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DISASTERS AND RAPID ASSESSMENT OF NEEDS:

A REVIEW OF CONCEPTS AND METHODS

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1. INTRODUCTION

Disasters are occurring with increasing frequency in the world and enormous sums of money are spent on disaster relief and reconstruction. Western[1] estimated that disasters involving international relief occur once a week on average. Today, with an increase in civil strife and famines, that statement has become an underestimate. Although no accurate records are maintained on emergency relief by any agency, incomplete reports of national and international relief, registered by the Office of Foreign Disaster Assistance (USAID), relief (from national and international sources) amount to approximately US$ 1 billion each year. Despite these significant expenditures and recurrent events, disasters, until very recently, have been handled as purely charitable exercises and without apparent professionalism. In the recent years it has been noted that disasters occur repeatedly in the same places and affect same populations and that relief costs have increased without any tangible mitigation of disaster impact.

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[1] **Western, K;, The Epidemiology of natural and manmade disasters - the present state of the art, Thesis, University of London, 1972**

The Sahelian famines of the early 1970s, the earthquakes in Tangshan (1976), Mexico (1985) as well as the Armero volcanic eruption demonstrated the need for a professional approach to mass emergency response and importance of preparedness in developing countries. Bangladesh, with repeated floods and cyclones killing hundreds of people and devastating thousands, along with famine and civil war in the Frontline States of South Africa helped push the approach to disasters to its natural conclusion. The new approach underlined the impact of disasters on the development of the country and its long-term effects on the affected population. Today, scholarly reports [2] and scientific articles[3] [4] [5] have convincingly stated the need for a systematic approach to relief. The concept of "preparedness" has since emerged and today, health and other professionals engaged in emergency relief have increasingly discarded the traditional attitudes characterised by "any donation is a good donation" and "the faster the action, the better the action". The human impact of disasters has become a subject of research and evaluation.

As a result of this attention, many different aspects of disaster management came to light and information became a major issue in disaster management. In the last decade, the need for information has crystallised in two main areas. First, early warning systems for famines became a central issue for famine control and prevention. Second, methods for rapid assessment came to the fore front for all emergency interventions. This interest in rapid assessment subsequently revealed the inappropriateness of relief in terms of the time delay and the content. The neglect of proper assessment of needs tended to produce health relief

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[2] Hagman, L. et al.,Prevention is better than Cure. Report on human and environmental disasters in the tThird World. Swedish Red Cross, Stockholm 1985

[3] Toole, M., Waldman, R.J., An analysis of mortality trends among refugee populations in Somalia, Sudan and Thailand, Bull. WHO, 66, 1988.

[4] Seaman, J., Epidemiology of natural disasters: contributions to epidemiology and biostatistics, Karger Press, Basel, 1984.

[5] Lechat, M.F.,Disasters and public health, Bull. WHO 57 (1), 1979.

founded more on rumour than on fact and has therefore, lead to inefficient and inappropriate use of limited health resources. It has, now, become clear that proper needs assessment is critical efficient and effective relief and rehabilitation.

Consequently, in the early 1970s, the study of disasters evolved rapidly. Techniques and knowledge hitherto, transmitted from person to person in a folkloric manner, began to be assembled systematically. Major non-governmental organisations involved in health relief published influential reports[6,7,8] . As an indication of the importance finally accorded to disasters as a long-term problem, agencies such as the UNDP, UNICEF as well as several bilateral development assistance agencies initiated emergency preparedness programmes to help countries at risk to better cope with their disasters. By 1980, WHO established a collaborating centre for disaster epidemiology.

This paper addresses the issue of rapid assessment of health needs in emergent situations. The paper is limited by two main contraints. One, the scope of health impact in disasters is so wide-ranging that no particular aspect of assessment can be treated in adequate detail in one paper to satisfy specialists. Emergencies include a variety of situations, each having its own particularities. Epidemics and outbreaks, for example are assessed differently from floods and earthquakes. For epidemics, different methods are required to deal with outbreaks of yellow fever, meningitis or cholera. Furthermore, the health needs assessment of displaced populations require not only the assessment of one single health problem but of the entire gamut of health care needs. Displaced populations have special health needs, such as nutritional interventions, infectious disease control for drought victims, surgical and trauma care for those affected by civil war. On the other hand, they also require all normal daily health care, including obstetrics and immunisation.

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[6] Hagman, L., et al op.cit.

[7] Seaman, J. The Epidemiology of Natural Disasters, Karger Publishers

[8] Wijkman, A. and Timberlake, L., natural disasters: acts of god or acts of man?, International Institute for Environment and Developmnet, London, 1984.

The second constraint is more fundamental insofar as the amount of systematic research conducted on rapid assessment methods and health management in disasters is limited. As a result, there is no body of literature on which to base conclusions or propose hypotheses. This paper presents an overview of the assessment as experienced in the field and discusses some important methodological issues in the context of mass disasters. It first prresents the background of natural disasters in the world and its characteristics and subsequently critically discusses selected aspects of assessment methods.

2. DISASTERS : BACKGROUND

Natural disasters which occur relatively frequently and have a significant human impact may be classified in two main categories:

Acute with rapid onset: earthquakes, flash floods, cyclones and other high wind events;

Chronic with slow onset: floods, famines, civil strife; refugees and displaced persons; epidemics.

Other disasters, such as landslides, avalanches, snow storms, occur less often and threaten smaller populations. The number of disasters in all of these categories have been increasing over the last thirty years. Rampant urbanisation, environmental degradation and global warming coupled with improved communications have all contributed to this increase. While all of these disasters cause structural damage, their mortality and morbidity effects are variable An earthquake of equal intensity will kill and injure differentially according to the affected community's level of socio-economic development. (Table 1)

Table 1

Comparison of characteristics of earthquakes in Managua(1972) and California(1971)

Disaster characteristics	Managua	California*
Richter scale reading**	5.6	6.6
Extent of destruction (Mercalli Intensity Range VI-VII)	100km^2	1,500km^2
Population in affected area	420,000	7,000,000
Dead	5,000	60
Injured	20,000	2,540

* San Fernando valley
** Logarithmic scale

Disasters for which rapid assessment is required are those emergency situations that exceed the adjustment capacity of the affected community and require external assistance[9]. In general, the adjustment capacity of a country depends on the risk of disasters in that country and its physical and economic development. Sewell and Foster[10] have developed indices ranking the adjustment capacity of different countries according to their risk and developmental stage (Table 2). In this paper, it is assumed that the rapid assessment would normally be undertaken by a national or international health agency with the specific aim of plan emergency health response. This is an important distinction because methods and techniques would vary according to assessors level of skill of assessors, their familiarity with the local conditions and existing information and communication systems. For example, in developed countries, baseline data , laboratory facilities are easily available and efficient communication systems exist. In most developing countries, this is not the case and in times of disaster, it is even less so. Therefore, methods and techniques for rapid assessment in these conditions have to account for these lacunae.

[9] Lechat, M.F., op.cit.

[10] Sewell, D.W.and Foster, H.D. Environmental risk: management strategies in the developing countries. Environmental management, 1 (1) 1976.

Table 2

Comparative score of risk, development and adjustment capacity vi-à-vis natural disasters

Country	Degree of risk	Development stage	Adjustment capacity
Japan	4.0	4.5	4.5
USA	3.5	5.0	4.0
Chile	4.5	3.0	3.0
Bangladesh	4.5	2.5	2.0
Indonesia	4.5	3.0	3.5
The Netherlands	4.0	4.5	4.5
United Kingdom	2.5	4.0	4.0
Malaysia	4.0	3.5	3.5

Adapted from : Sewell and Foster (1976)

The disaster cycle can be differentiated into five main phases, extending from one disaster to the next. These are :

* *the warning phase* indicating the possible occurrence of a catastrophe and the threat period during which the disaster is impending;
* *the impact phase* when the disaster strikes;
* *the emergency phase* when rescue, treatment and salvage activities commence;
* *the rehabilitation phase* when essential services are provided on a temporary basis;
* *the reconstruction phase* when a permanent return to normalcy is achieved.

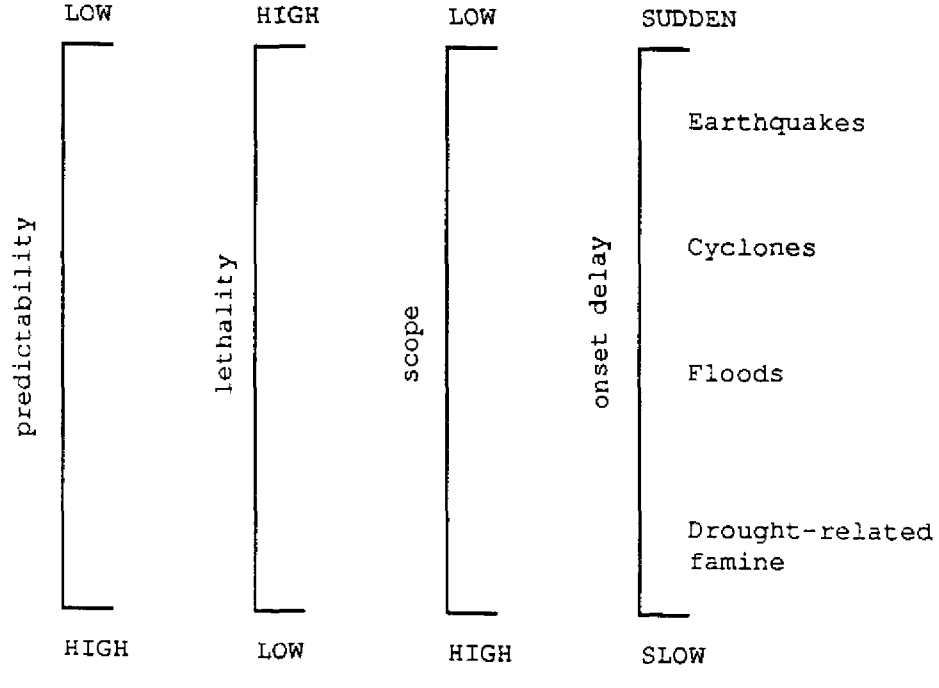
While disaster-induced mortality and morbidity differ between these phases and they are also a function of the prevailing health and socio-economic conditions of the affected community. As a result of this, global statistics on disasters seem to

indicate a significantly higher frequency of natural disasters in the Third World than the industrialized countries. A disaster may be defined by the vulnerability of the population to a natural event and not by the mere fact of its occurrence [11]

2.3 Special characteristics of natural disasters:

It is useful to begin by locating the four major disaster types on relative scales of lethality, predictability, onset time and impact scope. This ranking provides some guidance towards understanding the variation in mortality impact noted among disaster events across time and space. Figure 1 displays the four scales with the relative positions of the disaster types.

Figure 1
Ranking of principal natural disasters on relative scales of predictability, lethality, scope and onset delay



On a global scale, the mortality rates generated by natural disasters show interesting tendencies. These tendencies create

[11] De Ville de Goyet, C., Lechat, M.F., Health aspects in natural disasters, Trop Doc. 6, 1976.

the beginnings of an analytical framework within which specific impacts may be systematically analysed for robust indicators, efficient needs assessment or preparedness and rehabilitation planning. The mortality resulting from disasters is a function of physical and other structural risk, levels of development and capâcity for coping or adjustment (preparedness) of the community. Table 2 displays comparative data from a number of countries.[12]

As seen in Table 3, between the two ten-year periods, 1960-69 and 1970-79, a significant increase in average mortality per event is noted in all categories except in floods where direct mortality is generally low.

Table 3

Changes in disaster mortality between the periods 1960-69 and 1970-79

Disaster type	Deaths per event		Mortality (per 1000 exposed)		Importance of increase
	1960-69	1970-79	1960-69	1970-79	
Drought-related famine	202	2311	0.5	9.5	++++
Flood	158	213	4.5	3.0	-
Cyclone	88	2291	43.0	122.7	++
Earthquake	750	4871	262.5	324.7	+

Adapted from : OFDA (1960-1980)

The greatest increase in mortality is noted in earthquakes, which takes a quantum leap from one period to the next. The huge increase in earthquake mortality is partially explained by the Tangshan strike of 1976 in China which contributed more than half of the entire ten-year period death toll. The official estimate of 224,000 dead accounts for exactly 47 per cent of the total

[12] **Guha-sapir, D. and Lechat, M.F., The impact of natural disasters: A brief analysis of characteristics and trends, Emergency and Disaster Medicine, 1 (4) 1986.**

number of deaths due to earthquakes during this time. But even allowing for the Tangshan quake, the death mortality per strike remains as high as 1,780 per earthquake compared to 750 in the previous decade. Population density[13] , structural quality [14] , time of strike [15] and intensity of seismic activity [16] seem to be the main risk factors, but they fail to adequately explain the high mortality in earthquakes. Local conditions,seem to play a bigger role than expected in determining disaster mortality.

Geographically, the mortality generated by disasters is consistently and positively correlated to the level of the economy. Table 4 presents figures of mortality classified into three national income categories.

Table 4
Disaster mortality by level of economy

Mortality	Economy		
	Low income	Middle income	High income
Per event	3300	500	125
Per 1000 population	69	28	19
Per 1000 km2	48	8	1

Adapted from : Swedish Red Cross, 1985

Mortality rates, controlling for the number of disaster events, are substantially higher in poor countries than in the richer ones. This classification is, of course, gross and the data demand closer analyses for a clearer definition of risk factors and vulnerability patterns amongst the severely affected populations. Such analyses can have direct impact on programme planning and policy-orientation. Table 4, however, does serve to indicate the important influence of the prevailing socio-economic

[13] Lechat, op.cit.

[14] Glass, R., and Urrutia, J.J., Earthquake injuries rela ted to housing in a Guatamalan village, Science, 197, 1977.

[15] De bruycker, M., Greco, D., et al., The 1980 earthquake in Southern Italy: rescue of trapped victims and mortality. Bull WHO, 61 (6), 1983., 1983

[16] Alexander, D., Death and injury in earthquakes, Disasters 9 (1),1985.

conditions on the eventual disaster impact[17] [18]. For predictive and needs assessment purposes then, the socio-economic and health conditions prevalent in the affected community could be a better determinant of the epidemiological impact than the physical characteristics of the event.

3. RAPID ASSESSMENT : GENERAL CONSIDERATIONS

The rationale for rapid assessment is the need for a rapid response. The inevitable loss in accuracy, completeness and reliability in rapid methodologies may not be justified unless a quick response is required. The scope of rapid health assessment in emergencies covers both evaluation of impact (situation review) and assessment of needs. Its primary goal is to prevent morbidity and mortality due to the disruptive agent. The range of the scope implied by rapid assessment in memergencies can be best appreciated by examining the type of damages they create. Table 5 displays the common effects on environmental health caused by the four most frequent natural disasters The overall objectives of an assessment are fundamentally similiar to a standard community health diagnosis or an epidemiological investigation, scaled down to essentials. The general aims are:

- to assess the immediate health impact;
- to assess the potential health effects;
- to assess the local response capacities for immediate relief and control of developing situations;
- to estimate immediate and secondary health needs;
- to address current problems and prevent further damage

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[17] Cuny, F..C., Disasters and development, Oxford University Press, Oxford, 1983.

[18] Shah, B., Is the environment becoming more hazardous - a global survey, 1947 - 1980, Disasters, 7 (3), 1983.

TABLE 5. EXPECTED EFFECTS OF 4 NATURAL DISASTERS

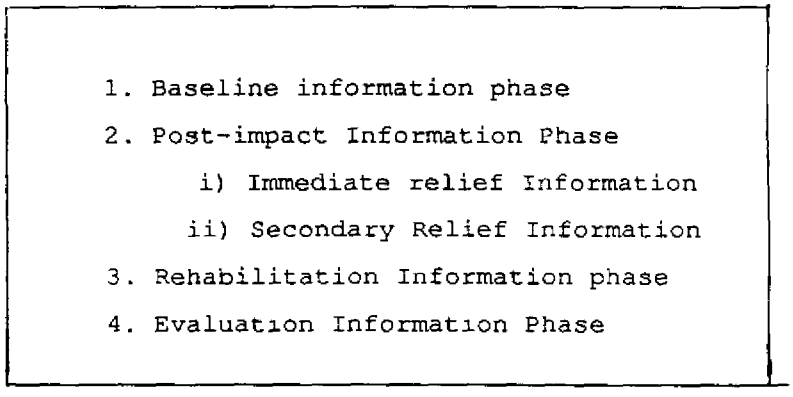
	Most common effects on environmental health	Earthquake	Hurricane/ Tornado	Flood	Tsunamis
Water supply and waste-water disposal	Damage to civil engineering structures	+++	+++	+++	+
	Broken mains	+++	++	++	+
	Power outages	+++	+++	++	++
	Contamination (biological or chemical)	++	+++	+++	+++
	Transportation failures	+++	+++	+++	++
	Personnel shortages	+++	++	++	+
	System overloading(due to shifts in population)	+	+++	+++	+
	Equipment,parts, and supply shortages	+++	+++	+++	++
Solid waste handling	Damage to civil engineering structures	+++	++	++	+
	Transportation failures	+++	+++	+++	++
	Equipment shortages	+++	+++	+++	++
	Personnel shortages	+++	+++	+++	+
	Water, soil, and air pollution	+++	+++	+++	++
Food handling	Damage to food preparation facilities	+++	+++	++	+
	Transportation failures	+++	+++	+++	++
	Power outages	+++	+++	++	++
	Flooding of facilities	+	+++	+++	+++
	Contamination/degradation of relief supplies	++	+++	+++	++
Vector control	Proliferation of vector breeding sites	+++	+++	+++	+++
	Increase in human-vector contacts	+++	+++	+++	++
	Disruption of vector-borne diseases control programs	+++	+++	+++	+++
Home sanitation	Destruction or damage to structures	+++	+++	+++	+++
	Contamination of water and flood	++	++	+++	++
	Disruption of power,heating,fuel,water, or supply waste disposal services	+++	+++	+++	++
	Overcrowding	+	+	+	+

+++ : severe possible effect; ++ : less severe possible effect; + : least or no possible effect.

The time phase defines the detail and the scope of the assessment. The information needs may be divided into phases corresponding to the evolution of the process.(Figure 1)

Figure 1

System phases for information gathering purposes



The need for information and the choice of assessment techniques are subject to the rapidity by which the results are required and the time phase of the disaster process in which the assessment is being done. Ideally, baseline information should refer to normal circumstances, that is the pre-disaster period. This body of information should include those items that are labour-intensive, time-consuming or pain-staking to collect but nevertheless, provide essential input to needs assessment and the planning of relief operations Examples of such information are demographic characteristics, agricultural or meteorological data.[19]

A needs assessment undertaken in the immediate post-impact period will focus on life-line needs and prevention of impact related mortality. In the secondary phase, the assessment will address longer-term shelter food and health care. Subsequently, development of sentinel surveillance systems, immunisation programme will also be added to the aims of the assessment.
The success of an emergency assessment is largely dependent on knowledge of local conditions and availability of baseline data.

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[19]**Guha-Sapir, D., and Lechat, M.F., Information systems and needs assessment in natural disasters: An approach for better relief management, Disasters 5 (4), 1986.**

This is why preparedness is an essential component of post disaster-response. The endemic disease profile of the affected community, their pre-disaster health status and infra-structure will determine to a large extent the content and methodology of an assessment. Pre-disaster nutritional situation and cropping patterns will determine actual and potential food needs. Loss of harvest (actual or potential), salination of arable soil, loss of tools of trade could all eventually lead to severe food crisis in poor, agricultural populations. Emergency assessment would have to evaluate these risks and propose provisions against these eventualities.

Relief response, despite sufficient funds and good-will, has consistently been late and inappropriate due to inadequacies in rapid assessment. Decision-makers have been unable to wait for long drawn out assessments due to political or humanitarian pressures for action. Supplies or support have often been sent which remained unused and often created logistical backlogs.[20] For example, the standard response of assistance agencies to an earthquake or other acute emergency has been to send teams of surgeons or anaesthesiologists. In Mexico, two such teams arrived and discovered that the city of Mexico had sufficient facilities and skilled personnel to treat victims who needed immediate surgical care. The teams returned home 11 days later never having dismantled their field hospitals or treated anyone. More recently, an unspecified request in December 9, 1989 for blood and plasma for Rumania , generated 5 million dollars worth of donations by several European countries by mid December. No agency considered the need for an assessment of the real requirements. At the end of December, 4 million dollars' worth of products remained unused. Similarly, 20 per cent of the medications sent to Armenia had passed their expiry dates on arrival, were soon to expire or were of no use in an emergency.[21]

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[20] Blankets sent to India following the 1976 floods were donated to Nepal in 1982 and were re-donated to India in 1987. Relief for the victims of the Mexico earthquakes included contraceptives and high-heled shoes.

[21] Autier, P.,Ferir, M.C., et al., Drug supply in the aftermath of the 1988 Armenian earthquake. Lancet, 335, 1990.

Relief commonly arrives well after the first crisis has passed and continues to arrive lagged behind its period of need (Figure 2). The first shipments of relief in this period consists frequently of materials and personnel which would have been useful had they arrived 48 hours earlier. As a consequence of this continuously lagged response, relief and subsequent response remains largely irrelevant. Finally, when the long term effects begin to manifest themselves, relief dries up altogether, since these needs were not assessed during the emergency period .

A related problem is that unuseable relief supplies and relief personnel require time and attention from the host country's limited resources. Drugs require classification, storage and occasionally, destruction. Relief personnel require housing, supervision. Volunteers require coordination. This can take valuable time and resources away from the main objectives of preventing and mitigating further death and damage. On an average, 60 agencies arrived each week in Bangladesh, over four months following the 1988 floods. While these cases sound anecdotal, they unfortunately characterise the profile of the majority of the relief aid today. the urge to send medicines, personnel, surgical items and any other handy material has been rooted in the international image of disaster relief.

Despite these deep-seated stereotypes of disaster relief, the management approach to disasters is, steadily changing. Attempts to introduce robust methods and procedures and to rationalise response are gaining ground. Recently, WHO has made a major effort to consolidate knowledge in its Rapid Assessment Protocols in Emergencies[22]. Although a step in the right direction, the protocols suffer from a lack of concrete methodological guidelines for specific situations. Simple questions such as how many observations are "sufficient" and how can these findings be interpreted remain to be specified.

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[22]WHO/EPR/90.1.1 -90.1.9

4. METHODOLOGICAL CONSIDERATIONS IN RAPID ASSESSMENT IN DISASTERS

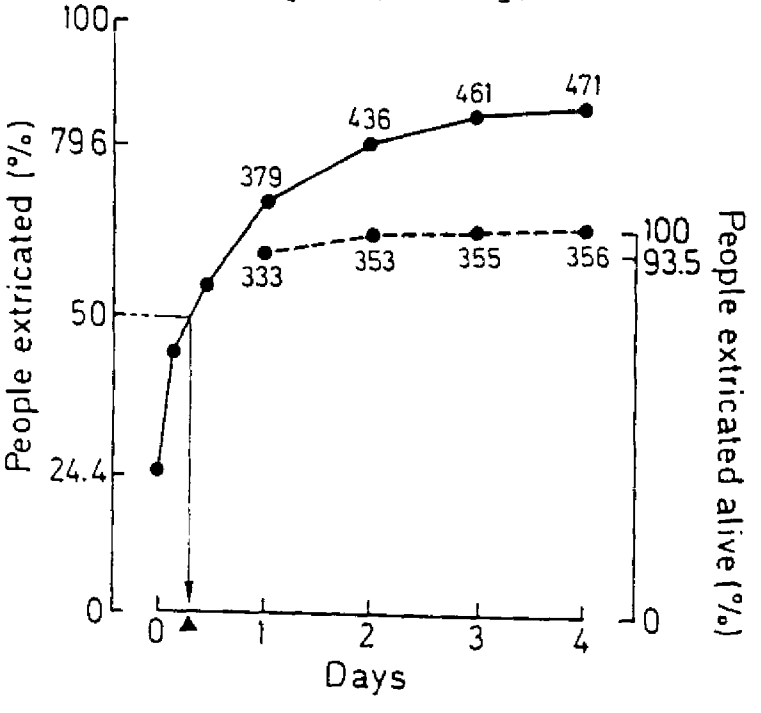
The aims of an initial rapid assessment in an emergency are :

- determination of the magnitude of the disaster;
- measurement of the present and potential impact;
- assessment of resources needed, including local response capacity;
- planning of appropriate response.

Ideally, as described in Figure 2 (Information Phases in a Disaster), an initial survey is first undertaken for immediate needs. The time required for an initial assessment varies with the type of disaster and its location. Initial assessments of epidemics, floods and displaced populations may be performed in 2 - 4 days. Disasters, such as earthquakes or cyclones, require the most immediate assessment preferably within one day. As noted by Debruycker et al. in Italy and Glass et al. in Guatemala, the majority of the deaths due to an earthquake occur within the first 48 hours (Figure 2).

Figure 2

Survival Curves of Victims in the 1980 Earthquake (Campania, Italy)



In virtually every situation the initial assessment should be followed by a more thorough and focussed examination of the situation. Furthermore, if relief intervention programmes are to be evaluated, then baseline information should also be collected. The second assessment may take 2 - 4 weeks to complete and will provide more accurate and reliable information that can be used for many different purposes.

4.1 Criteria for information selection

Time and resources to collect the information are specially limited in emergency situations. Therefore, all collection of data in the post impact period should meet a set of criteria if the assessment results are to be in time for use. These criteria are :

- *the public health importance and usefulness of the information for decision making.* Only information which affects the relief programme planning and implementation should be included. This would include not only information that would determine type and quantities of supplies but also other factors such as camp location possibilities according to sources of water, mosquito breeding sites and potential burial facilities.

- *feasibility of information collection and analysis given available personnel skills and materials.* It is useless to plan on data that cannot be collected or collected well. The biases in measurements, for example, on nutritional assessments, can throw conclusions seriously off target. Indicators that are not resistant to vagaries of the field or are too sensitive to measurement errors should not be included.

- *cost of assessment procedures.* The cost implications of the size of the team and the time factor involved in composing it

can reduce entirely the usefulness of the exercise. Unless the results of the assessment are available quickly, the response will be ad hoc.

- *reliability and representativeness of the information.* The extent to which the assessment reflects the whole population affected by the disaster should be indicated in the report of conclusions. The possible bias or weaknessess in the estimates or conclusions should also be specified.

4.2 The assessment team composition

Who should perform the assessment has been under some debate recently amongst persons involved in both research and the field. Ideally, local health officers should be trained to undertake the initial assessment and perhaps the secondary assessment. However, since no standard protocol or methodologies exist, the practice has always been to fly in external experts or whoever available at short notice to report what amounts to an impression of the situation. Since the health problems after a disaster are multisectoral, involving public works, water and sanitation, food and agriculture and finance, a multidisciplinary input is useful. An integrated team consisting of health personnel (physician, epidemiologist, public health nurse), a sanitary engineer, nutritionist, logistician has been adequate for immediate and secondary relief assessment. The composition would, also, vary according to the disaster in question.

The tasks for the team would be approximately the following :

- Identification of existing and potential health problems caused or exacerbated by the disaster;
- Assessment of secondary environmental consequences likely to have further impact on health;
- Determination of health related services required to address the major health problems;
- Prioritisation of the activities to address the major health effects;

- Evaluation of the local and national capacity to transport, store and distribute relief supplies.

4.3 Specific Case Discussion

Among the different emergent situations, two specific areas have been relatively well examined. These are rapid health assessment among refugees and rapid nutritional assessment. Assessment techniques for acute natural disasters still remain fragmentary and ad hoc. Response to epidemics tend to be extreme - either a full scale epidemiologic investigation is launched, at the termination of which, the epidemic has burnt out or by providing supplies more or less as available at that time.

4.3.1 Rapid nutritional assessment:

Rapid assessment of nutritional status has been relatively well studied by many researchers. In particular, Trowbridge et al [23] and more recently, Manley et al.[24] have published methodologies particularly adapted to rapid assessment.In the majority of cases, rapid assessment of nutritional status is required for drought or other severe food shortage situations. The aims of assessment in these cases are (i) to confirm that a nutritional emergency exists and estimate the number of those severely affected (ii) to assess how severe the food crisis is likely to become in the short and medium term (iii) to identify the groups most affected and the risk factors that could potentially worsen the status (iv) the assess the need for a more detailed evaluation.

In nutritional crises or disasters resulting in food shortages, anthropometric indicators,principally, weight/height, height/age, weight/age and mid upper arm circumference have been used and tested for their potential. The field inadequacies of age based

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[23] Trowbridge, F., Staehling, D. et al Sensitivity and specificity of arm circumference indicators in identifying malnourished children, Am.Jnl.Clin. Nutr.33 1979

[24] Manley, M., et al., The wasting-stunting classifying scale: a new device for the rapid assessment of nutritional status of young children, Journal of tropical Pediatrics, Vol. 29, February, 1983.

measurements have been discussed by Bairagi[25], Chen[26] and others. Bairagi estimates the extent of bias in age mis-statement to be serious enough to invalidate many results. Trowbridge[27] and Sapir [28] have examined the sensitivity and specificity of these indicators vis-a-vis their cut-off points. There is general agreement that arm circumference (at 125 mm) provides a quick and sensitive assessemnt of undernourished children between 12 - 60 months of age. However, the robustness of this indicator with regard to the cut-off point is low. Small shifts in the threshold generates major changes in false positives and false negatives making the tool questionable in field conditions.

4.3.2 Rapid health assessment among displaced persons: Displaced persons include both refugees and internally displaced persons. The aims of a rapid health assessment in case of massive displacement of populations are (i) to assess the magnitude of the displacement; (ii) to assess major health and nutrition needs of the displaced population; (iii) to initiate a health and nutritional surveillance system; (iv) to assess local response capacity and immediate needs.

Displaced populations, especially those due to drought, have the most wide ranging and pervasive health implications. Drought-related displacement usually involves groups severely under-nourished and physically exhausted. The environmental and social conditions in which they find themselves following displacement are particularly deficient and chaotic. Health needs assessment in these situations are extremely difficult and ranking of priorities ambiguous.

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[25] Bairagi, R., Chowdhury, M.K., et al., Alternative anthropometric indicators of mortality,. Am. Jnl. Clin. Nut. 42, 1985.

[26] Chen, L.C., Chowdhury, M.K. and Huffman, S.L., Anthropopmetric assessment of energy-protein malnutrition and subsequent risk of mortality among pre-school children, Am. Jnl. Clin. Nut: 33, 1983.

[27] Trowbridge, F., et al., op.cit.

[28] Guha-Sapir, D., The nutritional and non-nutritional impact of supplementary feeding programmes: A study in eastern India, EC Research programme on Tropical Medicine, R, Research Report, Brussels, 1989.

As far as rapid assessment is concerned the reason precipating their displacement is not entirely irrelevant. The risk of certain diseases, for example, malaria is higher if the community is moving in from a non-endemic to an endemic region. Glass reports on the elevated incidence of malaria and deaths due to it among the refugees arriving at the Sa Keo camp at the Thai-Kampuchea border. The arrival of these refugees from a malaria free zone to an endemic area resulted in a health situation that was highly vulnerable to outbreaks of the disease. If the displacement is motivated by drought, the chances are the population will be seriously malnourished and the demographic profile will be skewed in favour of families without males or a disproportionate number of very old and very young. This is because as the food situation deteriorates over time, the adults leave home to search for work or food and the families then move on their own, when the village decides to move. Civil war or returnees, such as the ones seen on the Frontline states are frequently in good health and nutritional condition when they arrive, but if health services are not quickly organised, their status can decrease rapidly. These background conditions can determine the focus of a assessment mission and the types of methods to use.

Since refugee health problems has the dubious distinction of encompassing all aspects of a normal health structure with some additional specificities, assessment in these situations are essentially a telescoped version of the planning of a health programme in five days. The worst case scenario that an assessor are those observed in the 1983-84 droughts in Sudan, Ethiopia and other Sahel countries, namely the sudden apparition of 20 - 40,000 persons in an advanced state of destitution with high rates of disease and malnutrition and no apparent means of survival. Rapidity of the assessment takes on a different significance in those situations.

4.3.3 Acute natural disasters:

Rapid assessment in this type of disasters tend to focus on mortality and expected morbidity estimations. The types and

quantities of injuries and subsequently, the need for food and disease control, especially in floods or cyclones typify the assessment procedures. Earthquakes, do not generally produce a situation where the health of the surviving poulation is severely affected although the death rate is high and fast and survival curves plateau within 24 to 48 hours of the impact. Most deaths occur with the first 6 - 10 hours and those surviving are generally unaffected. Injuries and trauma to survivors are relatively limited and are concentrated also within the first day or two. The surviving, affected population are healthy and require shelter, food and water. Floods and cyclones bring on greater health implications. Besides mortality and morbidity from immediate impact, water borne diseases, respiratory tract infections and on the longer term, decreases in nutritional status have been observed.[29] [30]Guha-Sapir and Lombardi, 1988). On an overall level, the main public health concern following a disaster has been the fear of outbreaks of disease as a secondary consequence to the acute natural disaster. This has not been observed to occur very frequently. However, there are some epidemiological determinants that influence the risk of an outbreak after an earthquake, flood or cyclone These are:

- the endemic levels of disease in the community;
- ecological changes;
- population displacement;
- population density;
- interruption in health services;
- disruption of sanitary facilities.

4.3.4 Epidemics and outbreaks:

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[29] Somers, A. and mosley, W.H., East bangal cyclone of November 1970: epidemiological approach to disaster assessment, Lancet, 1, 1972.

[30] Guha-Sapir, D. ,Lombardi, C; and Sasse, A., Outbreak of Leptospirosis following floods in Sao Paulo: An epidemiological study, EC Programme on Science and Technology, Research Report, Brussels , 1988.

The principle aims of a rapid assessment in epidemics is i) to confirm that an epidemic or a threat of one exists; (ii) estimating its geographic distribution; iii) estimating its health impact; iv) identifying local capacity to control transmission and reduce mortality. The usual approach in epidemics has been to take on a classical epidemiological investigation which normally takes two to three weeks to complete. In fact, if an epidemic is already in place, as it usually is, before any emergency action is taken, the following information can be sufficient for an assessment. First,the establishment of a working case-definition is essential for any further field investigation and case identification. Second, geographic distribution of the epidemic should be defined not only from hospitals but also from new graves and review of death certificates. Improved recognition and better reporting of disease due to rumours of an epidemic can artificially increase number of cases when there is no real increase in the disease. Third, the establishment of the mode of transmission of the disease which will determine the control mechanisms. An investigation on the type and source of infection , severity of illness and prognosis will also be required for an initial assessment. The data on the sample of cases ideally should be mapped by community groups and geographic regions to filter out high risk areas or groups. The methods used for an assessment in epidemics will use survey (hospital or population-based depending on the expected prevalence of the disease) and laboratory methods. Time series data is especially important here for identifying the location on an epicurve.

5 DISCUSSION AND CRITICAL COMMENTARY

In the recent years, a few epidemiologic studies have been published that have contributed significantly to the development of the rapid assessment techniques proposed by the WHO and furthered the cause of robust techniques for the field. Survey techniques have been proposed based on experience particularly in sudden, massive population displacement situations. Epidemiological and other indicators that are easy and quick to

measure have also been examined for their potential in reflecting health needs. Much of this knowledge today is based on occassional field experience and relatively little systematic and scientifically controlled research has been undertaken to validate the methods. Typically, methods used in emergency rapid assessments collect and analyse data under time and resource constraints and therefore it becomes all the more critical to test and develop robust field techniques.

In emergencies, perhaps more than any other situation, the stakes of making errors are the highest. Inadequate assessment, in a rapidly evolving situation, such as floods or famines, frequently implies significant numbers of lives lost and serious long term health consequences. Since disasters in developing countries generally affect large groups of population, the individualised approach to emergencies as practised in western nations is inappropriate. Rapid assessments and relief have to be approached with epidemiologic principles and understanding of statistical principles of population based estimations is critical.

At the current time, the methods used for rapid assessment are variations on those used for normal assessments or epidemiological investigations. The variations are generally ad hoc depending entirely on the assessor's individual capacities, the time frame and the donor mood. There is little use of standardised methods. Information on assessment techniques used to arrive at the conclusions and their biases have rarely been provided. Among the techniques used, there are some common sources of error and bias that are revealed repeatedly in emergency health assessment.

An initial assessment often focusses on what are thought to the most affected areas, rather than an overview of the entire disaster area. The problem with this approach is that, on one hand a worst case scenario is observed in injuries or other health needs. On the other, it may mean that the areas identified as most affected may not be, in fact, the worst. Frequently, the selection of sites as the worst affected are a sample biased by

the source of information. Similiarly, the source of information on morbidity may also severely influence morbidity estimates. Information from health providors may not be accurate or representative. On one hand, numbers of injuries may be under reported due to poor record keeping or because health facilities may be inaccessible for many of the injured. On the other hand, numbers of injuries may be over-reported because the same injuries are registered or counted several times. At later stages of the disaster, other factors may emerge that reduce the usefulness of morbidity data collected from health providors. For example, the availability of health care may improve as a result of the disaster response, leading to increased utilisation rates for both disaster-related and non-disaster-related injuries. Better diagnostic equipment and heightened awareness may permit more accurate diagniosis in some locations than others. This limits the comparability of the data gathered from different sites.

Another source of error in the immediate impact phase arise from partial information on mortality. An important consideration in using mortality data is that it is not as useful for immediate relief as the evolving injury pattern. However, for assessing future need priorities, it is useful to determine leading causes of death and associated risk factors in specific types of disasters. In rapid on-set disasters, it is particularly difficult to estimate the number of bodies that have not been recovered. For this reason, reported mortality is often limited to the number of bodies recovered, thus under-estimating true mortality. The differentiation between mortality estimates based on body counts and those which include persons missing is key for any population-based estimate. In addition, while it is easier to attribute the event as the cause of death in acute, rapid onset disasters, such as earthquakes and cyclones, this is more problematic in slow onset diasasters such as famines or floods. The deaths occurring as an indirect effect of the disaster, such as deaths due to diseases aggravated by malnutrition may be attributed to the drought by some definition and not by others. This definition of attributed cause of mortality or morbidity has

serious implications for how need is assessed and response planned. In slow on-set disasters the problem of excluding that portion of morbidity and mortality that would have occurred in the normal course of events is also significant.

Assessments in disasters typically use some form of surveys in disasters and they usually involve families or houses. They are sometimes hospital or health care providor based especially in the case of epidemics.

The current emergency assessment situation in practice reveals three types of surveys. First, those based on probabilistic sampling. These potentially provide the basis for valid conclusions about the prevalences of different conditions in a population based on the observation on a selected sample. Second, subjective surveys which use samples based on an individual's judgement and knowledge of the issue and the population. These are frequently used when there is no time to get less biased assessments. Finally, "randomly convenient" surveys that select a sample from houses along the road, children in markets or at some fixed time of day. These surveys are usually undertaken to assess overall health needs of group of people suddenly displaced or homeless by an earthquake, flood or cyclone or displaced by famine or civil war.

An important methodological issue in surveys for rapid assessment, in the epidemiological context, is the need for a reliable denominator. It is critical for the validity of any indicator that will be used for the assessment. This is evidently easier said than obtained, especially in the rapidly evolving situations. However, the significance of a valid denominator should not be under-estimated. The definition of the geographic area and the population affected is essential to any rapid assessment initiative. Creative methods such as counting the number of houses without roofs by an aerial survey in an earthquake and multiplying it by the average family size of the country would already provide a working figure for the total number of homeless. Standard co-efficients (for example, 0.15 for

proportion of children under five) would provide further estimates for infants and small children for feeding and immunisation planning.

Representative bias in survey sampling can be a serious weakness in rapid assessments in emergencies.Since sample sizes in a emergency rapid assessment can rarely be large enough to accomodate bias statistically, other precautions should be taken to reduce it. Sample representativeness can be increased in by several ways. Besides avoiding markets, centres of towns or main roads, the range of the health impact can be estimated by selecting the most affected and least affected villages (according to a local authority). This can be further refined by asking different individuals, such as a religious leader, a local political person, government official, non-governmental organisation, missionary, for information on "worst" affected and "least" affected. If there is no clear consistency in the replies, several "worst" villages should be included for surveying. Within the village, random starting points should be used and contiguous houses avoided. Since there are frequently no streets or numbers or any order that resembles that which is commonly described in sampling textbooks, disaster experts have been known to use the sophisticated method consisting of throwing a (emptied) bottle or a pencil in the air and commencing in the direction indicated by the point. Urban centres should be treated differently from rural centres since living patterns are different. Some marginal groups should be specially sampled, such as nomadic settlements, slums, or forest and mountain people.

There are other sources of bias leading to low representativeness. The timing of surveys for example can produce a misleading sample. Surveys done at certain times of the day will over sample women or men or old persons due to work, school and other occupational patterns. Hospital or health care station based information can be very misleading except in situations where the prevalence of the main health effect is very low (e.g. meningitis). In other situations, the hospital or health station based information will reflect only those who have actively

sought care. Since those who seek care are not necessarily those who need care, assessment results can present a unrealistic picture of the affected population and relief efforts may miss the mark entirely.

Estimations of mortality and cause of death are also key factors in an assessment exercise. It was suggested in the post Tangshan earthquake assessment[31] (1976, China) that the low levels of head and chest injuries recorded in the hospital registers was mainly due to the fact that persons with these injuries died on impact or soon after. Thus, the morbidity profile of the earthquake, based only on those surviving several days in the hospital, revealed artificially low rates of trauma to the upper torso. When compared to other more complete injury profiles reported by Beillik (1982), it is clear that head and chest injuries are the predominant categories of immediate health impact in earthquakes.

In camp conditions, a method for estimating deaths prior to having a proper registration system established has been used by Waldman and Toole (1990). It consists of planting a 24 hour guard at the burial place to note all bodies that are brought in by relatives. Alternatively, in a camp where no burial facilities were available and the dead were removed by an external contractor, the epidemiologists charged with the assessment task, paid the contractor a flat fee to report the numbers and some basic details on the bodies he carried off. Mortality assessment can be very problematic in many emergency situations, since food rations or other relief goods are supplied on per capita basis. This naturally, discourages families to report deatns for fear of losing part of their portion.

Finally the choice of sampling methods for the assessment (household or institution based), will depend on the expected prevalence of the disease or phenomenon in question. At a rate of 5 cases/1000 at the peak of an epidemic as expected in epidemic meningoccocal meningitis, a household survey is meaningless. For

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31 **Fu-Dawei, Medical treatment and rescue work after tangshan earthquake, Red Cross Society, Heibei, China (Mimeo, no date)**

yellow fever on the other hand, a household survey is indicated, but since the aim is cutting off transmission and improving protection rather than preventing mortality, much effort for an accurate assessment of the number of cases may be little practical value for mounting an immediate emergency response. The severity of a disease and therefore its duration can also be key to misleading conclusions in rapid assessment missions. An example of such misjudgement is illustrated by the rapid assessment mission sent to Chad in 1973, during the height of the famine. The report of the team of experts concluded that no serious malnutrition existed and there was no cause for alarm. It was reported later on after examination of data over a longer period than was considered by the rapid assessment team that the children most severely malnourished were dying very quickly at the peak of the famine. Therefore only the survivors (moderately or mildly malnourished) were available to be surveyed by the team. This phenomenon of a low point prevalence of a disease as duration of illness decreases is a pitfall in rapid assessments that could seriously invalidate the results. Sampling methods and survey content should be modified according to the health problem in question and the phase of the emergency, (for example, when in the epi-curve of a meningitis epidemic thde rapid assessment is taking place).

Limited surveys, if properly done, may provide a rough idea of the extent of damage, prevalences and incidences of malnutrition and diseases. The larger and better designed the survey, the more reliable the results. But in emergencies there is a trade-off to be made between accuracy and timeliness, in addition to accounting for resource and logistical constraints. The most practical view in these circumstances is that being roughly right is generally more useful than being precisely wrong. The delay in reporting the assessment conclusions generally means that relief response will have been initiated without any consideration of the actual needs. Having said that, it does not by any means imply that spurious methodologies or amateurism can replace rigorous thinking. The use of indicators that do not reflect the phenomena in question or surveying samples that mislead the

assessor in the conclusions can create more damage than not taking any action. The challenge is to modify regular methods to fit the constraints of the situation.