Cholera – The Threat Is Not Over

MAPPING THE PATHOGEN HIGHWAY

A Water Research Commission funded study successfully assessed the source of several disease-causing pathogens, their route through and survival in the environment, thereby forming a basis for the development of appropriate catchment management and intervention strategies to reduce the health risk to water users.

The most common source of contamination of surface waters is human and animal wastes. The introduction of waterborne pathogens by these sources is of particular concern, especially since there are still millions of people in South Africa who, out of necessity, make use of these unsafe sources for drinking water and other uses.

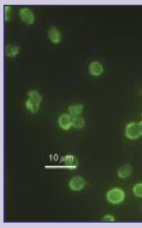
At present, most of the water industry's efforts are focused on the removal of waterborne pathogens during water treatment rather than preventing these pathogens from entering the environment. However, the authors of this report believe that a catchment management approach towards microbial pollution will only be successful if it is based on a clear understanding of the origin, fate, survival and transport of pathogens that have been introduced into the water body.

The possible sources of selected parasites (*Cryptosporidium*), and bacteria (*Salmonella* and *Vibrio cholerae*) in freshwater environments, their survival and clinical reference in a rural and peri-urban area were investigated. An assessment of the environmental factors and social determinants that contribute to the transmission of disease associated with the selected waterborne pathogens was also undertaken.

A number of key findings were revealed in the study. For example, it was observed that cryptosporidiosis is mostly spread through person-to-person contact rather than from animals to humans. The high percentage of the human genotype (80%) observed in the cases investigated suggests the importance of person-to-person contact and human sewage contamination of drinking water, recreational water and food sources, as a means of spreading the parasite.

Although food has been implicated as the main source of *Salmonella* infections, the role of contaminated water in the transmission of the disease in developing countries was largely unknown to date. This study revealed that *Salmonella* was indeed prevalent in the environment. This could be due to faecal contaminants from animal and human excreta that find their way to freshwater sources.

Further research indicated that *Salmonella* survived for extended periods of more than six months in sediments at temperatures typically



In 2000/01 South Africa faced one of its biggest health threats ever when a cholera epidemic swooped the country, leaving at least 265 people dead and infecting 117 147 in five provinces. In reviewing the epidemic the Human Sciences Research Council (HSRC), in collaboration with the Municipal Services Project, found that the water-related disease threat for vulnerable communities is far from over. Lani van Vuuren reports.

The cholera epidemic demanded an urgent review of the state of water provision to the traditional rural areas and informal settlements where it was concentrated. The reason was that those who could not afford the new charges were returning to traditional and untreated water sources, and were falling victim to the disease.

In the period since the cholera epidemic, events have shown that this was not a unique occurrence. The outbreak of typhoid in Delmas during August to October 2005 in which there were at least five deaths and almost 600 cases demonstrated the continued vulnerability of poor people in urban and rural settings to water-related disease. The evidence in this case pointed to problems in the management of the bucket system, affecting the quality of water.

EPICENTRES OF DISEASE

Led by Dr David Hemson, the HSRC research drew on two study sites in KwaZulu-Natal, one at Nqutshini, a small tribal-governed settlement near Empangeni and the other at Nkobongo, a developed, low-cost housing area with continued informal settlements near Ballito. In both cases a series of open-ended interviews were undertaken to capture the ideas and feelings of the local people followed by a small-scale survey.

The household survey indicated that considerable improvement in access to piped water and toilets had been achieved. A positive response to the epidemic has been a renewed interest in sanitation, and toilets (including ventilated improved pit toilets and arch loos) have been constructed in the communities concerned.

Unfortunately, at the time when the interviews were conducted (2004), Free Basic Water services had still not been implemented in these communities, and the cost of water still continued to play a major factor in people's access to sufficient safe water. Households reported that, compared to the situation during the cholera outbreak they were now paying for water instead of fetching it from the nearby river.

Although prepaid standpipes were modified to provide 200 ℓ/day to those with cards, a major obstacle to receiving free water remains the cost of the card itself. Greater vigour and prioritisation needs to be given to ensure that the rural poor and those in poor peri-urban communities who need it most benefit from the provision of free basic water. This will ensure that people are not forced to revert to untreated and unsafe sources, the researchers say.

INTERRUPTED SUPPLY

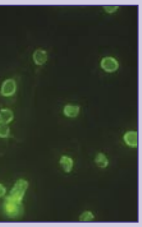
One of the unexpected features of water delivery in the community (particularly in Nqutshini) is its unpredictability and poor management. The research revealed that despite the enormous attention focused on the area as the early centre of the cholera outbreak it continues to be common for water to be unavailable from the taps at Nqutshini without reason or notification.

From the figures it appears that repairs take some time to be implemented, and that breakdowns lasting days were happening several times a year. In contrast, the operation of water services in Nkobongo appears stable even though the costs of water are comparatively high.

Poor water service has elicited a range of responses and coping mechanisms at the community level, namely buying (or stealing) water, storing water and vandalism. The latter, in particular, has exacerbated problems and has affected community social dynamics. The reasons for vandalism were closely associated with high levels of dissatisfaction and

associated with freshwater streams and rivers in South Africa. This is of concern as they could easily be released from the sediment into the water phase at high concentrations during rain events or other disturbances of the sediment.

This study also examined the genetic diversity of *Vibrio cholerae* in the Vaal Barrage catchment. Several different strains of *Vibrio cholerae* were discovered in the Vaal Barrage, an indication that the bacteria could adapt to its environment allowing it to survive longer. This may portray the potential of environmental populations of the bacteria to serve as reservoirs for future epidemic strains.



- To order the report (WRC Report No **1398/1/05**, contact Publications at Tel: (012) 330-0340 or E-mail: orders@wrc.org.za)

Reasons for water interruptions during the year		
	Frequency	Per cent
Vandalism	17	21%
Burst pipes	14	18%
General maintenance/repairs	12	15%
Pump not working	7	9%
Non-payment for services (cut off)	6	8%
Not enough water in the system	3	4%
Water only delivered at fixed times	3	4%
No interruptions	1	1%
Poor management	1	1%
Do not know	16	20%
Total	80	100%

Source: HSRC

Girls struggling to dig a new hole to get cleaner water. The lack of Free Basic Services in some rural areas still force people to return to using unsafe sources.

hostility among those who felt their water was interrupted for no good reason, whose water was cut off due to non-payment, and who were unable to afford yard connections.

Vulnerable communities need an efficient water service with low levels of interruption. This will require better municipal services. Greater accountability and responsiveness to community needs can be achieved through public participation, the study recommends.

STORING DISEASE

In community interviews people mentioned that they stored water against the probability of long interruptions of supply (in some cases water was stored for up to two months at a time). This increased water storage had led to a higher risk of households experiencing cholera. This is because the containers may not be clean and bacteria multiply, particularly when the containers are not sealed.

There should be greater awareness about this danger among health authorities and health promotion to reduce disease resulting from a lack of knowledge of this problem. The problem is unlikely to fade away, however, until there are more stable levels of operation, the researchers note.

The two communities have roughly the same level of access to water services through public provision, and household income levels in both areas range between poverty and extreme poverty. This study established that extreme poverty is a key indication of household vulnerability to both cholera and diarrhoea in the two communities researched.

Lower household income is associated with the incidence of cholera in 71% of cases compared to 39% in the higher income bracket. In addition, of the 13 households reporting diarrhoea among children, ten had a household income of below R400 a month.

Investigations also revealed that those communities and families that have previously experienced water-related diseases appear to be particularly vulnerable to recurrence. In this study, diarrhoea among children is closely linked to the previous experience of cholera.

Health and municipal authorities should give priority to communities and families that have had a history of water-related disease to ensure that every measure is taken to end the cycle of disease, the authors note. “The cholera epidemic has passed, but the problems of access, improved management and water quality remain. Continuing reports that a significant percentage of water services authorities are not meeting water quality standards is cause for concern and an argument for greater civil society monitoring and assessment,” the study concludes.

Breakdowns in services cause many people to store water, increasing the risk of disease.