Research

Timing of mortality among internally displaced persons due to the tsunami in Sri Lanka: cross sectional household survey

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Abstract

Objective To describe the distribution of mortality among internally displaced persons during two and a half months after the Indian Ocean tsunami, 2004.

Design Cross sectional household survey with retrospective cohort analysis of mortality.

Setting Camps for internally displaced persons due to the tsunami in an eastern coastal district of Sri Lanka.

Participants 3533 people from 859 households accommodated in 13 camps.

Main outcome measures All cause death and number of missing people.

Results 446 deaths and 11 missing people were reported after the 2004 tsunami, of which most (99%) occurred on the day of the tsunami or within three days thereafter. No deaths were reported for the two and a half month period starting one week after the tsunami.

Conclusions Most mortality after the 2004 tsunami occurred within the first few days of the disaster and was low in the study area.

Discussion

Mortality related to the Indian Ocean tsunami in 2004 was concentrated in the first few days of the disaster and no death was reported from one week after the tsunami up to two and a half months of the study period. At least six deaths could have been expected among the 3076 survivors and the recall period of 80 days in our study, on the basis of an assumed crude mortality of 0.25 per 10 000 person days, a benchmark for displaced populations in South Asia. The massive additional mortality due to infectious diseases, as warned by the World Health Organization, was not substantiated.

Our finding can be partly explained by the phenomenon of the "harvesting" effect—that is, decreased mortality after a large number of deaths as a result of an adverse health event among a vulnerable population. This effect has been documented in other disaster settings, such as the earthquake in Taiwan and the heat waves in the Czech Republic.

The low mortality may also indicate successful aid activities. Prompt international responses were started with sufficient

![Distribution of 446 deaths and 11 missing people by date among 3533 displaced people in Ampara district, Sri Lanka on 26 December 2004, day of the tsunami, and subsequent days](image-url)
funds. Moreover, the Sri Lankan government functioned sufficiently to coordinate the influx of aid by using its well structured administrative and public health systems.

If this low level of mortality was primarily due to the nature of the disaster, however, then the use of the vast available funds may be questioned. How effective these activities and funds were in relieving the crisis is important in view of, for example, the massive humanitarian crisis that continued at a 10-fold or higher crude mortality among the displaced population in Darfur, Sudan.

The argument may be circular because the mortality could have been minimised by the extensive relief effort of the international community. Nevertheless it can be speculated that the fund raised for the tsunami was disproportionate to need, especially in the context of other ongoing humanitarian crises and global health issues that are continuously costing millions of lives.

What is already known on this topic
Massive additional mortality among survivors of the 2004 tsunami was a concern, especially due to infectious diseases.

What this study adds
Mortality due to the 2004 tsunami was concentrated in the first few days of the disaster.
Increased mortality among displaced persons was not observed.

Contributors: TA, NN, and OK designed and coordinated the study. TA, DGMC, and SDD carried out and supervised the field study. TA, NN, and KM analysed and interpreted the data. NN wrote the draft and all authors revised the manuscript. NN is the guarantor.

Funding: Grant in aid for special purposes (No 16800056), Ministry of Education, Culture, Sports, Science, and Technology, Japan.

Competing interests: None declared.

Ethical approval: Ethical review committee of the Faculty of Medicine, University of Peradeniya, Sri Lanka.

(Accepted 27 October 2005)
doi 10.1136/bmj.38693.465023.7C

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