

Cholera in the Mdletsheni Tribal Authority

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Abstract

The objectives of this case study were to describe an outbreak of cholera in a remote Zululand community in relation to the risk factors of the community, the intersectoral response generated and the resultant long term community development issues. Epidemiology information was researched through the internet and details about the characteristics of the community were gathered from internet sources and personal experience. Important Results are that outbreaks of disease can be the trigger for effecting community development responses from funding organisations and communities themselves. An outbreak can serve as an opportunity to make change happen. Scattered and sparsely populated areas of rural health districts in South Africa have lagged behind the development tidal wave and consequently have much lower rates of safe water and sanitation infrastructure. The response to the outbreak in terms of case fatality rates was low indicating an efficient response from authorities.

Key words: Intersectoral collaboration, poverty, development policy framework, water and sanitation.

Introduction

Hlabisa Health District has a population of approximately 210,000. It comprises 2.4% of the total population of the KwaZulu-Natal Province, the north eastern province of South Africa (Fig.1). The district covers an area 3,729 square kilometres and ranges from flat sandy coastal terrain to mountainous and undulating bush up to 500m above sea level. Approximately one third of this area is covered by nature reserve.

Hlabisa is made up of four tribal areas, all Zulu speaking people, each under the authority of a tribal chief (*inkosi*). Each tribal area is divided in to headman (*induna*) areas. The geographical size and population density varies enormously between these tribal areas, Mpukunyoni being the largest with a population of 112,028, Mdletsheni with 37,468, Hlabisa 21,425 and Mpembeni with 6,555.

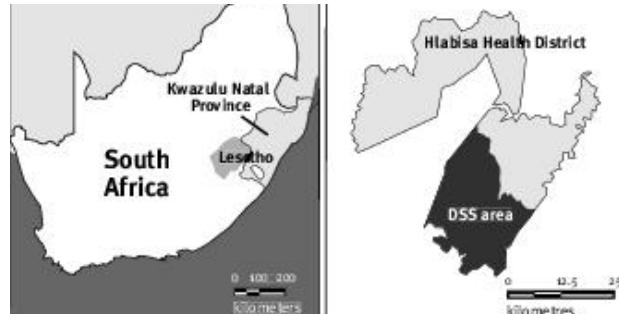


Figure 1: Reproduced from The Africa Centre

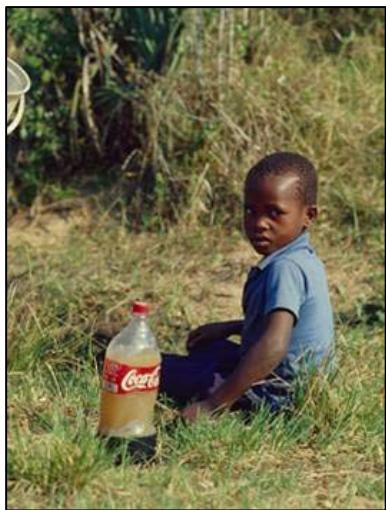
Demographic Information System, Africa Centre for Population Studies and Reproductive Health, South Africa. (The DSS area is the "Demographic Surveillance System" area set up with the MRC in 1997).

Zulu homesteads are not clustered into villages as in other parts of Africa but are scattered multigenerational homesteads comprising of 1 – 100 people (Fig 2). The area is characterised by large variations in population density from 0 – 6,500 people per square kilometre (Solarsh et al 2000). The population is least dense in the Mdletsheni tribal area where people live in the most remote parts of the district in a very traditional way of life. The population demographic data show 45.6% male and 54.4% females in the district. This is due to the economic migration of male family members from the rural areas of low employment opportunity to neighbouring industrial centres.

Mdletsheni is the tribal area worst off for access to safe drinking water with only 2.7% having piped water, 9.2% having public taps, 0.2% have access to a water tanker, 6.6% use borehole or rainwater and 79.5% using unprotected rivers, dams and springs. Sanitation provision is also rudimentary in Mdletsheni with 67% of the dwellings having no toilets and 31% making use of pit latrines (Curtis et al 2002).

Figure 2: Rural Hlabisa, a generational homestead.





The health services of Hlabisa District consist of a central hospital with curative and emergency services and twelve outreach primary health care clinics. Areas not covered by fixed clinics receive a mobile clinic service on a two to four weekly basis. Community health workers cover about half of the homesteads and are responsible for general health promotion advice, identification of certain illnesses such as tuberculosis, malnutrition and their subsequent referral to clinic or hospital, and community development activities including community organisation for change. Community health workers are lay people chosen by their communities, in Hlabisa district they are all women.

Clinics are well used with approximately 95% of pregnant women attending for antenatal care at least once during their pregnancy and up to 80% of children achieving full vaccination (Solarsh et al 2000).

Figure 3: A young boy sits next to the stream where he has collected water. (Photo provided by Paul Deverill, WEDC - Water, Engineering and Development Centre. Loughborough University, UK; KwaZulu Department of Health and personal files).

Figure 4: The mobile clinic at Hlabisa hospital preparing for clinic service in the community. KZN Dept. of Health.

This case study describes the outbreak of cholera in the Macabuzela induna area in Mdletsheni tribal area of Hlabisa district in 2000/2001, the impact on the local community and health services, the measures taken to control its spread to other areas, and the subsequent long term management strategies used to reinforce water and sanitation development in that area.



Investigation

Cholera is an acute intestinal infection caused by the *Vibrio cholerae* bacterium. It has an acute onset with painless, profuse watery diarrhoea that can quickly lead to death from dehydration and shock. Less than 10% of those infected however will display these symptoms and most will have a mild form of the disease indistinguishable from most other forms of gastroenteritis and in fact most will not have any symptoms at all but become carriers of the infection. Vaccination, mass chemoprophylaxis and *cordon sanitaire* are ineffective in preventing or controlling outbreaks (WHO 1993). Only a few organisms can cause epidemic diarrhoea; cholera type 01 and 0139, *E. coli* serotype 0157:H7 and *Shigella dysenteriae* serotype 1 (Von Schimding and Yach 1995)

The seventh pandemic of cholera, now in progress, started in 1961 in Sulawesi, Indonesia. The vibrio responsible for this pandemic is the *V. cholerea* 01, biotype El Tor strain. It spread rapidly through Asia, India then USSR, Iran and Iraq. It reached the African continent in 1970 in West Africa, where the continent had not had cholera for over 100 years. Cholera is spread by contaminated water and food; large sudden outbreaks are usually due to contaminated water supplies (WHO 1993). Cholera is restricted to humans. The incubation period may be from a few hours to 2-3 days.

The actual numbers of people from Macabuzela who were affected by cholera are difficult to retrieve since the epidemiological data from Department of Health statistics (DoH 2003) covers two areas together, one of which is the Hlabisa District and the other Ngwelezane District, a neighbouring health district. This area is "Lower Umfolozi" in Table 2, but approximately 60% of the cases arose from Mdletsheni Tribal area.

The province of KwaZulu/Natal had experienced cholera outbreaks before. In the 1980's over 22,000 people were infected with cholera and the epidemic resulted in 78 deaths. However the sheer scale and mortality rate of this new epidemic would shadow previous ones. From August 2000 to February 2002 the disease had infected 113,966 people and claimed 259 lives in the province (Cottle and Deedat 2002). The index case was notified from the Hlabisa District on 14th August 2000 (DoH 2000) and it was identified as the *V. cholerea* El Tor type 01 strain, resistant to the usual antibiotics, tetracycline and erythromycin and sensitive to nalidixic acid and ciprofloxacin. By October 4,000 cases had been notified and 31 deaths reported, and by December the numbers had gone up to 6,473.

Table 1: Distribution of cases and deaths in KwaZulu/Natal Province. 10th August 2000 to 5th April 2001. (Reproduced from Mugero, Epidemiology Unit, KZN May 2002).

Area	Cumulative cases	Total Deaths	Case Fatality Rate
Lower Umfolozi	18 436	22	0.12%
Eshowe	24 575	29	0.12%
Durban	1 138	15	1.32%
Stanger	6 566	14	0.21%
Port Shepstone	8 032	19	0.24%
PMB Ndlovu	3 797	17	0.45%
Ladysmith	231	1	0.43%
Newcastle	937	10	1.07%
Ulundi	18 414	37	0.20%
Jozini	153	7	4.58%
Total	82 275	171	0.21%

The data in Table 2 below, demonstrates that KwaZulu/Natal province was the worst affected area in the whole of South Africa, comprising the large majority of cases (99%).

Table 2: Total number of cholera cases and deaths, August 2000 to 31st July 2001. (Reproduced from NDOH, Health Systems Research, Research Coordination and Epidemiology)

Province	Cumulative cases	Total confirmed deaths	Case fatality ratio
KwaZulu/Natal	105 389	219	0.21%
Mpumalanga	125	4	3.20%
Gauteng	65	4	6.15%
Limpopo	793	2	0.25%
Free State	1	0	0.00%
North West	6	0	0.00%
Northern Cape	0	0	0.00%
Eastern Cape	9	10	2.6%
Western Cape	1	0	0.00%
SOUTH AFRICA	106 389	229	0.22%

Systematic biological examinations carried out during the pandemic showed high levels of *V. cholerae* carriers in the population. A number of environmental surveys undertaken established the fact that many rivers were infected with the bacterium (DoH 2000).

Four perspectives exist on origin of the epidemic:

1. The *contamination perspective*. The Umhlatuze River was cited as the source of the outbreak and effluent from the nearby township of Ngwelezane is poured in to the Empangeni Lake and there was evidence that water seepage occurs from the lake into the Umhlatuze River. The CSIR had conducted research in 1998 – 2000 which showed that there were traces of cholera in raw sewage from rural hospitals in KwaZulu and communities in these areas were utilising water from sources close to these hospitals. The study also showed that the sewage treatment works in many of the areas health facilities had broken down.
2. The *dormancy perspective*. Investigations showed no clear link between the different index cases from different districts despite the important population movements in the province. The inability to link the spread of cholera between areas led scientists to believe that endemic cholera had been activated due to flooding and humidity, and thus the cholera epidemic did not have a single source area.
3. The *poverty perspective* blames poverty as the cause. This acknowledges poverty as a decisive factor in understanding the epidemic but cannot be said to be the cause. This is discussed further in the next section.
4. The *political economy perspective* reflects the governments' policies in which cost recovery has impeded access to development amongst the poorest members of society (Cottle and Deedat 2002).

The people who live in the area serviced by Macabuzela clinic are poor, they have little or no infrastructure with regards water and sanitation, and they are nutritionally vulnerable and have few reserves from within the family

or community to cope with acute outbreaks of disease. They also have no knowledge about cholera, where it could have come from, what causes it and how to treat it. They have no knowledge about how to protect themselves or their family members from the disease. The majority of the local people collect their water from unprotected water sources and have no idea that it was simply this practice that was causing the severe diarrhoea that was affecting members of their community (Fig 5).

In August 2000 Macabuzela Clinic staff reported an increased number of cases of diarrhoea, and then suddenly huge numbers of cases of people with profuse watery diarrhoea and shock were being referred up to the hospital. Laboratory examination of the watery stools confirmed that the cause was *V. cholerae*.

Figure 5: The daily collection of water from unprotected water sources. (Photo provided by Sarah Parry-Jones, WEDC).



Management history and effects

Macabuzela clinic is a small isolated rural health outpost with two resident primary health care registered nurses on duty twenty fours hours a day, seven days a week. They were very quickly overwhelmed by the extent of the problem. The hospital's ambulances were constantly carrying shocked and dehydrated men, women and children the two hour journey from the clinic to the hospital. Ambulance drivers at that time were simply "drivers" and they were not trained in any first aid techniques. Patients travel alone in the back of vehicles. Patients arriving at the hospital were often close to death because of the ongoing fluid loss and no additional fluid replacement during the journey. There was an urgent need to implement strategies to manage the problem locally at the clinic and community level.

The response from the district hospital in Hlabisa was a multidisciplinary one involving the army, environmental health officers, the department of agriculture, the health department and community leaders. It was a multi pronged attack on the disease, its causes and its prevention.

Providing acute care:

- The army was called in to provide an extension to the existing clinic. They erected four large canvas tents which could house ten beds each. The camp beds were also provided by the army.
- A roster of additional health staff to be residential at the clinic was organised. Members of staff from the hospital and other clinics were moved to the clinic site. A doctor was stationed at the clinic as well as two additional nurses.
- Community health workers in the area were briefed about the disease and started visiting the homesteads advising people about the cause, prevention and treatment with oral re-hydration solution.
- Additional supplies of intravenous fluids were ordered as well as intravenous giving sets and cannulas, antibiotics and urinary catheters for those who needed major resuscitation.
- An ambulance was stationed at the clinic so that severe cases could be brought to the hospital urgently.
- A protocol for clinic management was developed for all staff to follow.
- Environmental health officers scoured the area to identify potential sources of contamination; they also provided health education to community members.
- The department of agriculture provided water tankers to the area so that people would not need to use river water for drinking purposes.

The main problems identified within the community related to community beliefs about the disease and how they tried to deal with it. One of the environmental health officers reported that community members were mixing donkey faeces with water and drinking it in the belief that whatever was making the donkey faeces hard would also make their stools more solid! Many Zulu traditional methods of healing involve purging themselves by giving enemas or herbal medicines to induce vomiting. This only made the problem of dehydration worse. The other main problem was highlighted by ongoing illnesses despite people being served with "safe" water sources. The environmental health officers found out that not only were the water tanker drivers charging people for the water that they were supposed to be providing for free, they were filling up the tankers from infected water sources because it was easier than going to the recommended water source outside the community!

It was impossible to manage the employees from the department of agriculture since they had their own management. There was very little cooperation between different government departments and the managers for these workers were far away and often not contactable.

The epidemic peaked in February 2001 and throughout the province 1,000 new cases a day were being seen in health facilities across the province. The epidemic subsided in May until it was officially closed on July 31, 2001 following zero case reporting (DoH 2003). This was probably due to the fact that the rainy season had come to an end, in the province the rainy season is from November through to March. But also because the contaminated areas were well contained within districts and by the end of the rainy season probably most of the people in the area had been exposed to the bacterium.

The case fatality rates (CFR) in South Africa ranged from 0.12% to 4.58%. The Lower Umfolozi District CFR was 0.12% (Mugero and Hague 2001). The WHO commended South Africa for its response to the epidemic since a CFR of less than 1% can be expected where there is epidemic preparedness and a good response. In some developing countries CFRs have reached 50% where the resources and health systems are totally inadequate to meet the required responses necessary to contain acute, rapidly spreading epidemics such as cholera (WHO 2000).

Resolution

After the acute epidemic had taken its toll, it was felt that although the whole district was in dire need of water and sanitation infrastructure development, Mdletsheni tribal authority had a reason to be targeted first. It was also felt, because of the epidemic itself, that the time was right to start discussing water and sanitation development in that area and motivate people for change. Together with a number of community health workers, I tried to establish sanitation development amongst the scattered water development projects that were beginning to develop throughout the district for years. We set up a local NGO called Vusimpilo (literally "Wake up Health") in 1994 to tackle the underlying causes of poverty and disease in Hlabisa. Funds were very difficult to obtain and uptake by communities for sanitation development was poor.

People across the whole of rural South Africa had been crying out for water for years, sanitation however was not high on the needs list. The minister for water affairs was quoted as saying: "Poverty is at the root of this cholera outbreak. This tragedy can be directly linked to the problems people still have in accessing safe and clean drinking water, especially in rural areas" (Kasrils 2000). However to blame the cholera outbreak on poverty "as a root cause" is to avoid the answer to the vital question – what causes poverty?

Others felt that the poverty argument was not credible in so far as it failed to recognise the culpability of the current government policy and legislation in reproducing existing levels of poverty (Cottle and Deedat 2003). In fact, in communities affected by the epidemic, when interviewed about their water services it became apparent that the Department of Water and Forestry Affairs (DWAF) water provision policy framework fundamentally prioritized "cost recovery" over its stated goal of providing communities with improved access to water. Many people were expected to pay joining fees which were well out of the reach of the rural poor. If community organisations failed to collect this fee, the water project would not even get off the ground. The other main concern was that the DWAF did not consider funding sanitation infrastructure development. In fact at this time there was no agency whose remit was to provide adequate sanitation to rural areas. This separation of water and sanitation service reflects the broader understanding of DWAF at the time.

The first meeting held at Macabuzela clinic to discuss water and sanitation with the community was attended by approximately 150 people (predominantly women). Some very interesting key points were learned from this meeting:

- Over 5 million rand had been distributed to a water committee two years previously but no community water developments had been developed.
- People were desperate for water systems to be put in place. Many women had to walk over 5 km to fetch water from ground water sources.
- Sanitation was not something people wanted to invest their money in; their priorities were life's basic necessities, food and water.
- The community was already well organised by the local community health worker to motivate for change.
- Many people were very angry since they had in fact paid a joining fee two years previously and had seen their money come to nothing.

From my observations and research on rural development, the following important points were learned:

- Rural development projects need to include women in order to be sustainable. Analyses of stabilisation and structural-adjustment programmes show that gender inequalities have an impact on the attainment of macroeconomic objectives (Alba 2000). Strong evidence from around the world confirms that gender equality accelerates overall economic growth, strengthens democratic governance and reduces poverty and insecurity (Dervis 2005).

- Participation from community members is the most effective way of ensuring success. Information, consultation and active participation gives citizens the chance to learn about policy plans, to make their opinions heard and to provide input into decision making. This involvement creates greater acceptance for outcomes (Gramberger 2001).
- Project plans need to plan for future maintenance and decisions regarding future responsibility need to be discussed at the onset. The art of planning for the future has always been a human trait. In essence a project has a start date, an end date and details the tasks that have to be carried out and when they have to be finished. Project management is not only about planning but also about human attributes like leadership and motivation.
- Water and sanitation development should be developed simultaneously if there are to be real health benefits. Improved water supply alone reduces diarrhoea morbidity from between 6% to 25%, if severe outcomes are included. Improved sanitation reduces diarrhoea morbidity by 32% (WHO 2004).
- Without health education and general education about the use of toilets and water systems health benefits will not be apparent. Hygiene interventions including hygiene education and promotion of hand washing can lead to a reduction of diarrhoea cases by up to 45% (WHO 2004)

The African National Congress (ANC) had a vision for South Africa. The RDP document or “Reconstruction and Development Programme” for South Africa describes the strategy for the provision of basic services, growth and development for the population after the ANC came to power following the first democratic elections in 1992. After a number of years however it was apparent that the bureaucratic systems of government would not allow for speedy implementation of the process. The “Mvula Trust” was set up in 1993 as an independent body funded by government, to deal specifically with the implementation of water and sanitation. The Mvula Trust developed policies, strategies and procedures for implementation (Mvula 2006). Initially these policies were based on economic principles and many developments failed to materialize because the needs of the poor were not taken into account. Their policies gradually changed over the years to accommodate these needs. However cost recovery still plays a large part in the planning of development of projects.

In Macabuzela, there then followed numerous community meetings. The process initially dealing with establishing a community water and sanitation committee who had responsibility for making decisions about design, choosing employees, managing funds and overall management of the project from its onset and through to its completion and future maintenance. Once the committee had been chosen, monthly meetings involved committee members only. It was one of the responsibilities of the committee to report on the progress of the project to the community. The committee chose four local individuals who would be the “technicians”. These community members went for training at the Amatikulu Primary Health Care Centre, which was set up in the 1970s to teach community health facilitators and community health workers. It gradually increased its resources to include the training of community environmental health officers, water and sanitation workers and builders to learn about basic health and hygiene, as well as the minimum requirements necessary for safe sanitation and water development. Ventilated improved pit latrines are the minimum standard for health and hygiene in sanitation without water systems. Technical standards involved correct siting of the latrine, correct depth of the pit, use of ventilation pipes, use of water to wash hands outside the latrine. Together with community health workers, their job was also to spread the message about the project to all households in the area.

The project caused a stir in the surrounding areas; people were asking why Macabuzela area had been chosen instead of their area. This required delicate diplomacy. Cholera was cited as the reason to target Macabuzela; however it is fair to say that every area in the district needed a similar programme. The Mvula Trust projects required a community contribution from all participating members. The contribution was usually 10% of the cost of the project. Initially this was financial, however it became clear that communities often could not meet these commitments. After some months it was agreed that community members could make their contribution in the form of labour. This meant that individuals would not be paid for their services; their labour was being “contributed”. This was also an issue for communities where unemployment was high, however most members agreed to this. For sanitation projects this was considered fair since the toilets were an individual responsibility, when it came to water development however the negotiations and labour contracts were much harder to develop. Every household had to dig its own pit; this was the minimum “contribution” necessary to join the project. With the help and advice of the community environmental health officers the pit had was dug to the required depth and in the recommended place. The building technicians would then come and build the rest of the latrine. The design of structures that were built depended on what each household could afford. The photograph below (Figs 6, 7) shows the interior of the cheapest latrine, without a seat and made of rudimentary bricks. Some households with more finances would have a built-in seat and the structure would be made of cement blocks. Others built their own structures out of local materials.

Figure 6: The interior of the VIP toilet (ventilated improved pit latrine). (Photo provided by Peter Harvey, WEDC).

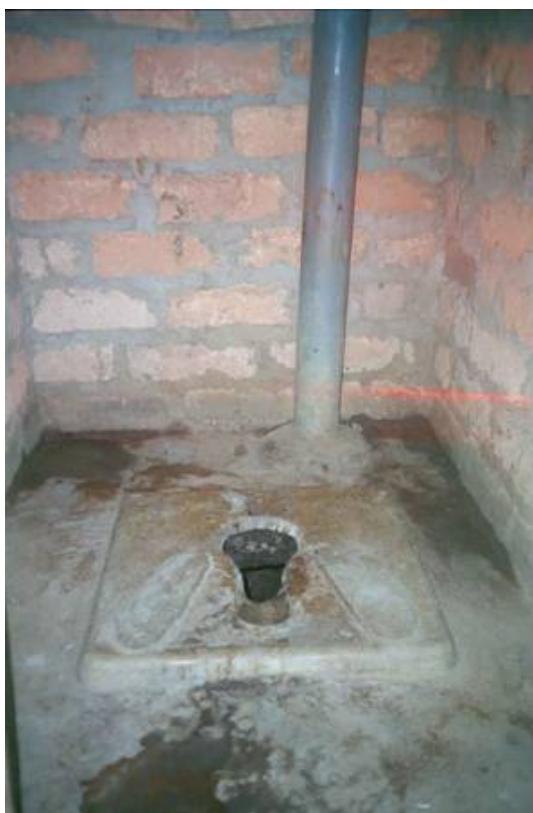
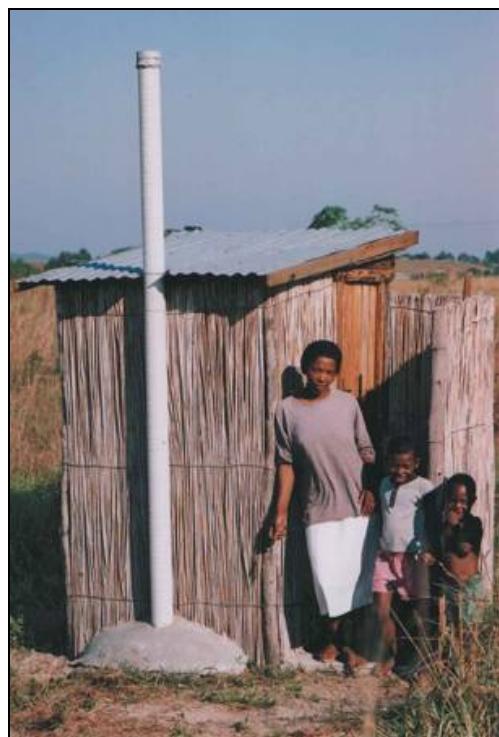


Figure 7: The ventilation pipe could be inside or outside depending on choice. The critical technical specification being the height of the pipe above the pit and the way the faced the prevailing winds. (Photo provided by Paul Devirill, WEDC).



With regard to the water project that had supposedly been funded, my first task was to find out what had happened to the previous five million rand that had been handed over to the water committee. After some careful interviewing I found out that the local school principle was the chairman of the committee responsible for this money. I called the funders in to meet the committee; some of this money had been spent on water development for the committee member's households only. In fact many of the committee members had tap stands within their own yards. There was still a substantial amount of money still available so the water project got started again (Figs 8-11). Local people were involved in the design of the project and their contribution would be paid labour since they had already paid their joining fee and working on the project. Payment for services would help with the local economy.

Figures 8 and 9: Clean and safe water. (Photos provided by Paul Devirill and John Pickford, WEDC).



Figures 10 and 11: Community members with their safe water supply (Photos provided by Paul Deverill, WEDC).



At the time of my leaving South Africa a number of water and sanitation committees had been set up within Hlabisa Health District. Community Health Workers were the key people in the organisation of these committees. They were often on the committees themselves since the people trusted them. A number of water projects had been completed but the only sanitation project that had been started was the one in Macabuzela. "Water and sanitation is one of the primary drivers of public health. Once we can secure access to clean water and to adequate sanitation facilities for all people, irrespective of the difference in their living conditions, a huge battle against all kinds of diseases will be won" Dr Lee Jong-wook, Director-General, WHO. The Department of Health's (2003) "Management of Cholera" document congratulated itself on the low case fatality rates which reflected the effective treatment of affected cases and listed 8 recommendations. Sadly water and sanitation development, collaboration between government departments and health education did not get a mention in the recommendations:

- Strengthen the capacity for surveillance.
- Improved infection control in health facilities.
- Strengthen the capacity of epidemic preparedness.
- Strengthen the coordination of preparedness.
- Develop a forum for officials engaged in surveillance.
- Ensure the availability of national guidelines.
- Strengthen epidemic management committees.
- Strengthen active involvement of communities in surveillance.

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