agent against RF.RR. The questionnaire has given the opportunity for the responding group to express opinions and hobby-horses, thereby gaining insight into the thought patterns and prejudices current within the disasters community. Meetings and discussions with members at the coal face of disaster response have been a distinctive feature of the research, as has the opportunity to interview and give emergency treatment to the victims of natural disasters.

The qualitative findings provide useful material for comparison with the quantitative results from the questionnaire. The qualitative dimensions have been given a high degree of attention because of the operational significance within disaster response. Both the qualitative and quantitative findings will be addressed regarding their contribution to the research problem in its entirety and also to the specific hypothesis of the thesis namely: that many remediable resistance factors to rapid response exist despite the efforts of the IDNDR and despite the current state of development of disaster mitigation, preparedness and management strategies. Attempts will be made to draw connections between the quantitative and qualitative data and to ascertain where there is supporting evidence or otherwise between the two regarding the hypothesis.
CHAPTER 8 DISCUSSION AND CONCLUSIONS

8.0 Introduction

The methodology and the findings chapters have produced a substantial amount of material suitable for discussion and comment. The primary task however seeks to address how effective the survey process has been in addressing the research problem and answering the subsequent intuitive questions presented at the outset of this thesis. Issues raised from the outcomes of the survey will be given attention, particularly the ranking of RF.RR, and the groupings identified from the factor analysis process (6.10.2.3). Creative tensions and contradictions arising from the survey will be given appropriate discussion, including language problems as a potential RF.RR and the amateur/small player versus professional/big player issue in disaster response. Recommendations for further research in the area of RF.RR will be cited and messages for the disasters community from the outcomes of the survey will be listed. A hypothetical model of RF.RR-free international response will be presented and philosophical points relating to the future of disaster response strategies will be offered.

8.1 Discussions on Factors extracted after data processing

Factor analysis seeks to take a large set of variables and looks for a way to reduce the data or summarise it, using a smaller set of factors or components (Pallant 2005). The technique of PCA was used (6.3.6) for the processing of the survey data obtained from the questionnaire responses. Within this system a mathematical model is employed in which only the shared variance is used for the factor analysis (Tabachnick 2001). The resulting groups of factors were attributed names which characterised the nature of the underlying variables within each group. This proved to be a successful procedure in providing four component groups which had a common theme (Table 7.10). The ranking of these groups in order of precedence were 1) preparation, 2) capacity and dimension, 3) aggravation, and 4) attitude and evaluation. These will be discussed under their respective headings, with comment about their wider implications within disaster response, and relevance to RF.RR.
8.1.1 Preparation

This is a key area in achieving rapid response to the plight of victims within a disaster zone. Preparation can include a wide area of DMP strategies (2.6) including education of the local population within a vulnerable area as to measures to be taken in the event of a hazard scenario. Preparation is linked to anticipation and vulnerability, and thinking ahead to possible scenarios will enable planning to be performed. Preparation can occur in the vulnerable location or on behalf of the potential rescue teams and relief services. In vulnerable countries attention can be given to sound building practices (2.7.6) and construction materials. Additionally anticipation of casualty statistics and potential sources of aid in the event of a disaster can be given (Kozuch appx C). Capacity building in vulnerable countries is now high on the agenda of the United Nations WFP (Stanhope 2005). This is eminently logical concerning local preparation and improving resilience rather than having to bring resources and emergency materials from great distances. Preparation and capacity building can seek to improve the infrastructure and resilience of a vulnerable community and this may mean improving health and nutrition as well as safer housing and knowledge of access roads. Preparation embraces education of the local population concerning vulnerability and measures to be taken in the event of a natural hazard. New Zealand is particularly efficient in preparation and education and most homes have emergency supplies of food and water. Additionally they have a positive education programme which embraces what to do in the event of an earthquake, and home DMP measures to prevent injury and death from falling objects or masonry.

Training comes high in the ranking of the Preparation group. Absence of training leads to inefficiency and incapacity to deal with disaster scenarios. Teams can become de-skilled if not put to regular operational tasks. Fire and rescue teams need to be familiar with the equipment that they are using and the specific equipment may need regular maintenance. In El Salvador the local civil defence service was easily overwhelmed and there was a singular absence of trained personnel in basic life support (7.2.3.3). Training of Accident and Emergency staff needs to take into consideration the types of injuries that may be encountered. Burns and crush injuries are seen with regular frequency in earthquake disasters (3.8). Accident centres and trauma units in seismically vulnerable countries need to have sound knowledge of procedures in dealing with these injuries.
Pre-planning can be done between local civil defence services and the relief agencies even at short notice, if the communication systems are in place and language barriers overcome. Networks and relationships between NGOs and vulnerable communities is on the United Nations agenda for effective rapid response (2.3.1.1). In some circumstances NGOs are already in place, working with the local people, and having knowledge of access roads, safe buildings and local resources, including hospitals and emergency equipment. This would appear to be the most efficient preparation particularly if there are communication lines with a back-up country enabling rapid and effective supply of appropriate equipment and personnel in the event of an overwhelming natural event leading to a disaster.

Early warning systems are included in the umbrella group of Preparation (table 7.10) and discussed (2.4.16). So many lives could be saved if adequate early warning systems were in place. The type of system required is country and context-specific but needs to take into account the type of hazard to which the locality is historically vulnerable. Early warning systems can be effective if they are operational and if understood by the local population. If the function is suspect with false alarms, then the system will not be given due attention. Early warning systems should be programmed to respond to climatic surges and seasonal variations and to give special warning in the event of a massive geo-seismic event. It is hoped that tsunamis in the Indian Ocean will now receive adequate warning for future events to which the surrounding countries have a known vulnerability. Attention is given to early warning and communication generally in natural disasters in the systems modelling figures (3.6 and 3.9). Preparation can also embrace pre-planning and disaster modelling using information technology such as Geographical Information System (GIS) and the Global Positioning System (GPS) (Smith 2001). Hazard modelling can be undertaken in which anticipation occurs to consequences from hazards caused by climatic or geo-seismic activity including potential numbers of casualties that will need treatment in any one region (Kozuch 2001). This has relevance to service delivery and availability of beds within the capacity of local hospitals. Desktop scenarios are undertaken in this form of hazard modelling. The techniques now have a commercial application. Satellite and radar are efficient in providing data related to potential hazards caused by climatic surges and give storm and hurricane warnings.
Motivation of the host country appears in this grouping and has much to say about the possibilities for preventing delayed response by ironing out potential RF.RR. This begs the question of political prioritisation and attention to DMP and capacity building. The internal state of a given country may not lend itself to investment in disaster prevention and preparation, and if civil conflict exists then preparation may not be possible. This touches on the need for advocacy for vulnerable countries and for the international community to address the major issues of poverty, inequality with fair wealth distribution (2.2.1). Japan, the United States of America and New Zealand are all prone to natural hazards and climatic surges. Geo-seismic events frequently affect those countries but the casualty rates have historically been low up until the hurricane Katrina disaster in New Orleans (Appx E4). This latter disaster illustrates that even MDCs with ongoing vulnerability can neglect DMP within the country in favour of engaging in conflict abroad or general apathy (Auf der Heide 2004). Priority for governments in this respect is a sensitive and politically-charged debate. Japan and New Zealand have given a high priority to DMP, with ongoing awareness and preparedness strategies in place and training of disaster teams maintained. Certain countries regard natural disasters as ‘the will of God or Allah.’ In this respect there can be a lessening of intent and motivation regarding DMP and preparation. This lack of preparation and attributing tragedy to the Almighty is failing to address the issues of man-made vulnerability and, from the Christian perspective, to embrace a theology that has health and healing at its heart with eminently practical preparation and solutions to physical problems (Luke 10.30).

Preparation is the key finding from the factor analysis. It is the advocacy message to the disaster community to prepare, train, capacity build and maintain communication lines and warn vulnerable communities before the disaster strikes. This message will be echoed in the conclusion to the research.

8.1.2 Capacity and dimension

This very important grouping of extracted factors embraces chiefly measurable quantities (Table 7.10) and is seen to rank in second place for the mean average scores (Table 7.11). The only exception to the quantification was one variable within the grouping namely shock and confusion. It could however be stated that this relates to mental capacity and thereby qualifies for this factor grouping.
Disaster management strategies seek to balance the equation of need versus provision of resources. The greater the damage and loss side of the equation the greater the quantities of resources necessary on the other. The damage and loss relates not only to people, buildings and structures but also to the capacity of local resources including emergency medical service provision. The whole question of capacity and dimension within natural disasters spurs the relief agencies to address early needs assessment regarding the extent of damage and the size of the disaster zone (2.5.9.1). The WHO has given specific attention to this area and the aspect of REA has been discussed (2.5.9.2). It is interesting to note that this is an area which has received specific attention within the IDNDR.

Capacity and dimension as a specific parameter within disaster management can be seen to relate to the local resources and coping strategies of the affected country as well as the capacity of the international community to assist the victims. From the medical perspective there are specific measurable quantities that need to be addressed within the dimensions of injury versus emergency provision and this comes under the umbrella of REA. The list includes the numbers of specific injuries that need to be given attention some of which are illustrated for earthquakes under systems modelling (3.8). It could be stated from the specific medical perspective that capacity and dimension needs to be given special attention in order to prevent RF.RR for victims of natural disasters. The emergency medical services need to give consideration to the following capacities and dimensions:

- Numbers of victims, both dead and injured
- Types of injuries in the survivors with quantification
- Capacity of the local emergency services including hospital beds, operating theatres and state of the medical staff
- Amounts of extra equipment required to meet the emergency needs including blood, antibiotics, surgical equipment and dressings

The Mexico City earthquake of 19.9.95 demonstrates the dilemma posed by a low frequency/high intensity disaster affecting a major city. The capacity and dimension equation relating to hospitals and staff presented enormous difficulties as several hospitals were destroyed. Medical staff in the city were suffering from shock and did not have the capacity to respond to the needs of the injured, according to reports from the Pan American Health Organisation (PAHO/WHO 1995). Furthermore communication
problems left staff uncertain where to go or what to do. The PAHO conference in San Salvador 2005 (Table 6.1) has given specific attention to the need for early assessment of the capacity of local hospitals after natural disasters, for an early assessment of the functional capacity of operating theatres and available numbers of theatre staff. The mental and physical state of the operating theatre staff need to be taken into the equation, too.

Capacity and dimension demand either measurement, assessment or some form of quantification. In the early stages of a major natural disaster this may not be possible as the situation is inevitably chaotic. Therefore it could be said that early needs assessment, using every possible technology and communication method, needs to address a chaotic situation at the outset and that an accurate picture may only emerge over the succeeding hours and days. This aspect necessitates not an isolated assessment but serial assessments and accumulation of information from many sources to build up an accurate picture (Klenk 1997). The S E Asia tsunami disaster of 26.12.04 illustrates the difficulties of assessing capacity and dimension when a massive area and several countries are affected (Appx E.4). The epidemiological measurements required in sizeable natural disasters come under the aegis of the WHO. The parameters that are of specific importance include the numbers of displaced people and the health needs of that population both from the acute injuries and also the chronic disease management.

It could be stated that from the responses to the questionnaire and factor analysis process disaster relief organisations, including emergency medical services, need to give high priority to the logistics of capacity and dimension within natural disaster scenarios including early accurate needs assessment and evaluation of the resources available to meet those needs. As a group of extracted factors from the data analysis the combined focus in this direction supports a view that capacity and dimension needs to be given high priority to prevent RF.RR within disaster response. In essence this means that planners and disaster relief agencies need to plan for potentially high impact events covering large disaster zones, and to tailor resources for each context-specific scenario.
8.1.3 Attitude and Evaluation

This cluster of component factors brings in the concept of attitude. It sits at position three in the ranking of mean average scoring for the extracted factors. Attitude is defined as:
A state of mind or feeling with regard to some matter; or a way of behaving (univ.dict.).
The attitude, stance or position of an organisation is captured within this grouping. Attitudes can be positive or negative and if the attitude of an LDC is to invest money in capacity building within vulnerable locations this is a great encouragement. If however MDCs have a disinterest in providing emergency aid to neighbouring countries this can be a source of tension and acrimony.

It is interesting that the United Nations involvement was one of the items within the factor extraction group under the heading of attitude and evaluation. The presence of the larger organisation or professionals will receive more attention under the heading of professional versus amateur within natural disaster responders.

Crisis verification of casualties and the disaster zone appeared within this grouping, and it could be that this would be better placed within the capacity and dimension group, and attention has been given to REA within that group. It can however be seen that attitudes can impact on verification of casualties and extent of disaster zone if an indifferent or unmotivated attitude exists within a country or from the international community. This may occur if the country in which the disaster has occurred has demonstrated indifference or hostility towards the international community in previous years. What does emerge from a discussion on attitude and evaluation is the need for good international relationships with an understanding of the pre-existing conditions in vulnerable countries and the capacity to communicate needs rapidly along tried and tested pathways with responding countries. Both the United Nations and the IFRC have instruments for assessing early needs assessment. (Hart 2004)

Financial factors present themselves within the grouping of RF.RR variables. Aid in its generic form concentrates itself on funding and fund-raising issues. The G8 summit gave attention to this. Much debate exists regarding the appropriate use of aid and the potential for misappropriation. Investment in DMP and capacity building within vulnerable countries all centre on finance and resources. Relief agencies all have budgets within
which to operate and the fulfilment of minimal standards is important to the credibility of
the organisation and the profile for fund-raising.

8.1.4 Aggravation

The term ‘aggravation’ has been chosen for the extracted factors within the fourth ranking
group based on mean averages. It encompasses frustrations, glitches and hassles but the
term aggravation was chosen to express the underlying commonality of the variables
included within the group (Table 7.10). The spectrum of problems within this group
varies from bureaucratic problems to cultural and religious differences. Additionally the
darker forces causing conflict and corruption are reflected within the group. It is
interesting that language difficulties did not appear within this group. Aggravation can
lead to anger and tension thereby complicating the responses of individuals and teams
within disaster response. It could be stated that aggravation is a built-in feature of disaster
response and should be factored in and planned for. Aggravation was particularly evident
in the hurricane Katrina disaster in New Orleans during 2005. (E4). Severe discontent
arose amongst the displaced population when delays occurred in bringing essential
supplies of food and water. Poor sanitation arrangements and lack of medication for
chronic medical conditions or the elderly population led to anger and frustration. RF.RR
was observed on a large scale. An escalating scenario of aggravation was observed
starting with discontent and frustration, leading to looting and rioting with civil disorder
and violence ensuing. This is a salutary lesson, showing the consequences of RF.RR. The
indignity experienced by the victims of the disaster was compounded by army and riot
squad acting in a heavy handed and confrontational way.

Conflict between NGOs was one of the component items within this factor grouping. The
problem of the NGO ‘circus’ is discussed within the literature review. (2.3.12). Too many
NGOs, or poor coordination between NGOs, can lead to severe difficulties at the site of a
major natural disaster. The United Nations has addressed this issue by the use of OSOCC
to assist in the coordination of the relief effort. (8.2.3.2). Additionally the Disasters
Emergency Committee (DEC) in the United Kingdom consists of twelve prominent
NGOs which communicate rapidly in the event of a major world disaster and attempt to
coordinate the response. (Appx E4). Decisions are made about which NGOs should
engage within the disaster zone and which should not. This sensible approach is an
antidote to RF.RR and leads to better coordination and use of resources.
Cultural and religious differences can lead to aggravation and potential conflict. This has been observed in the severe earthquake disaster in Pakistan. (Appx E6). Additionally in countries such as Sri Lanka in the tsunami disaster in SE Asia, where civil unrest existed, potential violence from hostile factions needs to be given attention. Different cultures have different value systems and attitudes towards death and disaster. This can produce aggravation when discrepancy exists over the need for speed of response by the international community. This was evident in the major earthquake in Gujarat, India on 26.1.01 (Appx E).

Certain aggravation problems were cited within the comments section of the questionnaire. These included customs and border control difficulties relating to canine search and rescue entry, despite passports and immunisation documentation. Additionally moving fuel for vital equipment across borders has been problematical. In the SE Asia tsunami disaster emergency 4x4 vehicles were impounded until customs duty was paid. All these factors of aggravation are RF.RR and it could be argued that compilation of potential aggravation problems by each disaster relief agency, and sharing of information as to problem solving strategies, could markedly assist the ironing out of RF.RR for the future.

8.2 Overview of the usefulness of the Factor extraction process

The factor extraction process to establish groups of RF.RR, with interpretation and identification by distinctive terminology has been a fruitful undertaking. The association of the variables within a cluster group provide interest, and throw up issues for attention and discussion. All these groupings have come about through the analysis of the respondents' choices. In essence it is therefore the work of the respondent group and a valid team voice and message that gives substance to the groupings and associations of variables within each group. It could be stated that the greater the loadings on each individual factor the greater the thrust of opinion or weight of argument for the significance of that particular factor. The net result is that this analysis of clusters and associations provides material for discussion at the organisational and operational level and therefore gives a useful tool to gauge the efficiency of any given organisation or policy/system within that team.
Additionally, Table 7.11 in the findings section provides a potential template to frame over any disaster, and to score the event as to whether the RF.RR were relevant in that instance. Recommendations for future relief operations could be passed on from lessons learned. It is the opinion of the researcher that this evaluation will stand as one of the most important outcomes of the research survey into RF.RR. The scorings for the mean averages for factor component loadings within each group produced an interesting progression with percentages as listed:

- Preparation 28%
- Capacity and dimension 26%
- Attitude and evaluation 24%
- Aggravation 22%

The survey design has sought from the outset to establish a hierarchy of RF.RR. This approach has given a stimulus towards facilitating order out of chaos and ultimately providing feedback to the respondents. The above four groupings exemplify areas to be considered by the disasters community and constitute a positive outcome of the research with potential for strategy modification in disaster response.

**8.3 Proposition 1**

The four major issues identified by the respondent group were identified as preparation, capacity and dimension, attitude and evaluation, and aggravation. This is solid evidence with which to address the research problem namely ‘why the delays between relief-provider and disaster victim?’

**8.4.0 Hierarchy within the identity of RF.RR**

Establishing a hierarchy was one of the ambitions of the research process whereby identification of areas of consensus within the disaster community could give strong pointers for attention or investment in improving the efficiency of disaster management strategies. This section discusses the research findings regarding the highest ranking RF.RR and makes observations and recommendations towards operational strategy improvements.
8.4.1 The three highest ranking RF.RR

Consensus was achieved regarding the top three RF.RR namely magnitude of disaster, state of readiness of the civil defence and local emergency services and DMP. There was some jostling for first position when the data was analysed by different methods. The SPSS data analysis gave magnitude of disaster first place, but the manual (no of times cited) analysis put state of readiness of civil defence and local emergency services in pole position. There was however only a 2 percent difference in the relative positions regarding the SPSS analysis and a 1 percent difference in relative positions on the manual system analysis. The only tension over the leading three RF.RR is from using the hierarchy produced from the Average Significance Value (ASV) analysis which relegated DMP to position 14 on the scale. As has been stated previously the precision of the SPSS system has been adopted in favour of the ASV system and is therefore given greater weight of argument in this important area of discussion.

It could be stated that from the analysis of the data, in attempting to establish hierarchy of RF.RR that magnitude of disaster, state of readiness of civil defence (CD) and local emergency services (LES), and DMP have been identified as three key areas needing to be given attention within the ambit of disaster management and rapid response strategies. The state of readiness of the civil defence and local emergency services and DMP both receive further substantiation from the qualitative findings, in which 15% brought local preparedness to the discussion table. Furthermore the particular RF.RR of state of readiness of CD and LES also appears in the highest rotated factor extracted group known as ‘preparation.’ This approach using triangulation of method gives a high degree of confidence in the approach adopted and the outcomes achieved. (Neuman 2000). What message might therefore be conveyed to the disasters community in feeding back this information? The whole of the 1990s was commissioned as the International Decade for Natural Disaster Reduction (IDNDR) and essentially engaged on establishing improved methods for DMP.
8.4.2 Proposition 2

The consensus of respondents from the disasters community would endorse the efforts of the IDNDR regarding the need for preparation, capacity building of the state of readiness of the civil defence and local emergency services, and in giving ongoing attention to DMP strategies.

Financial investment will need to be directed to vulnerable communities if this proposition is to be implemented. It therefore leads on to a secondary argument that all aid agencies and disaster relief organisations should perhaps address their priorities in the light of this finding, and invest resource into these potential RF.RR with suitable preparation and capacity building prior to a further disaster. DMP is a wide reaching area and could be considered to be somewhat vague regarding practical implication for any given organisation. Improving the state of readiness of the civil defence and local emergency services through capacity building adds substance to DMP and gives a positive practical suggestion as to what can be effective for vulnerable communities. Education regarding the local vulnerable population as to what measures to be taken in a potential disaster scenario was the RF.RR no. 35 on the questionnaire. From the discussion on education in this respect the narrative above (8.6.1) gives ample evidence of the importance of local education for vulnerable communities concerning practical steps to be taken in the event of a disaster. It could be stated that here is another target for investment under the umbrella of DMP thereby earthing the general concept into a specific process. The researcher would make this a priority message for the disasters community regarding priority of investment and effective means of overcoming RF.RR.

The magnitude of disaster has remained either in pole position or second place according to the analyses performed. This was the first RF.RR to be presented in the questionnaire and may have provoked a potential bias. It is interesting that in the open ended question magnitude of disaster was singularly absent. This is a creative tension but probably reflects the comparatively small number of commentators in the section 3c section (42). It could be that this is such an obvious RF.RR that the commentators did not consider it worthy of mention. There is the possibility that it could have been implied in the discussion regarding context-specific factors or combinations of factors. Despite these assumptions and reservations, magnitude of a given disaster has been placed in pole
position on the ASV ranking and also on the SPSS evaluation of the 46 variables. Additionally analysis of the first choice in the top five for the respondent group in section 3 a) of the questionnaire gave magnitude of disaster as highest ranking. A substantial thrust to the research has been to find out which RF.RR is the most significant. It could be argued that magnitude of a disaster poses the most pernicious RF.RR regarding disaster management. It may on face value appear rather obvious that this should be the case, when substantial damage has occurred over a wide area. The shortcoming of the wording of magnitude of a disaster is that it does not define whether it is the magnitude of the hazardous event or the magnitude of the damage incurred or even the area of the disaster zone within which damage has occurred. Magnitude can be immediately linked with the seismic energy of an earthquake or the force of a hurricane. Neither of these defines whether damage has occurred or relevance to rapid response strategies. Despite these assumptions and reservations magnitude of disaster has proved during the five year research period to have posed the biggest RF.RR particularly in the tsunami disaster in S E Asia in 2004 and the Pakistan earthquake of 2005. It could be argued that magnitude of disaster regarding damage and loss is increasing and the initiative of the IDNDR was a response to those losses. (2.5.1). It could also be stated that magnitude of disaster needs to figure very highly regarding disaster management strategies and should be high on the agenda for NGOs and the United Nations humanitarian organisations. Disaster modelling and desk top scenarios with global implications could be factored in to computer simulations and theoretical training scenarios. The researcher would advocate that these measures are undertaken in the aftermath of the tsunami disaster in order to protect the lives of vulnerable communities from similar disasters. High magnitude disasters need international assistance and engagement of many organisations. This begs the question of where does the cooperation, coordination, communication and control come from? It could be argued that different hazard modelling is required in high magnitude events compared to localised or country- specific disaster zones. International disaster modelling and preparation for high magnitude events could be a positive outcome regarding recommendation from this research survey.
8.4.3 The tight grouping within the five highest ranking RF.RR

The consensus suggested from the concurrence of the data from SPSS and manual methods of processing (Table 7.15) that the following five RF.RR are a tight group of RF.RR

- Timing of declaration of state of national disaster
- Political resolve of country affected by the disaster
- Bureaucracy of host government
- Transport
- Communication equipment generally

It can be seen that this group has three RF.RR related to the host government. This highlights the responsibility of those in power in the governments of vulnerable countries to address these areas. Preparation regarding the mechanism for early declaration of a state of national disaster, and communication channels to bring this about is worthy of consideration. Equally it could be stated that having a resolve to achieve rapid response, using preparation and planning measures, to ensure that there is limitation to any bureaucratic problems when the hazardous event occurs, is essential. Countries that have been historically slow to declare the state of national emergency should be identified and plans made to accommodate the reluctance to invite in the international community. Discussions could take place between governments to address the cultural and other areas of reluctance to receive assistance.

Transport and communication equipment generally are two other members of the highest ranking five but not directly related to host government. Transport does however impact on the host government and transport of personnel and equipment to and from a disaster zone is vital. Equally transport is needed for evacuation of casualties (2.4.8). The different transport options for use in disaster scenarios have received attention (3.11). The lack of appropriate transport constitutes a severe RF.RR. on many levels, including early needs assessment, reaching victims and providing shelter, food, water and medication. Additionally the evacuation of casualties to hospital, or to places of safety, from further hazard requires suitable transport. Transport is an ongoing process in the early stages of a disaster with a changing of transport need as the disaster unfolds and daily needs assessments are undertaken. Here is a further topic for research work engaging on the various options and assets required to mount a successful large scale relief operation.
The reservations over the communication RF.RR on the questionnaire have been expressed (8.2.2.) but the position in this group highlights the vital importance of communication equipment in each stage of disaster response efforts. Additionally lack of appropriate communication equipment disables teams and organisations in their efficiency and speed of response to victims of disasters. It could be said that high investment should be made in communication equipment for all organisations engaged in disaster relief. Additionally each responding organisation should familiarise itself with the resources available through the United Nations (OSOCC) (7.2.2.2.3) and be prepared to avail itself of the enormous communication potential on offer through that facility.

8.4.4 The hypothetical ‘ego factor’

An alternative name for this theoretical RF.RR that is being brought to attention could be the apathy factor (Auf der Heide (2004). Apathy can exist on many levels including within governments, local communities and in the general public. Disasters are "low-probability events." As such, they compete for attention with the priorities of daily living. Often, getting the public, elected officials, and organizational leaders to support disaster preparedness is just as difficult as developing the disaster counter-measures themselves. (Auf der Heide (2004).

Over-reliance on technology and man-made devices can lead to a false sense of security and thereby engender apathy. According to Drabek (1986) flood control projects are renowned for this effect. Levees and dams reduce the frequency of flooding and often remove inhibitions against living in a flood plain. Eventually however a flood will come that will exceed the capacity of almost any levee or dam. The salutary lessons learned from hurricane Katrina in New Orleans (Appx E5) supports this prophetic stance. Drabek (1986) also emphasises the human tendency to fatalism and denial even in high risk areas. This is a rather philosophical approach or ‘what will be will be’. Another aspect to the apathy factor is the concept of defeatism. This can contribute to apathy towards disaster preparedness and some people believe that every disaster is so unique that effective planning is not possible (Quarantelli 1979).
8.4.5 The Highest ranking RF.RR using top five choices from Section 3 a)

As discussed above, the survey had a main thrust to identify the most significant RF.RR regarding retardation of the disaster relief process or the strongest resistance. Despite the reservations of the questionnaire format, and potentially overwhelming panoply of questions and enquiries, this section proved fruitful and achieved what it set out to achieve. The mechanisms employed in processing the data in this group were explained. (7.1.7.1) The assessment and evaluation were done manually with no computer analysis apart from taking the highest choice for each respondent and looking at frequencies and hierarchical rankings. From the simple formulations and additions, the top four RF.RR include the following:

- State of readiness of Civil Defence and local emergency services
- Magnitude of disaster
- Attention to DMP at government and local level
- Political resolve from the affected country.

This gives interesting validation to the analysis of the 46 variables and the factor analysis into clusters or item groupings. Here we have the first two of the top RF.RR from the top five in section 3 mirroring the top two extracted and named groups from the 46 variables. Additionally the attention to DMP in the top five is represented under the heading of ‘preparation’ in the factor analysed grouping. DMP could therefore be given a special frame of reference in that it presented itself in the highest ranking variables in sections b and c of the questionnaire and also in the highest ranking cluster grouping from the factor analysis procedure. This is an important validation as the identification of the most significant RF.RR was one of the major undertakings of the survey. The highest ranking in importance then become state of readiness on the part of the civil defence and local emergency services, magnitude of disaster, and attention to DMP.

8.4.6 Proposition 2

The three most significant RF.RR are state of readiness of the civil defence and local defence services, the magnitude of the disaster, and the attention to DMP. This suggests an answer to the first intuitive question stated in the introduction namely:
What are the most significant resistance factors to rapid response in the emergency disaster relief processes?

8.5 Effective versus Rapid Response in Natural disaster scenarios

Here is a discussion topic that has the potential to undermine the whole ethos of attempting to identify RF, RR. The devil’s advocate holding this stance could level the criticism that rapid response to a disaster is of no value unless it has the potency to make a difference and provide effective care and attention to the disaster victims. The issue of well-wishers and do-gooders rushing to a disaster scene only to complicate or not be able to provide appropriate or effective aid, has been cited (8.2.1.5). Disaster junkies or voyeurs can rush to a disaster scene whether home or abroad. Those staring at road accidents not infrequently cause further accidents. A rapid response that is ill thought out, ill planned and poorly coordinated will be of little use in the face of a chaotic scenario which is frequently the case in natural disasters. The rapid entry of too many NGOs (2.3.12) can be well meaning but compromise the existing resources and thereby deplete available food and water available to victims. Poorly equipped or inadequately trained rapid responders will be of little use despite their prompt speed of attendance at a disaster. If no dressings are available to treat the wounds of victims or no suction apparatus to clear an airway of an extricated earthquake victim then the efforts can be futile. The combination of rapid and effective response (RAER) is an issue that could be addressed as a research topic. It could be useful to draw a personalised template of the emergency relief agent with itemised RAER equipment, systems and attitudes. A picture of an emergency trained nurse, paramedic or doctor carrying appropriate equipment including medical equipment and dressings and possessing the latest IT communication network and resources would approximate the template that is being advocated. In passing, the view of the researcher is that the major resource need for the victims of natural disasters is a massive team of nurses and an endless supply of dressings for effective wound care. In the humble opinion of the researcher, whose work has been blown out of the water over the debate of rapid versus effective response, the advocacy message in the dying moments would be that thousands of lives will be saved if attention is given to nursing and wound care provision.
8.6 Discussion concerning the influence of the IDNDR on response times

It has already been stated that there were shortcomings to the questionnaire design (8.2.2) and that the question relating to the IDNDR was not given enough space either physically on the questionnaire itself or regarding priority. This may have accounted for the inconclusive quantitative results in which 44% thought that there had been an improvement in response times since the IDNDR and 36% said there had not. 16% made no comment and 4% did not know (7.1.9). The responses from interviews with members of disaster relief organisations supported the mixed view of the influence of the IDNDR on response times to natural disasters demonstrated by the questionnaire responses. Informal discussions with people engaged on the committees gave varying responses to the usefulness of the meetings. Some felt that the decade and the meetings were 'a waste of time' whereas others were more positive and emphasised the cooperation and profile given to the wider implications of the humanitarian response within natural disaster scenarios. One misgiving that became evident in these discussions was the lack of invitation and involvement of the respective NGOs engaged in disaster response, many of whom are engaged in development work in vulnerable countries.

From the researcher’s perspective, the IDNDR has begun a process which is very important regarding cooperation between the various agencies and organisations involved in disaster relief. Additionally it has brought in the scientific community in ways that previously did not exist. It could also be said that the whole infrastructure of high technology has been positively influenced through the focus on systems and strategies having a technical support system. The decade was clearly inadequate to solve the problem of DMP, but in the researcher’s view, it has accelerated a process and enhanced the width of discussion and power base to DMP. It has not suddenly stopped at the turn of the century and has led to further initiatives such as the International Strategy for Disaster Reduction (ISDR) facilitated by the United Nations. (2.5.10). The then director of the ISDR in Geneva in 2001 stated that the IDNDR was but a signpost on a very long journey. (Benn 1995). This is a valid statement and it is hoped that the journey continues, particularly with reducing losses and accelerating response times to natural disaster victims.

Koffi Annan (1999) gave a comprehensive report on the disasters occurring during the
decade (2.5.9.2) and this included hurricane Mitch in 1998 and other serious disasters. Many recommendations were made, including the need for more effective early warning systems. Tragically five years after his statement the need for implementation of better early warning systems had gone unheeded, leading to the catastrophic losses of life and property during the Sumatra earthquake and tsunami in the Indian Ocean on 26.12.04 (E4). It could be stated that the RF.RR had exerted its pressure within the very nature of resolve and planning. *The road to hell is paved with good intentions* (anon). This raises the whole issue of resolution and political will in global prioritisation of DMP. It could be stated that the intention and execution of the IDNDR constituted an excellent strategy and important research exercise, at the end of which important recommendations were made. It would however appear that these recommendations have been regarded as *words of wisdom* but have not received the attention that was needed. It could be argued that the recommendations from the IDNDR will perhaps now be taken more seriously in the light of the world events. One of these was to concentrate on improving local disaster mitigation or capacity building for people in vulnerable locations. This recommendation is consistent with the results of the questionnaire in that the state of readiness of civil defence and local emergency services was considered to be within the top three RF.RR from the survey. Annan (1999) had recommended that local measures regarding DMP were significantly more cost-effective than big international responses (2.5.9.4). Again sadly the recommendations had not been heeded within five years of the statement being made, with the resulting consequences for the tsunami victims of S E Asia, and the residents living in low lying locations without adequate maintenance to levees. It had been hoped by the statements at the end of the IDNDR that satellite technology would improve the global early warning capability and, whereas this has assisted in the prediction of hurricane damage and earthquake vulnerability, there are still shortcomings and a need to balance cellular telephone profit-based use of satellite with investment into rapid response strategies for the future. It could be stated that satellite and improved early needs assessment and hazard warnings will provide a key weapon against RF.RR if investment and full use is made of the capabilities that it could offer.

8.7 Proposition 3

Satellite and improved IT technology could have a profound effect on improving early warning capability and communication leading to improved DMP.
8.8 The issue of Professionalism in disaster response

The issue of professionalism in disaster response has been cited by 7% of the respondents to the questionnaire. (Appx F). Revealing comments were made by a prominent member of WADEM (Q79 UK) and also by an official within the United Nations (Q62 India OCHA) 3/42 (5%) reported statements relating to this area. The WADEM member’s comments bring the discussion into focus:

I am very concerned that those who make an emotional response and jump off to remote corners of the earth are often folk with kindest hearts but without training, some become a menace and a burden on the community, Myths abound about the local population being in a state of shock and thus incapable but evidence suggests they manage well, and need supporting with training in simple steps to take in the first few hours. Planned support in response to local governmental invitations and co-ordination of NGOs and UN is the best route (Fisher 2005).

From this the necessity for trained personnel and the capacity to bring something useful or contribute positively to the overall disaster relief effort is the issue in question. The presence of voyeurs and saviours within a disaster zone has been given attention. (7.2.1.5). Training in disaster management has been given attention in the survey and has also been reported in the comments section. (7.2.1.8). 14.3% of the respondents made comments regarding training but one made the astute comment that training may mean different things. For instance a weekend course in first aid is going to be very different from a comprehensive course in mass casualty management and major incident experience.

The United Nations departments have a strong experience and history in disaster management. UNOCHA has engaged in 99 missions in 61 countries in 8 years for emergency response to disasters. This illustrates the powerful contribution that the United Nations can offer with such wealth of experience. The statement by the WADEM member relating to planned support in response to local governmental invitations, and coordination of NGOs and UN being the best route, is sound. There is however a case for medical personnel with limited disaster management experience considering attendance at a disaster zone if there is an apparent need. During the emergency response phase to the earthquake in El Salvador it was possible for the researcher to attend with goods and equipment relevant to the apparent needs of the affected population. Whereas the
contribution to the overall disaster relief effort was comparatively small, the supply lines for future provision were able to be established, and links with NGOs working in the country forged. This has catalysed a compassion for the vulnerable communities and commitment towards future DMP and development enterprises. It could be said that small relief teams are able to be unencumbered by bureaucracy and be less prone to RF.RR than larger organisations. The attendance by the Royal National Lifeboat Association at the disaster in Mozambique in March 2000 illustrates the point in which decisions were made to attend promptly and the contribution to the disaster response was substantial. (Barlow 2005). A team of four staff members and four volunteers responded, after invitation, to an area in which 10,000 had been marooned by torrential rain and impossible to reach by helicopter. Here we see a small team, four of whom were volunteers and having limited experience, carrying out an effective relief operation when RF.RR of bureaucracy was sadly affecting the use of helicopters. It could therefore be stated that size of team is not the qualifying issue regarding attendance at a natural disaster, but commitment and contribution with adequate training or supervision is essential.

The commitment to the needs of the victims within the framework of professionalism is important. Even amongst emergency medical teams inappropriate procedures can be undertaken, leaving the local medical services struggling to cope with the after care and rehabilitation. This was described in the appraisal of the emergency relief efforts in Gujarat 26.1.2001. (Appx E 2) (Nobhojit 2001). Hit and run type of relief is less effective than long term commitment in which attention is given to rehabilitation and development work including DMP. The dignity and circumstances of victims needs to be given great respect and patients treated with kindness and sensitivity.

8.9 Outcomes of the Research Survey

The opportunity to meet and discuss the processes and systems entailed within emergency disaster relief has been a profound experience as has the privilege of serving in a disaster zone and providing emergency medical assistance to the victims of natural disasters. Having discussions with survivors of disasters has given a further perspective on the debate of rapid response being able to view the strengths and weaknesses from the user end of the service delivery. A fuller understanding of the potential obstacles to rapid response has been obtained which it is hoped will be translated into practical outcomes.
for the disasters community. The research survey in total has been a rewarding exercise for the researcher in terms of personal development, in which further understanding of the academic processes required to transform a project into an academic thesis has been achieved.

Specific outcomes of the research include:

- Obtaining a consensus of agreement over the eight most important RF.RR from the respondent group to the research instrument.
- The identification of four categories of resistance factor items through the use of statistical methods reflecting the underlying nature of the factors extracted from the 46 variables
- Identifying important issues within the disaster relief process that provides material for further research
- Satisfying the researcher that the mixed paradigm of quantitative and qualitative methods of approaching the subject has actually succeeded in which the theoretical basis for the research reinforces the experience of the operational findings.
- Unearthing an area of contradiction regarding language barriers being a RF.RR
- Unearthing a relative contradiction regarding the big player/small player debate
- Catalysis of internal compassion and motivation for the earthquake victims of El Salvador and the establishment of a charitable trust as a conduit for effective RF.RR-light rapid response.
- Identification of more RF.RR while engaging the disaster management field wearing RF.RR spectacles. See appendix D

8.10 Conclusions

It is now opportune to summarise the specific outcomes of the survey regarding its effectiveness in addressing the research problem, and answering the intuitive questions.
8.10.1 The Research Problem ‘why the delays between relief-provider and disaster victim

The research problem has been studied carefully through literature searches, face to face interviews with members of disaster relief organisations together with attendances at conferences and congresses on disaster associated subjects. Additionally victim-centred interviews and attendance at a disaster zones has enabled a fuller understanding of the problem. From the insights gained from these areas of study forty six variables impacting on rapid response to natural disaster zones were identified and documented. This process of identification of potential resistance factors to rapid response demonstrated that there was no single cause of delays between relief-provider and disaster victim but that the problem was multi-facetted. The research sampling tool proved to be effective in gauging the perceptions of the disaster relief community chiefly members of WADEM and associated response organisations and providing a greater degree of definition to the research problem particularly in gauging the significance of each resistance factor thereby enabling a hierarchy to be established. Through this consensus and hierarchy opportunity was given to compare the qualitative findings with that of the quantitative ones determined through the sampling process and analysis. The interviews held with members of the disaster community and those with victims substantiated the findings from the quantitative outcomes to the survey. This is particularly relevant in the ‘big three’ RF.RR namely magnitude of disaster zone, readiness of civil defence and local emergency services and lack of DMP. The five year history since the IDNDR supports this stance with thousands of potentially preventable deaths occurring through lack of planning in these three key areas. The attendance at the earthquake disaster in El Salvador on 13.2.2001 highlighted the logistical difficulties occurring in a high impact/low frequency disaster affecting a wide impact zone. This heavily endorsed the quantitative findings from the questionnaire survey. It also supported the findings regarding the lack of civil defence and local emergency service state of readiness and the general lack of attention to DMP within the country despite a high impact hazardous event in 1986. The personal experience supported the quantitative findings regarding transport, coordination and lack of political resolve. The early declaration of a state of national emergency in the 2001 earthquake disaster no doubt prevented many deaths compared with the hurricane Katrina disaster in New Orleans on 29.8.05. This fact also supports the quantitative findings regarding this particular RF.RR.
The five main issues arising from the qualitative material harvested from the questionnaire’s open-ended questions to the disaster community were **International, political, local preparation, coordination and training.** The local preparation supports the quantitative findings which ranked in position two in the hierarchical scale. Coordination and training could also be seen as supporting the DMP third ranking RF.RR from the quantitative survey findings. International and political aspects mirror the underling issues determined by the factor analysis process which included attitude and evaluation, and aggravation. There is therefore good evidence to suggest that the qualitative findings support the quantitative findings with added credibility through the process of triangulation.

Identification of the underlying issues through the factor analysis process of the 46 variables examined within the survey gave further understanding to the research problem. These included **preparation, capacity and dimension, attitude and evaluation and aggravation.** Lack of preparation or planning/forethought is clearly a major contributor to delays in the disaster relief process. This echoes the efforts of the IDNDR in recommending effective early warning systems and capacity building in vulnerable locations. Having the appropriate resources to meet the needs of the damaged community in any given disaster is reflected in the underlying issue of capacity and dimension. Too little, too much or too late is reflected in the response to the Hurricane Katrina disaster. Aggravation is clearly an important issue regarding delays between relief-provider and disaster victim and encompasses bureaucracy and political issues together with more practical aspects regarding transport or coordination.

Through all the above evidence it is fair to say that the research problem has been given greater definition through the efforts of the overall survey and this is a distinctive contribution of the work and adds to the body of knowledge for pre-hospital and disaster medicine and also to that of the disaster relief organisations particularly with regard to disaster management strategies.

8.10.2 Intuitive questions to be addressed included the following:

> **What are the most significant resistance factors** to rapid response in the emergency disaster relief processes? This has been addressed and answered from the results of the research survey which sought to identify a hierarchy of consensus within the perceptions of the respondent group from the disaster-relief
community. These have been identified as the ‘big three’ and the ‘group of five’ which are magnitude of a disaster zone, the lack of readiness of the civil defence and local emergency services and the lack of disaster mitigation and preparedness strategies in the first group and transportation, communication, lack of political resolve, slow declaration of a state of national emergency and bureaucracy in the second.

What interventions could be made to address these resistance factors? Ongoing strategies such as the ISDR have been identified within the survey period and this seeks to maintain the impetus of the IDNDR and maintain the profile of DMP at every level. Information sharing regarding new technologies and lessons learnt has to be an appropriate intervention in the light of the research survey. Publication of the results of the survey would provide a step towards catalyzing interventions. This could include definitive multi-agency planning for major disasters with desk top hazard modelling scenarios. A possible model to achieve this is illustrated.

What specific management decisions need to be adopted to prevent resistance factors to rapid response at the organisational level? Attention needs to be given to planning and preparation for the increasing frequency of high magnitude disasters potentially affecting large disaster zones. Coordination and communication have been raised as important issues within the survey and these could be examined at organizational level to test for efficiency. Minimising the bureaucratic process would also be in line with the findings of the research survey. Attention to capacity building in vulnerable areas for development agencies has also been identified within the survey. A fence at the top of the hill is more effective than an ambulance at the bottom.

Has the IDNDR had a significant impact in minimising the losses occurring from natural disaster? Clear messages and recommendations have been made but the implementation of the recommendations has not been performed satisfactorily as demonstrated by the tsunami disaster and hurricane Katrina to name two serious events. The respondent group was divided in their opinion as to whether the IDNDR had been effective in minimizing losses. The survey focus on this particular issue was limited in its depth of inquiry.
What further research work could be undertaken to address the findings and limitations of the field of study undertaken? This is addressed in the recommendations section.

8.11 Critical appraisal of the overall survey with strengths and weaknesses

An appraisal of the relative strengths and weaknesses of the overall survey and the methodology used is now presented.

In essence the survey set out to explore the basic questions relating to delays in response times between relief providers and natural disaster victims. The intuitive questions (1.4) included the following:

- What are the most significant RF.RR in the emergency disaster relief processes?
- What interventions could be made to address these resistance factors?
- What specific management decisions need to be adopted to prevent RF.RR at the organisational level?
- Has the IDNDR had a significant impact in minimising the losses occurring from natural disaster?
- What further research work could be undertaken to address the findings and limitations of the field of study undertaken?

The design of the survey sought to identify the RF.RR and to apply measurements to the perceptions of the disasters community relating to the level of significance they attributed to each factor. A hierarchy of RF.RR could then be compiled. Additionally it sought to ascertain the demographic details of the respondents, to seek opinion relating to the IDNDR, and comments on the topic or RF.RR and DMP from their perspective.

8.11.1 Strengths of the overall Survey

The survey was ambitious in dealing with such a wide subject. This could be considered a weakness, but the ambit afforded a challenge to the methodology and measures in designing an instrument measuring a definable parameter within the overall disaster process. Identifying a relevant topic within the greater canvas of natural disasters was
considered important. Additionally the survey topic had enormous relevance to the current global situation, with increasing losses and mortality through natural disasters and observed delays in reaching victims. This high relevance to an imminent human predicament on the world stage adds foundation to the strength of the survey.

The cooperation with a target population engaged in disaster response at the coal face gave further substance and relevance to the survey and validity to any outcomes. Further strength to the survey was the opportunity afforded to the researcher to gain information from people and situations in different global locations, thereby seeking different cultural perspectives and value systems. The experience gained of natural hazards both indirectly and directly gives substance to the survey from an experiential perspective. Presence at the epicentre of a major world earthquake at the outset of the survey period gave first hand experience of RF.RR.

Additional strength to the survey design included the opportunity to evaluate the systems and processes within different sized organisations, from 'big player' to smaller units down to the individual aid worker engaged in the task. The survey engaged with many highly interesting facets of the environment and the people that inhabit it. Many issues were raised regarding the stewardship of natural resources and patterns of behaviour between countries and individuals within those lands. The timing of the research survey could be regarded as a strength because it took place very shortly after the completion of the IDNDR. This added to the topicality of the survey and gave useful information and documentation regarding DMP.

A further strength of the overall research survey is its relevance to the human condition at this point in the history of civilisation. It seeks to ask relevant questions and to challenge existing organisations regarding RF.RR in their systems and policies. It touches on attitudes and motivation, and addresses issues such as inequality regarding wealth and safe housing. The survey provided the vehicle for stimulating deeper questions at an important time in history, and had the intention of exploiting the findings to improve the efficiency of the disaster relief process, thereby limiting secondary morbidity and mortality from delayed response. It could be stated that as well as being an academic exercise this is also a quest for truth which seeks to encourage further research in the field of RF.RR and to engage academics in pragmatic questions and solutions.
8.11.2 Weaknesses of the overall Survey

It could be stated that the overall study design was ambitious and too far reaching with many potential distractions from academic rigour. It could also be argued that the survey was asking a plethora of questions that could be construed as confusing or even threatening. The survey presented risk on many fronts and could be criticised for its disregard for safety issues, using a violent and dangerous country for a large part of the survey i.e. El Salvador. Ethical issues were identified at the outset, and further advice should have been sought on this important area prior to embarking on the survey.

A predictable weakness could have been the difficulty in extracting information from a transit medical population who were often engaged in remote locations.

The survey design pathway (6.1.1) presented a problem as the literature review had no information on the subject of RF.RR in natural disaster scenarios. This meant that an understanding of the problem had to be sought initially through the interview process to gauge the relevance of the subject. This exercise was time-consuming but rewarding. The literature review sought to assess the areas related to RF.RR and the origins of the disaster relief process. The volume of literature engaging natural disasters, DMP and the IDNDR was exhaustive and led to difficulties in selection of suitable material.

Further problems were encountered regarding time-frame in that the first six months of the survey were designated as official Prolonged Study Leave whereas subsequent attention to the research had to be shared with other pressing occupational duties.

Despite the good quality data obtained through the survey procedure using the questionnaire as the research tool the sample size from the target population is comparatively small. Greater validity to the findings and outcomes could possibly have been achieved if a larger sample size had been obtained.

8.11.3 Recommendations for further research through modification of the survey design

An important observation was stated regarding survey design relating to the study of RF.RR in natural disasters namely that delays are context-specific and can be due to
combinations of factors (7.2.1.1). Further research could be directed towards assessing such combinations of RF.RR within the context of natural disasters. Possibilities have been suggested and could include parameters such as distance/transport/ coordination or language/ communication/ cultural problems. It could however be stated that an approach such as this may introduce too much complexity into the survey design and compromise the ease and speed of completion of the questionnaire.

Attempting to address both quantitative and qualitative issues within a survey has presented an interesting challenge. It could be argued that the sampling tool would have produced a larger sample size if it had confined itself to purely quantitative assessment of RF.RR through being shorter and more user-friendly.

8.12 Appraisal of the questionnaire as an effective research tool

The questionnaire (6.1.5.5) was a pivotal item within the overall survey and sought to ask quantitative and qualitative questions within a structured format with three sections. It asked for information concerning demography of the respondent in the first section and the perceptions of significance regarding 46 itemed RFRR in the second section. The third and final section of the questionnaire sought opinion on the five most important RF.RR, the influence of the IDNDR and views on RF.RR and DMP. Questionnaire design is a highly specialised process and information was sought from academic sources (Ekinci 2001) and from literature relating to questionnaire construction (Oppenheim 1992).

8.12.1 Strengths of the research tool

The questionnaire required attention prior to usage in the current form. The ease with which the pre-pilot assessment occurred and the comparative promptness of receiving positive response to the pilot survey were seen as strengths. It could be argued that the wide ranging enquiry, contained within the research tool, was comprehensive and engaging which conferred an intrinsic strength. The ability to distribute the survey tool by either post, electronically or in person could be regarded as a strength. The fact that the tool was being circulated to like-minded personnel with common goals within the disaster community could be seen as highly appropriate regarding target population and seen as a strength. Eliciting high quality data that has stood the test of criterion validity is also seen as one of the most positive features of the questionnaire as an effective research tool.
Additionally the number of important issues that were raised from the open-ended questions concerning the topic of RF.RR and DMP give additional strength to the effectiveness of the tool. Pushing the respondent to make a choice of five of the most important RF.RR was seen as a vital part of producing a hierarchy which was one important strand of the research survey.

8.12.2 Weaknesses of the research tool

Critical appraisal of the research tool is justified in order to shed light on discovered weaknesses and to make recommendations for further questionnaire design for future researchers. It could be argued that the questionnaire was exhaustive and provided an overwhelming document that would discourage attention and engagement on the task of completion. With hindsight this would appear to have been the case although the evidence for this is only the comparatively small sample size achieved. No direct comments were received regarding the length or complexity of the document. Further attention will be given to questionnaire comment in the section 3 response evaluation.

Attempting to gain information from such a wide ambit of issues could be regarded as a weakness as could the particular format of the document. Ambiguity of some of the questions was an ongoing thorn in the flesh, as were questionnaires returned only partially complete. Distribution using the postal system to remote locations was a mistake which was realised early in the survey, so the mechanism was corrected to purely electronic thus giving the respondent the choice of either mail or electronic return. The initial questionnaires gave the 46 variables un-numbered and this turned out be a serious mistake when it came to processing, and for this reason was rectified early in the survey period. The Section 3 attempt to make the respondent focus on the top five or most important RF.RR was a useful exercise, but did cause some confusion as some respondents added questions that were not included in the 46 variables, or their responses did not tally with their answers in Section 2. Section 3 was rather squashed and in retrospect looked like an add-on or while you are here doctor scenario.

In the early design stage of the questionnaire the researcher was anxious to present the RF.RR in the negative. This is now seen as a naïve approach as the data would have been heavily biased from the outset and prevented the outcome of having reliable data. The
initial stance was to ask how bad is bad and the double negative would have caused much confusion. For instance the question regarding communication would have read difficulties with communication systems or absence of communication equipment. The presentation of communication generally was deemed to be adequate and the guidance received has proved sound. In overall terms the researcher was content with the format and design but would recommend a simpler presentation and a narrower choice of RF.RR for future survey sampling.

8.12.3 Recommendations for future research using a questionnaire as the sampling tool in the field of RF.RR

From the appraisal of the working difficulties and the comments of those completing it the following proposals could be made for researchers engaging in similar surveys:

- If an international target area is being covered ensure that the language is simple and easily understood
- Give attention to the formatting with appropriate spacing and emphasis within each section
- Avoid possible ambiguity within each specific question
- Avoid offering an exhausting number of response choices within the questionnaire as this may prove to be overwhelming for the respondent and limit the return of completed questionnaires
- Avoid a complicated format within the questionnaire
- Seek early advice from a statistician regarding questionnaire design in order to obtain data that is reliable and valid
- Use electronic distribution rather than relying on the postal service if an international ambit
- Give incentives for completion and possible prizes for early submission
- Use warm and friendly language in any covering letter
- Give careful explanation of what is being sought by the questionnaire and define any parameter that is being used as the major theme of the survey.
8.13.0 Appraisal of the Interview Process

Interviews were undertaken in the early part of the survey to gain a fuller understanding of the working of the disaster relief process and the roles of the personnel interviewed. Additionally this was seen as a learning exercise to identify RF.RR within the organisational experience of the interviewee. Interviews took place in various global locations and covered a wide area of experience and disciplines. Interviews with victims were also undertaken in the acute and non-acute situation. The interviewing process bears discussion and critical appraisal. A consistent programme was employed for the structure and content of the meetings (Table 6.2). Work has been done in the area of the advantages and disadvantages of interviews and questionnaires (Sekaran 2000) to which consideration has been given within both the design study and the appraisal process.

8.13.1 Strengths of the interviewing process

The interviews fulfilled the purposes intended. A fuller understanding of the roles of individual members of organisations engaged in disaster response was gained and important information regarding the overall disaster response machinery obtained. Stimulating conversations arose from these interviews despite them being semi-structured. Careful planning of the meetings was a definite strong point and the explanation given prior to the meetings as to identity and purpose were accepted, allowing introductions to be kept to a minimum. Having a pre-arranged plan for the meeting content was equally seen as ‘a strength’ at the outset. Discipline on time was regarded as a strong point of the meetings. Interviews within disaster relief organisations enabled other information to be assimilated about the overall efficiency or morale of an organisation through general inspection of the running and administrative side. Interviews held in disaster-prone countries were particularly helpful as the sense of urgency and imminence of further disaster added weight and substance to the meetings. Interviews in countries where a disaster had recently occurred were especially helpful in gaining first hand knowledge of how the disaster relief process worked, thus gaining advice on tangible RF.RR. The British Ambassador to El Salvador, at interview, gave accounts of the strengths and weaknesses of the disaster relief process and the competitive dimension between the embassies with which he had to grapple. The researcher found the interviews stimulating, opening doors into new areas of technology and understanding on a variety
of subjects, thereby enriching the process of simply trying to discover RF.RR. Having an observer was a positive step giving a sense of support, constraint from misrepresentation or wandering off-the-point. The involvement of the observer towards the end of the interview process was most helpful in covering ground that may have otherwise been overlooked. The interviewing process gave many answers and explanations over and above the questions posed, and quest for RF.RR. This added to the weight of qualitative findings presented in Chapter 7.2. Interviews with victims of earthquakes was revealing although a lengthy structured approach was not considered to be appropriate in the operational field conditions. Many stories were told of loss or tragedy and this was seen first hand. Recommendation for further research could include the victim-centred approach to ascertain 'just how things were for them' and what were the strengths and weaknesses of the relief process from their perspective.

8.13.2 Weaknesses of the interview process

The list of questions sent prior to the interview (6.3) was seen as a threat and some said so bluntly. The approach was potentially invasive, intrusive and somewhat threatening and, with hindsight, should be modified. Informing interviewees that the observer was a retired police inspector could also have added too much gravitas to the interview but no-one ventured a comment in this direction. Cunning and persuasion were used to gain access to sensitive departments. Some may suggest that this could have been underhand methodology with certain justification. Other weaknesses included the time and expense required to get to distant locations and the dangers of conducting interviews in potentially hostile locations.

From the overall appraisal of the interview process the researcher suggests that the strengths outweighed the weaknesses, the intentions were sincere and the results and outcomes doubly justified any cost or inconvenience.
8.14 Data collation and appraisal of the quality of the data

The questionnaires were distributed and collected over a three year period which saw several major world earthquakes. Mention has been made of the difficulties with the postal distribution of the early survey. This was rectified. The returns came in clusters which were helpful in a measure, but the overall slowness of response led one to think that the a major resistance factor had got into the system, and that the researcher was throwing in a large RF.RR at the outset. This slow response was a discouragement and caused loss of focus of the research process for a time. With each world disaster the researcher became increasingly aware of the importance of the survey and injected more enthusiasm. The tsunami disaster in S E Asia galvanised potential respondents to complete the questionnaire. The final number of 107 returns was regarded as adequate but double this quantity would have been welcomed. With hindsight incentives for completion should have been offered, e.g. reward for early completion, or free drink at the next World Congress of the WADEM. Evidently, other researchers within WADEM have achieved outstanding results using these incentives. No problems were encountered concerning the collation of returns and entering of computer data using Excel and SPSS data systems. The quality of the data was found to be of good standard which gave cause for encouragement.

8.15 Evaluation of the data and methods of processing

The data was initially processed manually with simple logging of demographic detail and simple additions of scores to assess the relative positions and hierarchical ordering. Excel spreadsheets were employed for demonstrating graphs and pie charts. The average score for each of the 46 variables in section 2 was initially used as the bench mark for assessing the most important RF.RR. This was subsequently revised although the hierarchy of average scores for each question in Table 2 can be found in Appendix A. SPSS was employed for data processing to assess the adequacy of the sample and the validity of the scale used. This is explained in the findings section Chapter 7.1. Factor extraction was achieved demonstrating four items which most appropriately reflected the nature of the underlying groups of variables. This was seen as an important milestone in identifying groups of RF.RR with a common underlying characteristic, to which appropriate names were assigned. Other investigations were undertaken to ascertain whether there was
significant variation between different demographic groups relating to responses to the perceptions. A negative significance was seen as an important finding. Tables and graphs were presented using the Excel and SPSS systems to give easy comparison of groupings with appropriate explanation.

8.16.0 Recommendations in the light of the research

8.16.1 Recommendations for future research into rapid response strategies

Much ground has been covered in the overall survey exposition and appraisal. Certain issues have emerged in which creative ideas for further study seem appropriate. These are now listed in the hope that someone may take up the challenge and carry the research into un-charted territory.

➢ Attention to the factors surrounding the timing of declaration of a national state of emergency
➢ Victim-centred surveys for evaluation of rapid response strategies
➢ Improved questionnaire formatting to elicit qualitative and quantitative findings
➢ Appraisal of the professional big players versus the NGO smaller player in disaster response
➢ Attention to the NGO circus and possibilities for engaging the question of host government selection of NGO donors
➢ Attention to the overall control and coordination of international relief efforts
➢ Exploration of context-specific RF.RR and giving attention to combinations of RF.RR
➢ Advocacy issues for women in natural disaster scenarios particularly as women and children are the group most severely affected in earthquakes and are often disenfranchised in the aftermath of a disaster
➢ Research into methods of transport and quantities of each method per kilometre of disaster zone or numbers of casualties
➢ Communication methods in disaster management
➢ The disaster history of a vulnerable country including aid history and the effects on the strategies of inter-current disasters
➢ Further appraisal of the influence of the IDNDR on response times to natural disasters.
8.16.2 Recommendations for feedback to the disasters community

There are many messages that the researcher would like to convey to the respondent group of the questionnaire. The essential facts regarding the outcome of the research survey will be presented. This will give particular reference to the most significant RF.RR and the ranking and hierarchy of both the component RF.RR and also the dimensional groups. Further detail will be given regarding the demography of the respondent group and the issues raised in the section 3c of the questionnaire. The results of the responses relating to the IDNDR will also be conveyed. It is hoped that further discussions will take place in the light of this research, and stimulation of creative ideas to improve the efficiency of the systems within the disaster response organisations. A clear message that will be presented is their consensus over the highest three RF.RR and the need to make the magnitude of a disaster, the state of readiness of civil defence and local emergency services, and DMP high priority agenda items for attention within allocation of funds, resources and time commitment. The failure of implementation of the recommendations of the IDNDR will be voiced and the absolute need for early warning systems and the ongoing investment in DMP will be underlined. A clear message will be sent in the light of the qualitative findings for improved coordination between NGOs and local emergency services and civil defence, and for avoidance of the NGO circus wherever possible. The value of establishing partner projects with locally based NGOs engaged on development issues within vulnerable countries will be highlighted. A recommendation will be made that the disaster relief process requires many more nurses in the ranks of the relief organisations, equipped with a limitless supply of dressings to attend to wound care, which the researcher has identified as a gaping void in the disaster relief process. The urgency of rapid needs assessment and the use of appropriate transport to achieve this will be voiced. Lack of helicopter transportation has been a serious issue in recent disasters and this should be given a high priority for future relief operations. The apparent contradiction of the quantitative versus qualitative findings regarding language as a RF.RR will be voiced as it is the considered view of the researcher that, despite the low priority indicated on the questionnaire responses, in his experience this has been a vital issue. Education of the local population living in vulnerable areas as to what measures should be taken in the event of a hazardous event has been identified as a key area for attention within the realms of DMP. This message will be reinforced in recommendations to the disasters
community. Leaving disaster response to the professionals or trained skilled personnel is an important issue that has emerged in the survey. This will be mentioned but with the proviso that small trained and equipped teams may be able to fly under the radar screen of bureaucracy quicker than the bigger organisations, particularly if use is made of partner projects or NGOs working in disaster-prone areas. A recommendation will be made to the disasters community to examine their systems for potential RF,RR and to deal with them appropriately. Additionally to address the problem of bureaucracy, which is a major cause of delays in rapid response, and to seek efficient and positive leadership and decision making. It will also be suggested that a new model of cooperation and coordinated response is now needed to embrace all the benefits of information technology to use in international planning for future disasters. A clear message will be sent that, in the view of the researcher, and on the evidence of the increased frequency and intensity of natural hazard events, preparation needs to be taking place urgently to address the high likelihood of mega-disasters such as a massive quake under the Sea of Marmara with tsunami inundation of a densely populated city. It is hoped that the messages conveyed to the disasters community will complement the work of the IDNDR and provide a stimulant against disaster amnesia.

8.16.3 Recommendations made to the United Nations World Food Programme (UNWFP) operational in El Salvador 26.2.2007 regarding outcomes of the research

To prevent future substantial losses in the extremely natural hazard-prone country of El Salvador the following measures need to be given attention:

➢ Equipping and training of the civil defence/local emergency services
➢ Education of the local population regarding environmental hazard/climatic surges
➢ Early warning systems with appropriate drills/awareness/response requirements/educational measures at community/school level. GPS network/tsunami watch/satellite and radar regarding storm hazard
➢ Registration of all vulnerable slopes and hazard mapping of vulnerable locations. Use of ‘shotcrete’ for stabilization of vulnerable slopes.
➢ Protection for poor communities ‘locked’ in vulnerable locations with barriers/reinforcement against slope failure/mud and boulder slide
➢ Investment of effort at the town and city council level regarding hazard awareness and cooperation with life-lines organizations and utilities regarding emergency
strategies. Possible use of ‘City Aware’ resources regarding DMP/hazard mapping available through Institute for Geological and Nuclear Science (IGNS) Wellington NZ.

➢ Improvement of the resilience of poor communities regarding buildings and health with attention to provision of building materials at cost price and provision of clean water/access to medical care

➢ Continue to address the problems of malnutrition within the remote rural areas with appropriate fortification of flour with iron supplements

➢ Capacity assessment of hospital bed facility/Emergency capacity for mass casualty scenarios or surge capacity with pre-planning regarding hiring/use of Mobile Field Hospitals

➢ Prepare audit regarding burns beds/specialist availability on burns management

➢ Improve capacity for rapid needs assessment within the next natural disaster including aerial surveillance/liaison with WHO and UN OCHA

➢ Assess the capacity of the transport system regarding access/evacuation of disaster victims

It was encouraging to learn that the hazard modelling software ‘City Aware’ delivered to the disaster agency Snet in San Salvador in 2003 had been adopted within the disaster mitigation and preparedness strategy. This is another positive outcome regarding the sharing of resources between an MDC and an LDC to which the researcher played a small part.
Plate 8.1 temporary shelter after earthquake in El Salvador 13.2.2001

Figure 8.1 Proposed model of RF.RR-free rapid response strategy

Figure illustrating an international rapid response model potentially free from RF.RR
8.16.4 Recommendation of a RF.RR-free international response model

The above model seeks to illustrate a RF.RR model for disaster response from outside agencies and local services to a disaster zone. The key facets are communication and coordination of response, incorporating a control centre and a transport coordination centre. Additionally the Control centre would have overall power with regard to liaison with the host government and making rapid decision as to which disaster relief agencies should be allowed into the disaster zone. The rapid deployment of WHO, rapid emergency assessment and rapid epidemiological assessment are vital within this mode. The monitoring centre engages all the modern technology and gives regular updates on the status of the disaster victims and directs aid through coordination with the control centre. The transport centre deals specifically with movement of vehicles and air transport with regular communication with the control centre. The United Nations early presence in the disaster zone would provide the on site coordination of relief agencies (OSOCC) with regular communication with the control centre.

This model seeks to put precision organisation onto a hitherto chaotic response operation. A network of rapid response such as this would need careful construction and regular testing using both operational training and desktop scenarios/computer modelling. These models could be sent electronically in order to perform rehearsals of different case scenarios. Familiarisation with the electronic rehearsal package would thereby save valuable time when the next real disaster occurs. Within any model of cooperation there needs to be trust, understanding and ownership of a corporate model. This relational dynamic would take time to build and would need acceptance on behalf of the leadership structure. A leadership model of respectful servanthood empowering the component groups would be the necessary ingredient to prevent dislocation of the strategy.

Disaster junkies would be excluded wherever possible and the infrastructure of a given culture respected. Aid would need to be targeted and the use of community based NGOs would be an appropriate access point and pathway for local aid provision. Plans would need to take into consideration the dimensions of a potential massive disaster as this would appear to be the trend and pattern for the future. Governments would need to have given acceptance prior to the implementation of this strategy for the system to work. In
essence it is a globally accepted model which is viable and necessary for future rapid response relief operations to disaster zones.

8.17 The Crie de Coeur

Despite the IDNDR unnecessary delays are still occurring regarding the movement of emergency aid between relief provider and natural disaster victim. This could be rectified by improvement in organisational efficiency and an improved hazard-modelling approach. Attention needs to be given to preparation for high magnitude hazardous events, capacity building for vulnerable communities especially the low income population and better equipping and training of local emergency services. Specific attention needs to be given to local early warning systems and a global alarm network.

The timing of the research is distinctive with 5 major world events within its ambit and massive lessons learnt regarding the cost of not heeding recommendations over DMP including local preparation/education. The rise in frequency and intensity of natural disasters through increasing global environmental hazards makes the recommendations both relevant and urgent. The work is original and analysing the obstacles to rapid response from a systems-user base has been extremely valuable.

There can be no single conclusion to a subject as emotive as rapid response to victims of natural disasters. It is hoped that the outcomes of the research survey will stimulate further thoughts and discussions on the subject of rapid and effective response to natural disasters. Additionally it is hoped that effective cooperation and coordination between disaster relief organisations will grow and that new international models for rapid response will be considered.

Lastly it is hoped that the advocacy issue for poor people living in vulnerable locations will be addressed and that the wealth of the nations will be translated into justice and safe buildings for the poor that they might dwell in safety and the children sleep in peace.
Plate 8.3 Salvadorian child asleep on barrel of iced fish La Libertad El Salvador

For to us a child is born Isaiah 9:6

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Appendix A

The Average Significance Value for each RF.RR (46 variables)

The data analysis using SPSS data has taken precedence with regard to the processing of the 46 items presented to the disasters community, over a manual approach. Prior to the development of systems such as SPSS alternative methods were used for obtaining hierarchical scores. Originally the data was processed using a manual system demonstrated below using the Average Significance Value (ASV) for each of the 46 variables. The equation and processing is logical and methodical. The result of the system produced a hierarchical ranking which has been used at intervals as illustration or comparison regarding the highest scoring RF.RR. It has also assisted to have the ASVs alongside during the discussions concerning the qualitative findings of the research questionnaire. The researcher has considered that the inclusion of this method of processing is to the benefit of the total work.

Section 2 Factors affecting Rapid Response

There were 46 questions in this section to be analysed by the respondents as to their affect on rapid response. Of the 107 questionnaires analysed not all the respondents answered all 46 questions. The initial results are shown in Table A2. The results were obtained by scrutinising each questionnaire, recording the score given by each person for each question and tabulating them as shown in Table 6. In order to find the average significance value for each question the following formula (Smith 2003) was applied:

\[
S = \frac{\sum_{i=1}^{10} s \cdot n}{N}
\]

where 
- \( S \) = average significance value
- \( s \) = significance value
- \( n \) = number of times mentioned
- \( N \) = total number of respondents answering that question
Table A1. Example of calculation of average significance value for Q1 of the questionnaire

Question 1: Magnitude of Disaster

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<th>s multiplied by n</th>
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<td>TOTAL</td>
<td>N = 106</td>
<td>Σs^n = 841</td>
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Therefore, average significance value (S) = \(\frac{841}{106} \approx 7.9\)}
Table A2: Analysis of 46 questions from questionnaire

The figures mentioned in the columns 1 to 10 are the number of times each question was given that significance value by the 107 respondents to the questionnaire.

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The average significance values for all 46 questions in rank order are shown in Table A3.
Table A3. Average significance value of each of the 46 questions (n = 107)

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<td>3</td>
<td>capacity of hospitals</td>
<td>6.8</td>
</tr>
<tr>
<td>17</td>
<td>total bureaucracy</td>
<td>6.8</td>
</tr>
<tr>
<td>28</td>
<td>SAR training</td>
<td>6.7</td>
</tr>
<tr>
<td>36</td>
<td>DMP</td>
<td>6.6</td>
</tr>
<tr>
<td>46</td>
<td>population density</td>
<td>6.6</td>
</tr>
<tr>
<td>32</td>
<td>A &amp; E staff training</td>
<td>6.5</td>
</tr>
<tr>
<td>34</td>
<td>CD systems</td>
<td>6.5</td>
</tr>
<tr>
<td>24</td>
<td>SAR finances</td>
<td>6.4</td>
</tr>
<tr>
<td>5</td>
<td>shock &amp; confusion</td>
<td>6.3</td>
</tr>
<tr>
<td>25</td>
<td>relief org finances</td>
<td>6.3</td>
</tr>
<tr>
<td>29</td>
<td>combined ops training</td>
<td>6.2</td>
</tr>
<tr>
<td>43</td>
<td>LDC lack of status</td>
<td>6.2</td>
</tr>
<tr>
<td>16</td>
<td>NGO bureaucracy</td>
<td>6.1</td>
</tr>
<tr>
<td>22</td>
<td>medical equipment</td>
<td>6.1</td>
</tr>
<tr>
<td>31</td>
<td>CD training</td>
<td>6.1</td>
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<tr>
<td>20</td>
<td>complex relationships</td>
<td>6.0</td>
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<td>23</td>
<td>host gov finances</td>
<td>6.0</td>
</tr>
<tr>
<td>4</td>
<td>state of buildings</td>
<td>5.9</td>
</tr>
<tr>
<td>8</td>
<td>customs problems</td>
<td>5.9</td>
</tr>
<tr>
<td>13</td>
<td>attitude of NGOs</td>
<td>5.9</td>
</tr>
<tr>
<td>26</td>
<td>SAR equipment</td>
<td>5.9</td>
</tr>
<tr>
<td>12</td>
<td>attitude of MDCs</td>
<td>5.8</td>
</tr>
<tr>
<td>30</td>
<td>relief org training</td>
<td>5.8</td>
</tr>
<tr>
<td>14</td>
<td>conflict bet NGOs</td>
<td>5.7</td>
</tr>
<tr>
<td>21</td>
<td>military personnel</td>
<td>5.7</td>
</tr>
<tr>
<td>44</td>
<td>climatic factors</td>
<td>5.7</td>
</tr>
<tr>
<td>45</td>
<td>evaluation difficulties</td>
<td>5.7</td>
</tr>
<tr>
<td>6</td>
<td>looting</td>
<td>5.5</td>
</tr>
<tr>
<td>42</td>
<td>UN involvement</td>
<td>5.5</td>
</tr>
<tr>
<td>7</td>
<td>corruption</td>
<td>5.4</td>
</tr>
<tr>
<td>9</td>
<td>language barriers</td>
<td>5.2</td>
</tr>
<tr>
<td>19</td>
<td>cultural differences</td>
<td>4.5</td>
</tr>
<tr>
<td>18</td>
<td>religious differences</td>
<td>4.0</td>
</tr>
</tbody>
</table>
Appendix B

Two-Stage Construction of the Questionnaire

Questionnaire prior to modification

Name ...........................................
Organisation ..................................

Below you will find a list of Resistance Factors to Rapid Response that I have established through both a comprehensive literature search together with face to face contact with many people involved in hazard and disaster management. The latter include members of UN departments, aid agencies, NGOs, Civil Defence organisations, geo-physical and academic communities.

I am specifically interested in your perception of the level of significance that you would attribute to each established resistance factor to rapid response. Please grade your response to each factor on a score of 1-10 where 1 is the least significant and 10 the most significant. Many of you will be familiar with this scoring system from establishing the level of pain perception in casualty victims, I believe that it will be a fruitful exercise and lend itself to good statistical analysis.

1= Insignificant....10= Highly Significant

Your scoring rate

1. Magnitude of Disaster
2. Insufficient state of readiness on the part of Civil Defence and local emergency services
3. Insufficient capacity of local hospitals
4. State of buildings
5. State of shock and confusion regarding emergency medical and rescue services
6. Looting and rioting
7. Corruption
8. Customs and border control problems
9. Language barriers
10. Distance and location of disaster zone
11. Transport problems of personnel and equipment to disaster zone
12. Indifference on the part of More Developed Countries (MDC’s)
13. Too many Non-Government Organisations involved in any given disaster (NGO Circus)
14. A competitive attitude between the various Non-Government Organisations present in any given disaster scenario
15. Excessive bureaucracy on behalf of the host government
16. Excessive bureaucracy on behalf of the NGOs and Aid agencies
17. Excessive bureaucracy of the total emergency response process
18. Religious differences
19. Cultural differences
20. Complex emergency with warfare scenario
21. Military personnel from host government adding extra complication to peace time relief efforts
22. Insufficiency of medical equipment
23. Insufficient financial resources of host government
24. Insufficient financial resources of Search and Rescue (SAR) teams
25. Insufficient financial resources of Relief Organisations
26. Insufficient SAR equipment (heat seeking, snake eye fibre-optics, heavy lifting gear)
27. Insufficient communication equipment generally
28. Insufficient training of SAR teams
29. Insufficient combined operational training between different international SAR teams
30. Insufficient coordination between different SAR teams
31. Insufficient training with Relief Organisations
32. Insufficient training within Civil Defence Services
33. Insufficient training of Accident and Emergency staff
34. Insufficient Early Warning systems in affected country
35. Insufficient Civil Defence Systems in affected country
36. Insufficient Education regarding measures to be taken in the event of a disaster by the population affected
37. Insufficient Attention to DMP strategies at government and local level
38. Slowness of response in declaration of a National emergency on the part of the affected country
39. Insufficient crisis verification regarding no of casualties and the extent of the disaster zone
40. Insufficient cooperation between local Civil Defence and Relief Organisations
41. Insufficient political resolve and motivation from the country affected by disaster
42. Lack or absence of UN involvement
43. Lesser Developed Country (LDC) status and lack of financial provision for disasters
44. Adverse climatic factors
45. Evacuation procedure difficulties
46. High population density within disaster zone

From your experience would you consider that there has been substantial improvement in response times to natural disasters through the influence of the International Decade for Natural Disaster Reduction (IDNDR)? Yes/No

Are there any other comments that you would like to make regarding Resistance Factor to Rapid Response or Disaster Mitigation and Preparedness?

I am extremely grateful for all your efforts in completing this document and please return in SAE
Completed Questionnaire on 'Resistance Factors to Rapid Response'

Please would you answer the following questions?

SECTION 1 - ABOUT YOU

Sex: Male: [ ] Female: [ ] (please tick)

Name: ....................................... Age: ... yrs

Nationality: ................................ Organisation: ..........................................................

Geographical location of organisation (city & country) ...............................................................

Professional status: .....................................................................................................................

Qualifications: ..............................................................................................................................

No of years experience in Disaster Management: ____ No of incidents attended: ____

SECTION 2 - FACTORS AFFECTING RAPID RESPONSE

Below you will find a list of Resistance Factors to 'Rapid Response' that I have established through both a comprehensive literature search together with 'face to face' contact with many people involved in disaster management. The latter include members of UN departments, aid agencies, Non-Government Organisations (NGO's), Civil Defence Organisations, geo-physical and academic communities.

I am specifically interested in your perception of the level of significance that you would attribute to each established resistance factor to rapid response.

Please grade your response to each factor on a scale of one (1) to ten (10), where one (1) is the least significant and ten (10) is the most important. If you feel that the factor is extremely significant, please choose a number on the right hand side of the scale and put it in the space provided. If you feel that it is extremely insignificant, please choose a number on the left hand side of the scale and put it in the space provided. There is no right or wrong answer, so please respond to all questions.

Extremely insignificant 1 2 3 4 5 6 7 8 9 10 Extremely significant

1. Magnitude of disaster
2. State of readiness on the part of Civil Defence and local emergency services
3. Capacity of local hospitals
4. State of buildings
5. State of shock & confusion regarding emergency medical and rescue services
6. Looting and rioting
7. Corruption
8. Customs and border control problems
9. Language barriers
10. Distance and location of disaster zone
11. Transportation of personnel and equipment to disaster zone
12. Attitude towards helping on the part of More Developed Countries (MDCs)
13. Attitude of NGOs towards helping, in any given disaster
14. Conflict between the various NGOs present in any given disaster scenario
15. Bureaucracy on behalf of the host government
16. Bureaucracy on behalf of NGOs and Aid Agencies
17. Bureaucracy of the total emergency response process
<table>
<thead>
<tr>
<th>Question</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. Religious differences in the disaster zone</td>
<td></td>
</tr>
<tr>
<td>19. Cultural differences between groups in the disaster zone</td>
<td></td>
</tr>
<tr>
<td>20. Complexity of the relationship between organisations</td>
<td></td>
</tr>
<tr>
<td>21. The involvement of military personnel from host government causing further complication to peace-time relief efforts</td>
<td></td>
</tr>
<tr>
<td>22. Medical equipment</td>
<td></td>
</tr>
<tr>
<td>23. Financial resources of host government</td>
<td></td>
</tr>
<tr>
<td>24. Financial resources of Search and Rescue (SAR) teams</td>
<td></td>
</tr>
<tr>
<td>25. Financial resources of Relief Organisations</td>
<td></td>
</tr>
<tr>
<td>26. SAR equipment (e.g., heat-seeking, snake-eye fibre-optics, heavy lifting gear)</td>
<td></td>
</tr>
<tr>
<td>27. Communication equipment generally</td>
<td></td>
</tr>
<tr>
<td>28. Training of SAR teams</td>
<td></td>
</tr>
<tr>
<td>29. Combined operational training between different international SAR teams</td>
<td></td>
</tr>
<tr>
<td>30. Training within Relief Organisations</td>
<td></td>
</tr>
<tr>
<td>31. Training within Civil Defence Services</td>
<td></td>
</tr>
<tr>
<td>32. Training of Accident and Emergency staff</td>
<td></td>
</tr>
<tr>
<td>33. Early warning systems in affected country</td>
<td></td>
</tr>
<tr>
<td>34. Civil Defence systems in affected country</td>
<td></td>
</tr>
<tr>
<td>35. Education regarding measures to be taken by the population affected in the event of a disaster</td>
<td></td>
</tr>
<tr>
<td>36. Attention to Disaster Mitigation &amp; Preparedness strategies at government and local level</td>
<td></td>
</tr>
<tr>
<td>37. Timing of response (e.g., Declaration of Nat. Emergency on part of affected country)</td>
<td></td>
</tr>
<tr>
<td>38. Crisis verification regarding number of casualties and extent of disaster zone</td>
<td></td>
</tr>
<tr>
<td>39. Co-operation between local Civil Defence and Relief Organisations</td>
<td></td>
</tr>
<tr>
<td>40. Political resolve from the country affected by the disaster</td>
<td></td>
</tr>
<tr>
<td>41. Motivation of the country affected by the disaster</td>
<td></td>
</tr>
<tr>
<td>42. UN involvement</td>
<td></td>
</tr>
<tr>
<td>43. Lesser Developed Country status and lack of financial provision for disasters</td>
<td></td>
</tr>
<tr>
<td>44. Climatic factors</td>
<td></td>
</tr>
<tr>
<td>45. Evaluation procedure difficulties</td>
<td></td>
</tr>
<tr>
<td>46. Population density within disaster zone</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION 3 - TRAINING AND IMPORTANCE OF RESISTANCE FACTORS**

From all of the above questions, which five (5) would you consider to be most significant to the subject of Rapid Response Resistance Factors? Please rank them in order of their importance of significance from 1 to 5, one (1) being the most important.
<table>
<thead>
<tr>
<th>Importance</th>
<th>Significance factor you identified (please indicate by printing a couple of words from the question)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>most important</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Have you received training in Disaster Management? *(please tick)* Yes _ No _

From your experience would you consider that there has been improvement in response times to natural disasters through the influence of the International Decade for Natural Disaster reduction (IDNDR)? *(please tick)* Yes _ No _

Are there any other comments that you would like to make regarding Resistance Factors to Rapid Response or Disaster Mitigation and Preparedness? ........................................................................................................................................................................
........................................................................................................................................................................
1. Pre-survey letter to Accident and Emergency Consultants and staff

Binscombe Medical Centre,
106 Binscombe,
Godalming,
Surrey GU7 3PR
1.4.2002

Dear Colleagues,

I am currently undertaking a post graduate research project which aims to identify perceived resistance factors to rapid response in any given disaster scenario. In this respect I would greatly value your assistance regarding the completion of this user-friendly questionnaire. This questionnaire is sent to you as a pilot, to test its effectiveness in collecting data, before sending it to aid agencies and non-government organisation for their response.

Some of the questions may not be very meaningful to you in your current role; however, I should be grateful if you would attempt to respond to them. I would be particularly helpful if you could return the questionnaire to me by mid-June.

Please do not hesitate to contact me on my email address (jagger_chris@hotmail.com) if you have any problems relating to the completion of the questionnaire.

With grateful thanks, in anticipation of your response.

Yours sincerely

2. Letter used for the pilot survey targeting Members of WADEM (15.05.02)

The same wording was used as for Letter 1 to the A & E consultants.
3. More fulsome informal ‘warm’ letter of invitation to WADEM members.

(17.08.02)

Dear ............

You may have received a document from me earlier regarding how I would value your contribution to the debate of Disaster Mitigation and Preparedness with specific regard to resistance factors to rapid response. As a member of WADEM I took the liberty of using the WADEM directory (2000) in order to obtain your contact details. The directory is somewhat out of date and a new version is in the process of revision and updating. If you have not received the document before I would be immensely grateful for your assistance in completion of the questionnaire. If you have received a copy previously and have not as yet managed to give adequate attention or might have mislaid it then I enclose a further copy for your use.

My research has taken me to several countries including El Salvador where I was involved in the relief efforts after the earthquakes of January and February 2001. The resistance factors to rapid response were evident during those times and hopefully the research will be able to have a positive outcome for the victims of natural and other disaster scenarios.

Thank you in advance for your cooperation and I look forward to hearing from you.

Please do not hesitate to contact me on my e mail address as shown with the letter heading or you may chose to reply using this route.

Kind regards,

Yours sincerely,


Dear .................

It was good to have met some of you at the 12th International Conference of WADEM at Lyon in May 2001. It was indeed a splendid occasion and no doubt the conference next year will afford a special opportunity for sharing experiences and education insight from around the globe.
To add to this debate I have embarked on a research project into Disaster Mitigation and Preparedness with special reference to Resistance Factors to Rapid Response in Natural Disaster Scenarios. In this respect I would greatly value your contribution to this endeavour and for your perspective on the topic.

I enclose what I hope you will find a user-friendly questionnaire and would urge you to complete this and return to the above address or to use the e-mail contact for either reply or for any queries that you may have.

I am hoping to construct a research tool based on the responses of the WADEM membership, and those of other organisations, to measure their response times and efficiency against known resistance factors to rapid response and to have a broader platform of knowledge to improve their system. This is indeed a challenge but one that I believe is worth undertaking. Having given emergency medical assistance in El Salvador after the 2001 earthquakes I am aware of some of the many resistance factors to rapid response and the consequences to the population there where substantial delays were encountered.

Thank you in advance for your cooperation and I look forward to receiving your important contribution.

Kind regards,

Yours sincerely,

5 Letter to the search and rescue teams from INSARAG directory (letters sent out in December 2002)

Dear ..................

I am undertaking a research project into disaster response strategies and would value your input from your field of operation and expertise. I am approaching each of the International SAR teams over this and am hoping to provide a research tool that will be of value to all of us engaged in disaster relief and emergency response strategies.

I would be most grateful if your team would give assistance in completing the enclosed questionnaire and if several members could complete a questionnaire individually this would give a broader base for the study. If however this is unrealistic a single response from one of the senior members of the team would be greatly valued.
The World Association for Disaster and Emergency Medicine (WADEM), of which I am a member, has been assisting me in completion of questionnaires and the early response is encouraging and does throw interesting light on the subject of Resistance Factors to Rapid Response. Your experience in this important field would be equally valued and I hope that you will be able to assist in this direction. If you have any queries or problems regarding the completion of the questionnaire please do make contact on my e mail address.

Kind regards,
Yours sincerely,


Dear

We are all asking ourselves some very difficult and searching questions at this time. No doubt in that reflection on the recent tragedy will be questions relating to disaster mitigation and preparedness, and rapid response strategies. There are lessons to be learnt for all of us and for those who have been directly engaged in the emergency medical response you have been in our thoughts and prayers. I have been galvanised to add weight to the research data submitted by WADEM members relating to ‘Resistance Factors to Rapid Response’ in the light of the present disaster. For those that have already submitted a completed questionnaire I am very grateful but would ask that you consider a second submission as perceptions may have changed. For those that have not yet responded I would be very grateful for your help over this important work. I am hoping that the final results will assist in ‘ironing out’ obstacles to rapid response and improve response times to natural disaster scenarios and hopefully reduce losses. A questionnaire is attached. Please feel free to respond either electronically or by post. Many thanks and I look forward to seeing some of you at the conference in Edinburgh and have submitted an extract on the work and hope to present the data.
7. Letter sent in August 2005 to delegates from the WADEM 14th World Congress in Edinburgh

Dear ...................

It was very good to be with you at the WADEM conference in Edinburgh this year. I was particularly interested in the response efforts to the S E Asia tsunami disaster and the cautions spelled out regarding enthusiastic amateurs draining the local resources and complicating relief efforts.

In the light of the conference and the disasters that are occurring with increasing frequency I would be very grateful indeed if you would complete the enclosed questionnaire regarding the obstacles (resistance factors) to rapid response. I am hoping to construct a useful tool for those engaged in rapid response to natural disaster scenarios in order to give timely and appropriate response.

Please complete electronically or print of and send to the address above. The questionnaire is attached.

With all good wishes and many thanks in advance,
Appendix C

Supplementary Sources of Information

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Appendix D

Supplementary list of RF.RR from Literature Search and from Major Natural Disasters since the turn of the century (Millennium)

During the duration of the research period it became apparent that there were other RF.RR that had not been considered at the outset of the survey. This came about through an increased awareness of the issues that were involved in disaster management both from a broader perspective and from a more detailed understanding of the systems and processes concerned. Additionally the study period was notorious for its high frequency and intensity of natural disasters, giving plenty of material for analysis of the relief responses and the delays observed.

These events included the following:

➢ Earthquakes in El Salvador 2001. These will be given special consideration.
➢ Earthquake in Gujarat, India 2001
➢ Earthquake in Bam, Iran December 26.12.03
➢ Earthquake in Indian Ocean with tsunami 26.12.04
➢ Hurricane Katrina 29.8.05
➢ Earthquake in Pakistan 9.10.2005

The research process has enabled a focussed appraisal or the disaster management in any given event through the lens of RF.RR. From the information available from journals and press releases the following supplementary list of RF.RR has been constructed. There is no priority or hierarchy associated with the list.

1. Inadequate prediction of major disaster. This may be inaccurate, insufficient, too slow or even absence of prediction.
2. Lack of public awareness of threat including public holidays and diminished responsiveness to threat of disaster (Tsunami 26.12.04)
3. Lack or absence of effective disaster management policy
4. Tribalism and conflict between cultural groups
5. Lack of cooperation between parties engaged in disaster response
6. Lack of data on medical capacity, both pre and post disaster status
7. Delay in blood gas analysis in patients being ventilated after natural disasters.
8. Delay in obtaining accurate vital medical information relating to individual condition. This could be ECG, blood gases/saturation of oxygen, urea and electrolytes etc
9. Adverse weather conditions e.g. Zarand earthquake in Iran on 22.2.05 where cold, wet weather hampered the search and rescue efforts.
10. Lack of collaboration between international organisations.
11. Lack of management information systems.
12. Lack of strong operational procedures.
13. Mud and boulder slide blocking access roads
14. Collective violence at the scene of the disaster.
15. Lack of coordination between the various relief organisations.
16. Poor communication of information relating to the disaster.
17. Lack of consultation with local organisations of beneficiary community.
18. Lack of vulnerability and risk analysis of disaster-prone countries.
19. Lack of highly skilled, technical expertise from international community.
20. Lack of technical briefings for national officers of governments and international agencies.
21. Lack of heavy lifting and earth moving plant.
22. Lack of military asset availability and lack of aerial supervision.
23. Lack of high quality on-site evaluation and diagnosis at scene of medical emergency, leading to delay in admission to the appropriate speciality or to a patient awaiting assessment in a casualty department, amongst other pressures on emergency staff.
24. Delay in transit time to appropriate hospital or ITU.
25. Poor pre-arrival notification and coordination of need and status of casualties/victims
26. Lack of post-disaster needs assessment and rapid epidemiological assessment (REA) relating to infection threat and control.
27. Inadequate data collection/accurate needs assessment in post-disaster state
28. Lack of consensus on data collation instruments
29. Lack of sharing of information in early stages of disaster
30. Poor co-operation between relief agencies
31. Use of different instruments and systems for data collection
32. Lack of experienced assessors for data collection
33. Absence of contingency plans relating to structural failure of a hospital
34. Lack of competent engineers and maintenance teams to assess the functional state, safety and capacity of a hospital after an earthquake or other natural disaster
35. Poorly monitored unfolding scenarios and developing needs related to exhausted or compromised lifelines
36. Poor co-ordination between public health policy planning, officials and emergency medical services
37. Decreased military budgets leading to smaller units having to cover wider areas
38. Problems with identification of victims and establishing cause of death in mass casualty scenarios
39. Ongoing risks to personnel from further hazard within disaster zone, or from CBW agents
40. Lack of collaboration between international organisations
41. Lack of management information systems
42. Lack of strong operational procedures
43. Collective violence at the scene of the disaster
44. Coordination and communication issues.
45. Lack of consultation with local organisations of the beneficiary community
46. Lack of highly skilled technical expertise from the international community
47. Lack of technical briefings for national officers of governments and international agencies
48. Decreasing military budgets and smaller units having to cover larger areas with inability to meet the demands of natural disaster scenarios.
49. Problems with identification of victims and establishing a cause of death.
50. Ongoing risk to personnel (NGOs) in emergency medical relief from CBW agents.
51. Lack of trust in the use of military assets in natural disaster scenarios.
52. Conflicting ideas over definition of CIMIC between the UN and NATO giving rise to conflict over regulation.
53. Lack of telemedicine facilities at field hospitals thereby necessitating evacuation.
54. Difficulties treating casualties at sea where there are sparse resources, great distances, isolation, communication problems, weather problems and accessibility.
55. Distance, weather and communication as above.
56. Problems providing blood for transfusion and technical problems around cross matching/compatibility.
57. People dwelling in buildings with poorly constructed concrete and un-reinforced masonry causing entrapment.
58. Buildings being positioned close together with narrow alleyways causing entrapment in earthquake scenarios as people try to escape.
59. Low socio-economic status preventing access to health resources.
60. Lack of coordination between local relief groups.
61. Disaster tourism by well-meaning agencies putting pressure on local resources and providers.
62. Public holidays and national celebrations leading to lack of vigilance.
63. Slow placement of emergency field hospitals
64. Lack of command centre
65. Poor decision making
66. Disaster happening during the hours of darkness when people in houses/asleep
67. Incapacity of local hospital by structural damage in the disaster leading to disruption of normal health-seeking patterns of behaviour.
68. Communication blackout after earthquake.
69. Overwhelming amounts of rubble.
70. Lack of power cutting tools to cut through concrete pillars
71. Absence of lifting gear and heavy earthmoving equipment.
72. Self-help policy within a country leading to delay in asking international community for assistance.
73. Poor coordination of NGOs attending disaster zone.
74. Lack of orthopaedic surgeons within the disaster zone.
75. Lack of language or knowledge of local culture needing time for hospitality and orientation consuming manpower.
76. Insufficient carers/nurses for post operative care.
77. Distance to Automatic External Defibrillator (AED)
78. Absence of AEDs
79. Lack of team spirit between medical/relief agencies with local aid workers
80. Previous disaster necessitating temporary shelter away from electricity, TV and radio communication therefore unable to receive emergency warnings regarding further impending disasters.
81. Runway problems through damage or availability of short runways making landings of large transport planes unfeasible.
82. Inability to access heavy lifting gear to small island communities such as Nias in Indian Ocean.
83. Insufficient doctors on small remote islands necessitating transfer to mainland or other islands.
84. Lack of petrol on small islands leading to delays in transportation.
85. Delay in getting aid into small islands where air access difficult and small boat access only possibility.
86. Bad weather hampering arrival of Chinook in Nias emergency.
87. C130 transport plane just not turning up for whatever reason.
88. Distribution problems regarding rice – in good supply and available (Nias)
89. Delay regarding sufficiency of body bags for disposal of corpses.
90. Lack of swimming ability causing panic and inability to survive in water surges and tsunamis.
91. Information overload re e-mail congestion leading to capacity inertia and overwhelmed response time.
92. Ignorance of relevant communication systems and avenues of access to emergency assistance.
93. Oversensitivity of early warning systems and false alarm scenarios.
94. Destroyed infrastructure in disaster zone preventing effective delivery of aid.
95. Conditions attached to aid donation slowing up process of delivery.
96. Committee meetings and general intransigence
97. Difficulties in negotiation between host country and donor country regarding the deployment of foreign field hospitals.
98. Bureaucracy at government level in the proposed re-building phase after the tsunami in Sri Lanka.
99. Corruption from building cartels demanding overpriced contracts for health facility provision and demanding ‘UN prices’.
100. Alteration to building regulations where building not allowed within certain areas i.e. within 100 yards of the coastline in Sri Lanka.

101. Committees failing to meet to discuss the proposed re-building of hospitals.

102. Panic and mass hysteria in major event disaster such as in a football stadium or where many people are in a relatively confined space.

103. Lag time until incident ‘awareness’ in terrorist attack especially if release of chemical substance.

104. Time delay in erection of the decontamination unit.

105. Confusion regarding crowd control and cordons.

106. Delays in obtaining extra help.

107. Problems over secondary care alert and bed capacity.

108. Coordination problems with Police/fire/ambulance services.


110. Too many VIPs visiting a disaster zone.

111. Failure of ‘translating’ known scientific risk to positive disaster management strategies for vulnerable countries and communities.

112. Global amnesia regarding previous disasters.

113. Import duty on emergency vehicles retarding the emergency relief process through bureaucracy.

114. Military response delays through armed forces being stretched too far and in different international locations.

115. Too many needs assessments for any given disaster with poor communication of needs and duplication by agencies.

116. Inaccurate needs assessments and failure of adequate prioritisation of needs.

117. High level of ambient noise while attempting location of buried victims after earthquakes.

The list is comprehensive and could lend itself to further analysis in the form of categorisation or allocation to groups. Some of the RF.RR relate to transport issues and practical lack of particular resources. Others relate to either attitudes or cultural problems. The list demonstrates that there are many pitfalls within the rapid and effective response to natural disaster scenarios and this gives material that could be suitable for further research. Additionally a list such as the above could be of interest to the disasters community regarding the efficiency of their own particular organisation or systems utilised with their field of operation.

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Appendix E  World Natural Disaster Events between 2001 and 2005

E.0 Introduction

A presentation is given concerning the world natural disaster events occurring during the research period, which gives an insight into the way the disasters community are operating since the completion of the IDNDR.

E.1 the Six major disasters

➢ Earthquake in Gujarat India 2001
➢ Earthquake in Bam Iran December 26.12.03
➢ Earthquake in Indian Ocean 26.12.04
➢ Hurricane Katrina 29.8.05
➢ Earthquake in Pakistan 9.10.2005

The sources of information for these events include media coverage, peer review and seismic details using the Iris Seismic Monitor, a tool of the United States Geological Survey (USGS).

E.2 The Gujarat earthquake India

Date and time 26.1.2001 08.53am
Hazard earthquake
Intensity 6.9 Richter scale
Location state of Gujarat N.W. India
Losses:
➢ 20,005 dead
➢ 166,000 injured
➢ 20,717 seriously injured
➢ 370,000 homes destroyed
➢ 922,000 homes damaged
Secondary hazards drought
Resistance Factors to Rapid Response (RF.RR)

1. Communication blackout
2. Specialised emergency field hospitals arrived after one week but were too late to reduce early morbidity and mortality.
3. No disaster management plan or early provision of an incident command centre despite doctors being flown in within twelve hours and operating out in tents.
4. Decision making was difficult and most decisions were made ad hoc.
5. Puzzlement by International Search and Rescue teams (SAR) that the Indian government were so reluctant to ask for help.
6. Self-help policy in India has led to a delay in seeking help.
7. Poor coordination of NGO's attending the disaster area.
8. Lack of language or knowledge of local culture led to precious time being lost on hospitality and orientation.
9. Resistance of patients to be transferred to tertiary centres due to fear of isolation in a busy city. This included spinal injuries/paraplegia.
10. Lack of DMP within the area and poor education regarding earthquake hazard
11. Disaster amnesia with little regard given to the previous earthquakes hitting the region.
13. Delay in accessing heavy lifting gear which arrived on day four.
14. Poor building construction with inadequate re-enforcement.

E.3 Bam IRAN

Date and time 26.12.2001
Hazard earthquake
Intensity 6.9 Richter scale
Losses:
- 42,000 dead
- 30,000 injured
- Thousands of homes destroyed
Resistance Factors to Rapid Response (RF.RR)

1. Communication blackout
2. Much dust and debris from crumbling ancient earth structures

E.4 Sumatra South East Asia/Indian Ocean tsunami 26.12.04

This was a massive disaster with many lessons learned regarding RF.RR particularly the absence of satisfactory early warning systems. The mortality was in the order of 250,000 but the final death toll may never be known because of the extensive disaster zone and people killed in remote locations.

10 countries were affected by the event. In addition many more nations were impacted upon because many foreigners were on holiday in these countries at the time.

Countries affected include the following:

- Thailand
- Sri Lanka
- India
- Indonesia
- Maldives
- Kenya
- Malaysia
- Somalia
- Burma
- Seychelles

Resistance factors to rapid response in this disaster included the following:

1. Little or no early warning of the impending disaster
2. Magnitude of the disaster-5000 miles approximately and 10 countries affected
3. Inadequate state of readiness of civil defence services
4. Remote location of many casualties
5. Slow accurate needs assessment and scaling of the disaster because of widespread impact
6. Communication problems with networks compromised and power cables damaged

7. Massive amounts of debris and road transport problems relating to both evacuation and access

8. Inadequate accident and emergency facilities with hospitals overwhelmed by weight of numbers of casualties

9. Fear of further catastrophe from aftershocks

10. Confusion and chaos

11. Looting

12. Political instability in Sri Lanka

13. NGO offices were found to be un-manned during Christmas break and some organisations with community-based projects in the locality of the disaster zone could have been used for early channels of communication and points for aid distribution. This has all the benefits of the staff in these projects being familiar with the language, customs and terrain involved in the relief programme efforts.

14. Hampered search and rescue efforts because of amount of debris over wide areas.

15. Lots of mud and putrefaction of corpses

16. Difficulties with identification of victims before decomposition

17. Lower caste Indians being denied necessary aid in favour of higher caste victims

Religious sensitivities between different countries i.e. American forces engaged in relief work supplying aid to Muslim victims.

**E 4 Hurricane Katrina 29.8.05**

**Hazard – hurricane 145 mph wind**

**Secondary hazard – flooding**

**Losses – several thousand**

**RF.RR**

1. Severe delays in response due to political intransigence

2. Lack of DMP

3. Extent of disaster zone

4. Looting and rioting/civil unrest
E.6 Region Pakistan

Location Southern Asia 73.581 deg East 34.443 deg North depth 10Km (6.2miles)

Date and time 8.10.2005 8.50am local time

Hazard Earthquake (Indian plate collision with Eurasian plate)

Secondary Hazards landslides

Intensity magnitude 7.6 Richter

Losses 30,000 killed

43,000 injured

2.5 million people homeless

RF.RR

1. Extent of the disaster zone, extending from northern Pakistan to India and Afghanistan
2. Steep topography
3. Transport difficulties with lack of helicopters
4. Remote communities
5. Coordination and communication problems
6. Overwhelming numbers of casualties
7. Lessons learnt
8. Buildings in known area of high seismic vulnerability need appropriate reinforcement
9. Helicopter assets need to be identified as part of DMP routine
10. Land use planning and building codes are vital for Pakistan
11. Public buildings need special attention particularly schools and must be re-enforced substantially
12. Sniffer dogs very important in location of buried victims

13. RFtRR has led to delayed treatment of wounds and fractures leading to severe complications including gangrene requiring amputation

14. In earthquakes such as this high priority should be given to sending substantial numbers of trained nurses to give urgent attention to wound care with appropriate cleansing agents and dressings and use of antibiotics early for infected wounds.

**E7 Conclusion**

The ongoing high frequency of natural disasters continues to present serious challenges to the disaster relief community. The extensive areas of the disaster zones have been the significant RFtRR and steep topography and remote locations a salient feature. Local defences and DMP have been sadly lacking. The recommendations in the light of the disasters presented includes preparation for large disaster zones, improved early warning systems and capacity building for communities in vulnerable locations with DMP taken into consideration at all levels of organization. Early needs assessment and evaluation with good coordination and communication between organizations will accelerate the efficiency of the disaster response process. Training with simulated computer modeling between organizations will assist the efficiency of the future responses.
Appendix F

Comments Section from Section 3 of the Questionnaire

Questionnaire 2: (Portugal)
Insufficient training and education in disaster medicine especially for the several operational heads.

Questionnaire 3: (England)
Red tape and poor/inaccurate/incorrect information or information and communication withheld cause endless problems

Questionnaire 4: (England)
Lack of understanding as to what constitutes a major disaster and underestimation of the impact thus slow to request outside assistance

Questionnaire 6: (Austria)
A lack of multidisciplinary cooperation such as doctor/chemist/engineer and skilled leader with PR experience

Questionnaire 7: (Norway)
The research should be qualitative rather than quantitative in its object

Questionnaire 10: (Sweden)
System for Command and Control of Medical Services (needs and resources)

Questionnaire 11: (Sweden)
Definition of disaster??.

Questionnaire 13: (Australia)
Safety concerns for rescue workers e.g. bush fires, earthquakes.

Questionnaire 14: (America)
The best responders are those that work in that field on a daily basis i.e. emergency room doctors do best as emergency doctors and paramedics on ambulances do best in the field.

Questionnaire 16: (China)
The culture of each nation

Questionnaire 23: (Russia)
It would be better and more clear to estimate not only the resistance factors but factors that help. For example, preparedness of manpower and resources, etc.

Questionnaire 26: (America)
For resuscitation potential help from outside the immediate area comes too late

**Questionnaire 27: (Singapore)**
Local amenity preparedness is the most important resistance factor

**Questionnaire 30: (England)**
From Mr D P Walter Consultant in Emergency Medicine UK
1. delighted to be of assistance in raising our home research profile in this area.
2. is a little confused by some of the questions.
3. clarification might be found in defining both experience and what could be classed as an incident i.e. regional UK flooding is a significant problem for the local population but hardly registers on the scale of ‘disasters’.
4. Definition of disaster training is a variable concept. Mr Walter has received training in both civilian and military aspects but would not claim to be ‘qualified’.
5. suspected that members of our organisation who do not have English as a first language may struggle to give accurate responses to some of the questions. Some of the contexts are convoluted.
6. it is my opinion that the host politico-managerial attitude and planning /preparation are the most important factors, followed by how the world views the events, in terms of resisting the prompt implementation of international assistance

**Questionnaire 35: (America)**
I am glad that this information is being gathered. In the disasters that I have participated in the time for preparedness and mitigation was taking place as the incident occurred. There seems to be a great deal of government apathy towards disasters until they actually occur

**Questionnaire 38: (Holland)**
I hope I filled this in correctly the questions are very unclear

**Questionnaire 42: (Belgium)**
What a waste of time when there is no use of quick-response assets at an international level e.g. medical military resources and coordination with UN agencies

**Questionnaire 53 (America)**
As an ‘Operational Responder’, I would have appreciated your questionnaire being better defined concerning political versus non-political issues. In many ways, an Operational Responder views a disaster in timeframes, since time is our worst enemy in saving lives. For example in the Mitigation category, we view Immigration and
Customs issues of paramount importance, especially regarding rapid entry into an Affected Country. Teams are often faced with needless delay at the entry point due to the Affected Country not being prepared to accept resources and not knowing how best to apply them to the situation. In many instances, ill-equipped (or untrained resources – what we call ‘Disaster Tourists’) arrive and are given inappropriate assignments, leading to continued suffering of those entrapped.

Additional island nations (Iceland, New Zealand, Australia to mention but a few) maintain strict quarantine requirements for animals that exclude the utilization of highly trained search canines from entry. This leads to long delays in victim tracking using air-scent canines, since in most instances, the Affected Country cannot supply this vital search tool. Many countries also have stringent restriction on medical care delivery, introduction of foodstuffs, and banishment of petrol or gases. These items play a large role in the incoming resources ability to be self-sufficient (thus causing no burden on the Affected Country), plus allow a menu appropriate for the members, medical service to first world standards for team members and victims encountered, and fuel requirement for the tools and equipment used by the team.

Operational Responders have little or no interaction with NGOs/PVOs, etc, in the Affected Country in that our role lessens as the event transitions to recovery from rescue. In most instances, once the Local Authority announces the end of the Rescue Phase, teams leave.

Battalion Chief Dewey H. Perks
Fairfax County Fire and Rescue Department
Urban Search and Rescue Section
Fairfax Virginia 22030 USA

Questionnaire 57: (England, NGO)
The stronger the emphasis on community level mitigation and preparedness (as opposed to NGO/government level) the more effective the response.

Questionnaire 58: (England, NGO)
I have made my comments based on response to the natural disasters that result in famine. Famines are slow onset disasters and are caused by a complex array of political and human resources conditions and so they are in a sense more than just natural disasters. But having said this most disasters have been caused by political decisions and other factors in some way. Disaster Mitigation and Preparedness is really talking about developmental work and this longer term work is where we need
to concentrate our efforts. This is about increasing people's ability and empowering them to solve their own problems. Much of the resources are given to high profile work such as responding when the situation becomes a disaster and we need to change this. We have to be able to support work where people can learn and this means that making mistakes has got to be okay and allowing people to determine their own future has to be okay. Much of the resources provided are provided in such a controlled way that they dis-empower people. Work needs to concentrate on changing the fundamental nature of people's relationships and their ability.

**Questionnaire 59: (England, NGO)**

Availability of experienced, competent personnel, security of staff.

**Questionnaire 60: (England, NGO)**

I have found some of the above questions very difficult to answer, because they depend on the type of natural disaster, and I found some of the questions could be read 2 ways. If the question was about level of significance of factors when deciding on a rapid response it would be OK, but by calling them 'resistance factors' it automatically puts a slant on the question. So for example, when you simply write 'Financial resources of host government', if the resources are high it would cause a higher 'resistance' to me sending a rapid response team rather than if their resources were low. So to put a number on this is fairly meaningless without knowing the context. Quite a few questions are like this, rather ambiguous as I read them. I may be misunderstanding what you are asking, in which case you might want to ignore this questionnaire in your compiled results!

**Questionnaire 62: (India, OCHA)**

1. FCSS, OCHA Geneva is the section which manages the United Nations Disaster Assessment and Coordination (UNDAC) team which has done 99 missions in 61 countries in 8 years for emergency response to disasters. It is also the Secretariat for the International Search and Rescue Advisory Group (INSARAG) which is the worldwide grouping of international urban search and rescue (SAR) teams. I am not aware of our having been approached by you for discussions regarding the 'resistance' factors above. Some of the questions, especially in the SAR portion seem to betray an incomplete awareness of internationally accepted SAR coordination procedures and standards i.e. INSARAG Guidelines which are used regularly in response by international SAR teams in emergencies and exercises. Perhaps a little interaction on these may be of use to you.
2. IDNDR has nothing to do with disaster response. It concentrated entirely on mitigation issues to reduce the impact of disasters so the question about IDNDR is redundant. The ERC (OCHA) is mandated by the General Assembly to coordinate international disaster response and it has been doing so in its various avatars (UNDRO DHA OCHA) since 1971

**Questionnaire 65: (England, NGO)**

Resistance factors to Rapid Response are context specific- the factors mentioned in your questionnaire would vary from location to location.

**Questionnaire 68: (England, NGO)**

Some factors are very context specific and could be insignificant in one context and significant in another eg customs and border control.

**Questionnaire 69: (England, UKFSSART)**

Transport to scene is biggest problem always and communications.

**Questionnaire70: (England)**

Most response is local but most resources go to national and international response systems. Much more effort should go into building local preparedness and response

**Questionnaire78: (England)**

I think that early warning and disaster mitigation are of paramount importance together with training of emergency relief organisations and coordination of the relief effort. Helicopters and early accurate needs assessment should be a key factor in future thinking regarding disaster management.

**Questionnaire79: (England)**

Difficult to relate the general improvement in response to the IDNDR- it was a patchy undertaking in many regions. I am very concerned that those who make an emotional response and jump off to remote corners of the earth are often folk with kindest hearts but without training, some become a menace and a burden on the community, Myths abound about the local population being in a state of shock and thus incapable but evidence suggests they manage well, and need supporting with training in simple steps to take in the first few hours. Planned support in response to local governmental invitations and co-ordination of NGOs and UN is the best route. (Sorry, but one of my hobby horses)

**No Questionnaire returned because**

I am having difficulty with the questionnaire. The questionnaire is an important one. It is not so much the ranking of any one factor but rather the combination of factors
that contributes to resistance. Thus while the magnitude of the disaster is very important and the degree of preparedness can also be important, the resistance could also be intrinsically linked to the existing national culture and it is the combination of one, two or three factors that provides the climate to resistance. For example, after the earthquake in Kobe it certainly was a major event, but there was also not a lot of current preparedness initiatives in place, and combined with a cultural need to ‘save face’ there was a great deal of resistance to outsider coming into Japan as the Japanese did not want to lose face by appearing to be incapable of responding adequately to the earthquake- the, international SAR teams were sent to sites which had already been searched by the Japanese to ensure that those living survivors would be rescued by the Japanese themselves. I use this somewhat overly generalized info in that in Japan it was probably the cultural factor and the lack of community –based preparedness that were the overriding factors; however in another country I may well be a different combination of factors that lead to resistance to outside help. Another example would be the lack of foreign assistance to the Tangshan earthquake in China which killed 200.00+ was it resistance, or an ability to meet the necessary needs internally? How does one distinguish between ‘resistance’ which leads to an increased negative impact on those affected versus a common-sense approach not to accept unnecessary aid?

For example, in the aftermath of the tsunami, in New Delhi the initial response was that they were quite capable of meeting their own needs as best could be met and saw themselves as a ‘donor’ country to other countries more stricken than India – is this resistance to disaster response- or a reaction to an incorrect ‘Western’ perception of what is a developing country and an attitude toward perceived inadequacies and inefficiencies in countries who are not as ‘developed?’

To respond to the questionnaire is thus very difficult because in my experience while there are some similarities, there are also many differences and it is more the combination of certain key factors that drives the acceptance of disaster response than any one factor being more relevant than another. So what may be an overriding factor in one country may not be of any significance in another country.

Other factors not included in your list which I believe have relevance are:

1. History and/or frequency of disasters-existence of a disaster sub-culture
2. History of international aid- has there been experience of international assistance and was it positive or negative.
3. National culture (you mention cultural differences in the disaster zone but I am talking about national pride, need to save face, etc. from an national perspective)

4. Media coverage and world recognition

5. Who are the victims? (e.g., nationals versus foreign nationals - i.e., I believe that if an identifiable number of the injured/dead are from another country then there may well be increase willingness to receive aid from the country of visiting nations/tourists)

6. Socio-economic status of those primarily affected - unfortunately in many countries the losses of some are not seen as important as the loss of others

7. State of world politics - international disputes around trade sanctions my precluded certain countries against accepting help from some countries but not from others - e.g., Iran earthquake in Bam.

8. State of internal politics at the tie of the disaster (i.e., it is not looting and riots post-disaster but the state of politics prior to the disaster =- e.g., Rwanda)

9. Origin of the disaster - I believe that willingness to allow insiders in for natural disasters can be different than for human-induced disasters (e.g. Bhopal)

I am doing a fair bit of research on disaster resilience - primarily on responders (e.g. screening of disaster volunteers so as to choose those volunteers who are best able to handle the negative impacts of disasters) and on maximizing resiliency during a disaster response, I ma increasingly concerned with the growing need in many North American communities to ‘rush in where angels fear to tread’ Although well-intentioned and altruistic in nature, there is definitely a perceived need to rush in with Stress teams and the rate at which these teams is called in seems to be on the rise often for incidents only a few years ago which would have been seen as sad/tragic but a part of growing up. Now the message seems to be that children/youth can not manage their own reactions and need help to get over situation when bad things happen, rather than promoting their sense of resilience and problem solving, By no means do I want to imply that the response to a major disaster parallels a response at a school where there has been a major incident but I use this as an example to try to explain my concerns about our perception of what other need an when they need it. Rather than to wait until invited in and to use specific strengths to address specific problems, I would have rather , I guess, that the survey not use the work ‘resistance’
which implies a negative connotation but rather a work like 'barriers' to receiving and requesting international aid. Laurie.

Questionnaire No 81: (Australia)

Delays occur because of the impact of too many players in decision making between in Australia eg Commonwealth and State and Defence etc to rapidly responding. Initial response post disaster might be quick but other team dispatches may be delayed because of politics.

Questionnaire 85:

My experiences in recent Tsunami disaster are in Andaman and Nicober Islands of Indian territory area only. I am filling in QA experiences gained by me for long 7 months working in these islands.

Lack of co-ordination of all national, international and local agencies was a limiting factor.

Local people were totally unprepared for Tsunami Disasters.

Questionnaire 87: (Poland)

What I hated especially during Kosovo 1999 war was the picture of the crowd of white 4-wheel-drive cars belonging to various relief organisations roaming without a clue in Albania and Kosovo. In each car there was a relief team member doing nothing, pretending they are helping. They spend a lot of money for 'disaster tourist trips' that could be used for the real disaster help.

Questionnaire 88: (Australia, Victoria State Medical Emergency response))

The questionnaire does not really fit our situation. I have assumed that most of the time you mean the affected country's resources, not ours.

In Section 3, gave 5 resistance factors which are not covered by our questionnaire!

1. We work to the invitation from government to government
2. Is it within our sphere of influence? Ie South Pacific
3. Does our government have the political will to get involved?
4. Have we a large number of citizens from the affected country resident here?
5. Is there massive media coverage from the scene and from our own talkback radio, current affairs etc?

Questionnaire 92 (Canadian lady who has lived in Sri Lanka in 1980s)

It seems to me that the gender aspects and role of women in disaster mitigation, response and recovery are often overlooked. Women, children and the elderly are really the most vulnerable populations during disasters- during the tsunami for
instance in some areas 80% of the victims were women. Women are also very vulnerable in refugee camps and are at risk of both family violence and physical violence from male strangers. Our team at University of Ottawa is undertaking research on the role of care-providers as first responders - 80% of nurses and family care givers are women. We are concerned about work and family conflict for care givers in quarantine conditions, particularly single parents. There is certainly a need for additional research in these areas.

Questionnaire 95 (Australia)
In his reply to the Table in Section 3 he put his 3rd factor as ‘deployment of too many field hospitals.’ I classified that as question 22 on QA. His 4th factor was ‘poor attention to longer term primary care requirements’. I classified that as question 23 on QA.

Questionnaire 96 (USA female nurse)
The instructions are vague. I answered in the context of...each element’s ability to serve as a resistance factor. I am not sure if that is what you meant.

Questionnaire 100 (Romania)
The most important factors are lack of knowledge about disaster management, that enables irrational behaviours and disaster myths, and the second in order of importance is the lack of financial allocations to disaster management and training activities etc.

Questionnaire 101
No comments, but No 101 (from Taiwan) gave his most important resistance factor in the Table as UN involvement, but then gave it a score of 1 (least important) in Section 2, the main questionnaire. Perhaps he didn’t know the meaning of ‘insignificant’!

Questionnaire 103 (British)
A rapid response capability is essential; the teams are ready and willing. Governments must get their acts together.

Questionnaire 104 (USA)
Responders should participate within an organised response system such as the Incident Command System

Questionnaire 105 (Finnish Red Cross)
I have been 20 years in Red Cross roster for missions abroad. I have learned that most important thing is to have well trained professionals to send out to help. This is not people going out without any understanding and respect for other cultures. We know
each other and our equipment well. In RC we all always invited by the hosting country, we never go without the country asking for our help.