Assessing Community Vulnerability

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Vulnerability assessment has, by definition, to be undertaken to review all elements which are exposed to potential hazards Therefore all sectors are involved, yet only a proportion relate to medical or health matters

The accurate assessment of vulnerable buildings, infrastructure, agriculture, economic assets and people, with particular reference to medical considerations, is the theme of this presentation. Vulnerability Assessment will be placed within the broader context of risk assessment, since it is one of the elements in a complex diagnostic process. Thus the broad sequence and methodology of hazard mapping, vulnerability assessment, resource or capability assessment and the definition of levels of protection, will be described in outline terms.

This paper will concentrate on social vulnerability analysis, with a series of complex questions being raised and where possible tentative answers will be suggested

- Why is community vulnerability analysis so badly neglected?
- How can vulnerability analysis be undertaken to reveal the particular social groups that are 'at risk'?
- What are the ethical dimensions of this process?
- What are the links between social and physical vulnerability assessment?
- What are the health/medical aspects?
- Who should undertake this work?

Finally, the question will be raised as to how community vulnerability analysis relates to resource analysis and the determination of levels of acceptable risk. Or put another way, how can the information gathered from this process be used in the development of risk reduction measures?

1. Why is community vulnerability analysis so badly neglected?

The analysis of vulnerability is a vital element in risk assessment and involves three broad sectors, all of which are closely inter-related

- physical. vulnerability of buildings, infrastructure, agriculture, etc
- economic: vulnerability of economic assets, incomes, industrial production Economic vulnerability can be further broken down into "direct loss potential" (e.g. the loss of a coconut crop in a cyclone) and "indirect loss potential" (e.g the economic consequences of the eight years it will take for newly planted coconut palms to produce a crop)
- community: vulnerability of livelihoods, incomes, community resilience and coping mechanisms.

The priority given by authorities to vulnerability assessment and analysis corresponds to the above list Physical vulnerability has a large literature and in many sectors, such as the seismic resistance of buildings, a history of almost 150 years. Economic assessment arrived on the scene later. During the 1960s-70s economic analysis began to appear, probably to provide essential data for cost-benefit analysis as a way of justifying the expense of protective measures.

However, community vulnerability has only recently been recognised as a further key element in a holistic appraisal of who and what is exposed in the threat of a disaster It had been previously neglected for four main reasons.

- The general bias in the planning process towards the physical sciences
- Bias of political concerns. Thus whilst the existence of buildings without hazard resistance may be politically acceptable a detailed analysis which reveals that a large proportion of a society is at risk may be very embarrassing to governments – especially when these are seeking re-election.
- Since community or social vulnerability is a late arrival there is still the need to develop an agreed methodology for assessment of risk factors.
- The final reason may be due to the lack of assessors from a professional background best suited for this demanding role.

Thus a situation has developed where there is minimal evidence of systemic vulnerability analysis in which the physical, economic and social data are comprehensively integrated together Furthermore, where vulnerability assessment takes place it is normally seen as a specifically physical process in measuring what is certainly more tangible and static than all the complexities of people within communities which are often undergoing dynamic change.

2. How can vulnerability analysis be undertaken to reveal the particular communities that are at risk?

This is a complex issue which deserves more than the summary below During the World Conference of the IDNDR in Yokohama in May 1994 the International Federation of Red Cross Societies (IFRCS) is organising a meeting on the subject of community vulnerability. This concentration of effort will hopefully provide answers to the questions being outlined in the rather superficial manner in this paper.

High risk groups of people will be revealed by working directly from hazard maps This process has to precede vulnerability analysis and if done properly in conditions where there are reliable data the highest risk areas will become an obvious starting point. In countries where resources are limited it is probably unrealistic to even contemplate detailed community vulnerability analysis other than in the more severely exposed locations

Furthermore it will help if assessors have a checklist to use as they gather data. The list of vulnerability topics can be very extensive but will typically include

- occupational risk (e g. fishermen in a cyclone area or farmers on the slopes of active volcanoes)
- age breakdown of the population, with particular reference towards the very young and very old
- the mentally and physically ill or handicapped
- women, as they frequently are more exposed to risk than men, for example in rural Central Asia within seismic belts women are more likely to be within their dwellings during normal working hours whereas men may be involved in farming, thus female vulnerability can be significantly greater
- ethnic minorities – their location can correlate with the most dangerous sites within a given area because of their lack of access to land, etc
- low-caste groups (for identical reasons as for ethnic minorities)
- health/nutritional status – it may be possible by careful questioning and even by non-medical persons to gain some assessment of the overall state of health

Obviously it is essential to use reputable sampling techniques to gather the above information Some information may already exist in census data, but this will certainly need to be expanded upon through interviews. The type of information that is needed will be aspects of knowledge, attitudes, economic status, occupations, etc, in relation to:

- perception of risk
- risk adjustment, e.g. the capacity of people to modify their lifestyle or buildings to cope with the threat
- coping mechanisms, including kinship ties, religious observance, social obligations and emergency reserves (sometimes termed "buffer stocks"). These coping abilities may operate at individual, family and community levels
- links between hazard potential and occupational factors, e.g. farmers may be more exposed to floods than other workers due to the basic fertility of flood plains

3. What are the ethical dimensions of community vulnerability analysis?

The first key issue relates to causal factors People are not generally at risk by accident. Many are exposed due to the highly complex web of causes and pressures that include exploitation to serve commercial, racial or political ends Thus to remove vulnerability it would be essential to address such causal factors by raising political or ethical awareness and mounting pressure for change If this is *not* undertaken then vulnerability will persist and recur even if its symptoms are rectified

The second issue relates to voluntary and involuntary risks. A clear ethical distinction concerning official responsibility can be made between those who take deliberate risks and those who have no option, such as in their choice of occupation. Thus the foolhardy windsurfers of Galviston, Texas (or elsewhere in the Gulf coast of the United States) who gain a thrill from practising their sport on the mountainous waves that precede a hurricane are in a very different category from poor Bangladeshi fishermen who find themselves in the Bay of Bengal unaware of an impending tropical cyclone

The third ethical issue concerns resources and how they are distributed. In the aftermath of a typical disaster the rich get richer and the poor poorer. This cliche is of course a crude generalisation with major exceptions but despite all the intentions of fair-minded public and NGO officials it is clear from numerous studies that those holding the levers of power use them to gain whatever they can – such gains are often at the cost of those who have greater need. The obvious implications are to assess the needs with accountability and the apportioning of assistance in accordance with need rather than status or want. The lack of post-disaster help can result in what has been termed the "ratchet-wheel syndrome" when the vulnerable become progressively more vulnerable as they are pushed back into greater exposure or greater poverty in each disaster.

The final ethical concern has already been highlighted. This is the deliberate failure of political leaders or civil servants to diagnose those who are more exposed to risk for political reasons.

4. What are the links between social and physical vulnerability assessment?

As stated earlier social vulnerability analysis must not be isolated from physical vulnerability assessment. There are a number of key links:

- Patterns of occupation within buildings
  This relates to where people live, work, enter and exit any building A means of escape is particularly important.
- Density of population within high risk zones.
  An example occurs in Andhra Pradesh, India, where the cyclone season coincides with the harvest Huge concentrations of migrant workers may be temporarily living on the flood plains to harvest crops when possible cyclones may occur. This density issue also relates to the micro-level, for example how a given building is occupied
  A significant proportion of all the deaths in the Mexico City earthquake of 1985 were caused by the collapse of a single apartment building.
- A lack of skills and knowledge is undoubtedly a key link between social and physical factors. If a man knows what happens in an earthquake, or is sure that he lives in a high risk zone, or has been taught ways to improve the safety of his home, then he and his family and community could become less vulnerable Of course this assumes that some direct action follows from the awareness!
- Finally, there is a link between poverty and vulnerability. The issues of economic and social vulnerability are two sides of the same coin. Poor families cannot afford safe land to build on

and when asked to devote an extra 20% to the cost of building a safe house that will resist an earthquake the answer is inevitably negative due to more pressing concerns.

5. What are the health/medical aspects?

The first of these relates to medical facilities –including buildings. When an adequate community or social vulnerability assessment is carried out the authorities (including medical officers responsible for hospital planning) will have a better grasp of the likely victims of the next minor or major disaster. Through simple loss estimate techniques using scenarios of likely impact detailed information will become available on:

- The age profile of likely victims
- Where do they live?
- How many may need treatment?
- What is their likely existing health/nutritional status?
- What are the anticipated injury patterns as determined by combining data on buildings (physical vulnerability) and the occupants (social vulnerability).

The next issue concerns "baseline" health/nutritional levels of the vulnerable population of high risk zones. There is an obvious need to consolidate the gathering of information so that health data are collected initially when social surveys are carried out This is one of the areas where traditional professional divisions can cause severe waste of effort. Thus if medical personnel are involved in social vulnerability analysis they will need to collect non-medical data as part of the process, and vice versa for non-medical staff

6. Who should undertake this work?

The first requirement is to find people who are very familiar with the local situation If the survey team comes from outside they will need to work closely with local personnel

The second requirement is to find people who are trained in how to organise sample surveys and also who have some understanding of simple interview techniques This is important since the surveys are likely to need a combination of direct and open-ended range of questions

The third requirement is the necessity that the teams assessing social vulnerability must not in any circumstances be the same personnel who disperse assistance The reason for this is obvious, namely if the person asking the questions about social deprivation or vulnerability is perceived as being from the provider body then a string of highly biased answers can be confidently anticipated in an attempt to secure financial support

7. In what way can community vulnerability analysis contribute to the reduction of risk?

The process described in this paper is diagnostic. It identifies *who* is at risk from *what*, and in *what location*. It tends towards the next stage which concerns protective planning and embraces both preparedness and mitigation measures.

Therefore, in a typical example, a community vulnerability analysis has been undertaken in a squatter settlement of a Latin American city. It has revealed that a very large concentration of people are at very serious risks from earthquake, landslide, flash flooding and other environmental hazards. The process may have identified occupational links – they may need to live in this dangerous site to secure their fragile livelihoods but depend on proximity to the metropolitan centre for work in central markets, street cleaning, etc. Thus preparedness and mitigation will probably be a sharply focused process aimed at the needs of the most vulnerable within an area where everyone is at risk to some degree. Preparedness measures are likely to include public awareness programmes on ways to live and build that will improve safety. Mitigation measures could be ways to relocate certain particularly vulnerable families – but in close proximity to their community. In addition there could be a focus on "institutional building" to strengthen local governmental and non-governmental bodies to assist such communities.

8. Summary

In brief there are five topics that need to be emphasised in community vulnerability:

- The neglect of community vulnerability analysis needs to be rectified urgently
- This process must become an integral part of risk assessment
- Ways will need to found to address social vulnerability in relation to various types of hazard potential
- Vulnerability analysis must be a fully integrated process that links physical, economic and social factors
- The process of community vulnerability analysis is complex since it involves political, ethical, social, psychological and economic factors

In conclusion the first three years of the IDNDR have place much emphasis on the physical elements but the time has now come to redress this imbalance and give priority to an accurate, methodical and integrated diagnosis of risks. Social vulnerability analysis has been one of the key missing links in disaster planning to date Attention to this need now is likely to yield rich dividends in protecting communities at risk

Vulnerability of Communities to Floods

Frank Farquharson

River flooding has always been a major cause of death and destruction of property In an examination of natural disasters in 1990, Berz (1) showed that floods account for 123 out of 420 events (29% of the total), and resulted in 2535 deaths (5% of the total), and US$4200 million economic loss (9% of the total) Because the data for 1990 were dominated by a major earthquake in Iran and severe windstorms in Europe, the study by Stillwell (2) of disasters in Latin America during the period 1900 to 1988 may be more typical, he showed that floods accounted for 42% of natural disasters, for 5% of people killed and 26% of the damage, although he does not differentiate between river and coastal flooding Overall, although the numbers of people killed directly by floods are relatively small compared with other natural disasters, the total numbers affected in some way by flooding exceed all other disasters For the period the OFDA (3) has estimated that 279 million people worldwide were affected by flooding, compared with 101 million for the next worse disaster, drought and food shortage

Although few people are killed directly by flooding, the indirect health effects caused by destruction of water supply and sewerage facilities undoubtedly cause a much larger number of deaths, and major illness, particularly in developing countries Studies in Britain and elsewhere (4) have suggested that those affected by floods may be twice as likely to be admitted to hospital, visit their doctor 50% more often, and that deaths increase by 50% over control groups unaffected by flooding The groups most at risk are the elderly, particularly men, although more research is required in this area

Flood damage may be minimised by a variety of engineering and sociological means, whereby communities at risk are either protected, or at least warned of imminent flooding to allow them to take preventative action Engineering solutions might involve improvements to river channels to increase their conveyance capacity, construction of flood relief channels or of flood embankments to protect vulnerable areas Such schemes are however, very expensive and may not be feasible in developing countries, particularly as poorer, migrant populations often congregate in marginal, flood-prone areas of growing cities

Flood warning is generally a cheaper alternative to hard engineering solutions, and may provide a more appropriate, cost-effective solution for developing countries. With technological advances in satellite and telecommunication systems combined with the availability of cheap, powerful computers very sophisticated technical flood forecasting systems may be applied, even in developing countries. Such an approach cannot prevent flood damage, but it can be combined with flood proofing measures to at least minimise the risks and damage costs. Flood proofing ranges from the simple expedient of sand-bagging doorways to installation of more sophisticated flood barriers, such as flood doors or stoplogs, to prevent water entering buildings. However, such techniques are unlikely to be effective in developing countries where the standard of housing is poor. Flood forecasting and associated warnings to the public may not be of any great help in preventing the secondary health effects of flooding due to the contamination of water supplies, unless the forecast lead-time is sufficiently long to enable contingency plans to be brought into operation to utilise alternative sources of water from bottles or water bowsers Flood damage costs are minimised where government agencies are prepared and where the public have been made aware of what to do in an emergency through programmes of public education.

Hydrologists and engineers cannot solve the problems of flooding alone, but can provide a range of tools to allow the flood risk to be quantified in any situation, and can assist economists and sociologists to develop practical, and cost-effective, solutions for a range of climates. There is certainly scope for collaborative research into the problems of flood damage and associated health risks to populations in developing countries, particularly as flooding affects more people throughout the world than any other natural disaster Flooding cannot be prevented, but its effects may be minimised using a range of generally known techniques

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