

## Medical relief in earthquakes

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In 1999 major earthquakes occurred in Turkey (Izmit); Greece (Athens) and Taiwan (Taichung). As well as killing people and traumatizing communities, earthquakes seriously interrupt social and economic development. Lives and infrastructure will always be at risk, but much more could be done to reduce the human consequences by better preparedness. On 17 August 1999 an earthquake lasting 45 seconds and measuring 7.4 on the Richter scale hit the region of Izmit in Turkey. In terms of devastation, it was one of the most powerful this century. By 7 October, 15 820 bodies had been recovered, the number of injured stood at 43 953 and about 40 000 persons were still missing.

Since 1939, the North Anatolian fault, on which Turkey sits, has produced a sequence of major shocks, of which the Izmit event is the eleventh with a magnitude of 6.7 or greater. In 1997, Stein and Barka<sup>1</sup>, using stress-based probability calculations, had predicted that there was a 12% chance of an earthquake occurring in the Izmit area in the 30 years between 1996 and 2026. Others such as Pearce<sup>2</sup> and Toksoz<sup>3</sup>, using accumulated stress models, thought that Istanbul could be the next area on the Anatolian fault to be affected.

Although the earthquake that hit Greece on 6 September was smaller (5.9 on the Richter scale) it too caused substantial loss of life. Well over 100 people were killed and, of the 1600 who sustained severe injuries, 380 were in hospital for over two weeks. The Greek Ministry of Finance estimated the cost of the earthquake at around US\$324 million.

The quake in Taiwan on 21 September 1999 measured 7.6 on the Richter scale and killed 2192 people. Another 8735 were seriously injured and the cost was reckoned at over US\$11 billion.

Most natural disasters (earthquakes, cyclones, floods) are events that recur at intervals in certain countries and regions of the world. In recent decades the number of such events has not increased, but their cost in terms of lives

lost, people disabled, and infrastructure and agricultural systems destroyed has been enormous. Urbanization and the increasing concentration of people into areas at risk will further raise the likelihood of major loss of life and long-term compromise of economic development. This is especially the case in poor countries.

Faced with humanitarian crises and disasters affecting ever larger numbers of people, the international community has donated over US\$7.3 billion in the form of relief operations (not including assistance in kind) since 1997. Most of the money was drawn from development budgets (Table 1), so development assistance has suffered.

The frequency of disasters and the increasing magnitude of necessary relief calls for serious consideration of new strategies to mitigate disasters and facilitate rapid recovery. Lessons can and should be learned from all disasters. For example, better housing and residential area codes are clearly required and need to be stringently enforced. In addition, the earthquake in Izmit provides an opportunity to review several aspects of health preparedness and response.

### TIMELINESS OF RESPONSE

Of pre-eminent concern in the aftermath of earthquakes is the timeliness of search-and-rescue operations. In Izmit, the first of the 112 Turkish teams arrived about 6 hours after the shock. The first 3 from other countries (Israel, Germany, Bulgaria) arrived about 16 hours later; though this speed was extraordinary, much of the assistance, and certainly assistance from outside, was probably too late for the immediate life-saving interventions that are required after an earthquake. Victims who are not extricated within 12 hours have a very low probability of survival<sup>4-6</sup>. De Bruycker *et al.*<sup>6</sup> reported that 80% of the people who were found and recovered alive after the Campania earthquake in Italy (1980) were extricated within the first 12 hours. Thus a vital lesson is that local communities must be seen as the 'front-line' of defence and recovery and at-risk communities will need systematic and continuing training, built on scientific evidence<sup>7</sup> if they are to fulfil their role.

### APPROPRIATENESS OF RESPONSE

Disaster relief operations bring out the best in international cooperation, and the capacity to move large amounts of aid is growing quickly. External relief could be even more

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Table 1 Natural and complex emergencies and international relief aid by year\*

Year	No. of natural disasters	International relief aid <sup>†</sup> (billion US\$)	No. of complex emergencies	International relief aid (billion US\$)	Total aid (billion US\$)
1997	231	0.30	14	1.50	1.80
1998	275	1.12	18	1.30	2.42
1999	171	0.09	17	2.20	3.10

\*Data for 1999 are incomplete. Natural disasters do not include epidemic outbreaks of which there are approximately 40–50 a year, and the international aid includes only cash contributions and monetary value of in-kind contributions if reported by donor

<sup>†</sup>Sources: EM-DAT database, WHO Collaborating Centre for Research on Natural Disasters, Université Catholique de Louvain, Brussels, Belgium and Relief WEB, Office of the Coordinator of Humanitarian AID (OCHA), United Nations, New York

effective if more clearly geared to epidemiological evidence. For example, detailed analysis of survival times of injured persons and causes of mortality after live-extrication could provide a framework on which emergency medical services and skills could be planned. Reports from Turkey as well as from other earthquakes indicate that the life-threatening injuries experienced in earthquakes demand orthopaedic, neurological and plastic-surgery care as well as expertise in crush syndrome support for renal failure.

Specialist services are needed quickly if lives are to be saved in the days immediately after an earthquake. Later, a different type of response is called for. Thus seven days after the shock in Turkey, most hospitals and mobile units in the Izmit area were dealing principally with minor injuries, psychological trauma, respiratory infections, diarrhoea, scabies and chronic diseases that had been aggravated by the breakdown in routine treatment. These too require special planning, and possibly also resource back-up. In Turkey by 24 August the Ministry of Health had put out statements to the effect that it had received more than enough of everything—blood, staff, medicines. From disasters of various kinds it is clear that failure to heed such messages can put a heavy and unnecessary burden on local authorities. International relief should thus be designed to provide the surgical and medical services that are appropriate to the known profile of needs, and be closely coordinated with local and national authorities.

#### MANAGEMENT AND COORDINATION OF RESPONSE

In fact, coordination remains a major challenge in the wake of disasters. The widely varying estimates of the death toll in Turkey were in part indicative of poor centralization and coordination of search-and-rescue operations and poor management of incoming data from the field. In consequence, decisions on further search-and-rescue operations may have been ill-based. Reports from the site of the earthquake also referred to the uncontrolled and often unrequested arrival of more than two hundred non-governmental health relief agencies with varying expertise,

whose potential contribution was sometimes compromised by their own perceptions of what was required and how to provide it. While some chaos will always follow disasters such as the Izmit earthquake, much could be avoided by sound preparedness and planning that provides national and international teams with clear chains of command and strategic tasks for teams and equipment. Preparedness of this kind can be an investment with many types of return, including the mitigation of political as well as social costs. As shown by the Guatemala earthquake of 1976, the Ethiopia famine of 1973, and the Bangladesh cyclone of 1970, perceived confusion, negligence, and administrative inadequacy following disasters can have serious political implications for governments and others.

Poor coordination has implications for resource management too. Even after the Turkish Ministry of Health declared on 24 August that donations of clothing and perishable items were not required and that qualified staff, blood and medicines were also available in sufficient quantities, aid continued to arrive until 30 September, including several tons of medical supplies.

Finally, better use of epidemiological evidence from previous disasters might improve the practicality of the recommendations made after disasters of this type. In Turkey some of the health information and education recommendations made by expatriate teams was more relevant to pre-disaster than immediate post-disaster conditions, and did not take into account the fact that, while the danger from infectious diseases was negligible, the psychological impact on the communities was enormous. Detailed educational messages on issues such as prevention of infectious diseases, at a time when people are primarily concerned with their own survival, searching for relatives and finding safe shelter, may be not only confusing but also irrelevant. The capacity of mass disaster victims to absorb and act on health education messages may also be limited if they have not been previously prepared for this. Education of the public for 'best health behaviour practices' after a major shock should be part of disaster prevention training, not immediate post-disaster recovery.

### WHY PREPARE FOR DISASTER?

Disasters can seldom be predicted with precision and people will always suffer in their wake. However, a growing case can be made for better preparedness in at-risk regions of the world.

The cost of recovery from disasters, even if estimated simply in immediate monetary terms, is enormous. The international community has made at least US\$50 million available to Turkey in immediate relief aid and life-saving activities. Some donors and countries have provided additional assistance-in-kind and direct bilateral aid. The total cost of reconstructing industrial facilities, homes, public services, and other infrastructure is estimated by the Turkish Central Bank at over US\$5 billion. The World Bank has thus far approved a US\$1.02 billion aid package to aid recovery.

This, however, does not begin to include the costs of permanent loss of family income as a result of deaths and disabilities. Nor does it take into account the serious psychosocial damage that is often done to individuals and the longer-term impact this in turn has on their capacity to recover and reinvest in their lives.

### CONCLUSION

There is now a body of evidence from natural disasters on the health problems that can arise and how they can be addressed. With modern information and communication systems, this information could be shared with the public and the local authorities in countries at high risk in ways that could reduce the human impact of future calamities. At

national and international levels, also, much more systematic effort is required in preparation for these events. Strategies built on the experience and knowledge that has been accrued could save countless lives and disabilities. This would also provide much-needed bridges between development aid, relief and post-disaster reconstruction.

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