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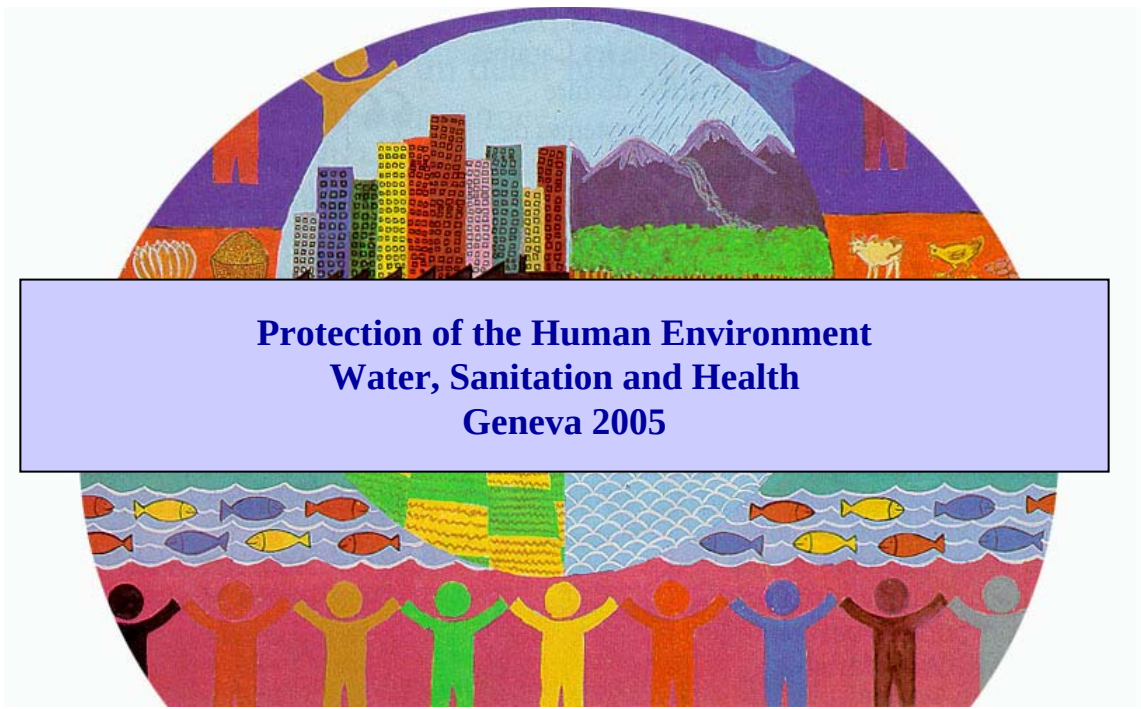
The Drinking Water Response to the Indian Ocean Tsunami Including the Role of Household Water Treatment

Thomas Clasen & Lucy Smith
London School of Hygiene & Tropical Medicine



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Summary

On 26 December 2004, an earthquake off the Indonesian island of Sumatra triggered a massive tsunami that devastated costal areas of eleven countries around the Indian Ocean. More than 280 000 were killed and at least one million were displaced by the disaster. An unprecedented emergency response ensued, with priority focused on the health and well-being of survivors. Citing the threat of outbreaks from waterborne diseases such as diarrhoea, cholera, typhoid and hepatitis, governments, UN agencies and non-governmental organizations (NGOs) urgently appealed for assistance to provide safe drinking water to affected populations. This study was undertaken to document the drinking water response, including the role played by household water treatment.

The destruction wrought by the tsunami on piped-in water supplies and groundwater pumps, and the saline water intrusion of shallow wells and surface sources, rendered much of the pre-tsunami supplies throughout the affected area completely unusable. The combined efforts of governmental bodies, UN agencies, NGOs, defence forces, commercial companies, other organizations and committed individuals, however, mobilized a drinking water response that was timely, comprehensive and effective. While specific actions varied somewhat from country to country, they followed a similar pattern that corresponded with the phase of the emergency. Following the first 48 hours, when survivors relied mainly on unaffected sources and some bottled water, responders began to reach areas in which the affected populations were assembling. They distributed large tanks and mobilized tanker trucks to fill them. As emergency efforts turned to stabilization and resettlement, responders used mobile treatment plants and emergency storage and distribution systems to increase the quantity of water supplied. Distribution systems were repaired or rebuilt. Restoration of many groundwater sources, however, continues to be challenged by saline water intrusion.

Despite evidence in development settings and certain emergencies that household water treatment, including chlorination, filtration, solar disinfection and combined flocculation/disinfection, are effective in improving the microbiological quality of drinking water and thus preventing the risk of waterborne disease, household-based approaches did not play a significant role in the initial phases of the tsunami response with the possible exception of boiling. This was not due to their lack of availability; millions of units of these products where shipped to the region. Rather, responders often found that household water treatment was not suitable during the immediate aftermath of the disaster due to (i) the need to emphasize water quantity over water quality, (ii) the unique conditions imposed by the tsunami that continued to necessitate the supply of bulk treated water, (iii) the unavailability of human and other resources for the programmatic support to launch household water treatment, (iv) concerns that the introduction of new methods of water treatment would send mixed messages about other practices, and (v) concerns about the sustainability of such methods. Boiling did play a role, though there was evidence to suggest that as it was practiced in tsunami affected populations, boiling was not providing adequate protection against faecal contaminants. Some organizations expressed the view that household water treatment would be introduced during the resettlement phase of the disaster response.

Much of the drinking water response to the Indian Ocean tsunami focused on providing a sufficient quantity of water, with perhaps less focus on quality. While this is consistent with recently developed norms, such a compromise may not have been necessary in this situation, where water was largely supplied in bulk and could have been adequately chlorinated at the source, in the truck or other supply line, or in the tanks at the camps. Surveillance of water quality was occasionally hampered by confusion over responsibility as well as a lack of equipment and trained personnel. There is evidence in certain areas that water quality, both at the source and especially at the household level, was compromised by high levels of faecal pathogens.

A comprehensive system of disease surveillance was undertaken in the affected areas in most countries. This yielded little evidence of epidemic levels of any infectious disease, including diseases that are frequently waterborne. This lack of outbreaks, however, is actually consistent with the experience following most natural disasters. The evidence clearly shows that the inevitability of an outbreak following a natural disaster is a myth. An exaggerated risk of waterborne diseases could divert attention from other priorities. At the same time, it is possible that the lack of outbreaks is attributable in part to the massive response that frequently accompanies a natural disaster. In any case, it is important not to become complacent, particularly since living in crowed camps is known to increase risk and the normal season of waterborne diseases increases with the onset of the monsoons.

We conclude with several recommendations: (i) continue to take steps to minimize the risks of waterborne diseases following natural disasters, (ii) develop and disseminate practical solutions for the special circumstances associated with tsunamis, including saline water intrusion, (iii) clarify the conditions under which proven approaches to household water treatment may be useful in emergencies and assess their role in the medium- and long-term response, (iv) improve water quality and surveillance without compromising emphasis on water quantity, (v) take advantage of the enormous resources committed to the tsunami response to make effective and sustainable improvements in water, sanitation and hygiene in the affected areas, and (vi) document experiences from the tsunami response, distil the lessons learned, disseminate the results and develop guidelines to inform future actions.

BACKGROUND AND INTRODUCTION

On 26 December 2004, an earthquake off the Indonesian island of Sumatra measuring 9.0 on the Richter scale triggered a number of massive tsunamis. The leading wave raced through the deep water at a speed of more than 800 km per hour. As it neared land, its enormous energy unleashed at least three waves of up to 25 m, killing and devastating coastal regions of eleven countries around the Indian Ocean. At least five million people were affected in Indonesia, Sri Lanka, India, Thailand, Malaysia, the Maldives, the Seychelles, Myanmar and Somalia. The death toll exceeded 280 000 people, and more than one million persons were displaced as a result of the destruction.

Citing the threat of outbreaks from waterborne diseases such as diarrhoea, cholera, typhoid and hepatitis, governments, UN agencies and non-governmental organizations (NGOs) urgently appealed for assistance to provide safe drinking water to affected populations. A World Health Organization (WHO) release two days after the event was typical: "Poor quality and quantity of water and insufficient sanitation, overcrowding and poor hygiene in temporary camps will bring forward the risk for outbreaks of different diarrhoeal diseases. Thorough and sustained water purification is an absolute priority." (WHO, 2005) Rapid assessments and statements stressed the urgency of the drinking water response: "Access to potable water is essential to avoid the propagation of waterborne disease. " (IFRC, 29 December 2004). Calls for the provision of safe water—a need with which all humans can readily identify—became a central theme in the campaigns of many organizations as they themselves became inundated with unprecedented levels of contributions from around the world. Many organizations even accepted in-kind donations of filters, chlorine and other water treatment products. Regular situation reports from the field monitored the drinking water response throughout the affected region.

While its magnitude, forcefulness and breadth, along with its seawater medium, present particular challenges in the provision of drinking water, in most respects the profile of a tsunami resembles that of a flood caused by a hurricane or cyclone. The drinking water response corresponds roughly with the phases of the emergency described by Davis and Lambert (2002). During the immediate emergency phase, people flee to high ground or other protected locations. Survivors are dependent on local resources for food and water while outside help begins to mobilize. A stabilization phase ranging from a few days to a few weeks then ensues when survivors begin to gather into makeshift camps. During this period,