Engineering in the time of cholera: overcoming institutional and political challenges to rebuild Zimbabwe’s water and sanitation infrastructure in the aftermath of the 2008 cholera epidemic
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ABSTRACT
A devastating cholera epidemic swept Zimbabwe in 2008, causing over 90,000 cases, and leaving more than 4,000 dead. The epidemic raged predominantly in urban areas, and the cause could be traced to the slow deterioration of Zimbabwe’s water and sewerage utilities during the economic and political crisis that had gripped the country since the late 1990s. Rapid improvement was needed if the country was to avoid another cholera outbreak. In this context, donors, development agencies and government departments joined forces to work in a unique partnership, and to implement a programme of swift improvements that went beyond emergency humanitarian aid but did not require the time or massive investment associated with full-scale urban rehabilitation. The interventions ranged from supply of water treatment chemicals and sewer rods to advocacy and policy advice. The authors analyse the factors that made the programme effective and the challenges that partners faced. The case of Zimbabwe offers valuable lessons for other countries transitioning from emergency to development, and particularly those that need to take rapid action to upgrade failing urban systems. It illustrates that there is a ‘middle path’ between short-term humanitarian aid delivered in urban areas and large-scale urban rehabilitation, which can provide timely and highly effective results.

Key words | water, sanitation, hygiene, cholera, urban infrastructure, emergency, humanitarian aid, rehabilitation, policy

INTRODUCTION
The situation that faced the government of Zimbabwe and its development partners in early 2009 was a daunting one. A devastating cholera epidemic had swept the country, with over 90,000 cases, leaving more than 4,000 dead. The high fatality rate of the epidemic had revealed the massive deficiencies in the health system created by years of silent decline (UNICEF 2010b). Likewise, with the focus of the epidemic in urban areas, the cause could be traced to the slow deterioration of Zimbabwe’s water and sewerage utilities. Once some of the best in Africa, service providers in Zimbabwean urban areas and small towns had been unable to invest in maintenance or expansion, had lost many trained staff, and were institutionally fragile. Many had almost stopped providing services; raw water was untreated, the hours of water supply were few and far between, and sewage flowed in the streets. Rapid improvement was needed if the country was to avoid another cholera outbreak.

In this context, donors, development agencies and government departments joined forces to work in a unique partnership. In the absence of many of the usual implementation agencies active in the urban water, sanitation and hygiene (WASH) sector, a lead role was taken by UNICEF, the UN Children’s Fund. This was despite the fact that urban infrastructure of this scale was not a regular part of UNICEF programming; the agency usually focuses
on rural water supply in the 100 countries where it is active in the WASH sector. However, the distinct institutional, political and economic context of Zimbabwe required novel approaches and unusual partnerships. It also called for a response that went beyond emergency humanitarian aid but did not require the time or massive investment associated with full-scale urban rehabilitation – a ‘middle path’ that was both highly pragmatic and highly effective.

THE SITUATION THAT LED TO THE EPIDEMIC

A ‘perfect storm’ of conditions led to the cholera epidemic. After years of being one of the most developed and stable countries in Africa, with extensive infrastructure and a high standard of living, Zimbabwe plunged into a political and economic crisis starting in the late 1990s. Inflation reached millions of per cent, the Zimbabwean dollar collapsed, and unemployment sky-rocketed. By 2008, disruptions to the economy had resulted in about five million people needing emergency food assistance. The economic crisis and the collapse of the Zimbabwean dollar meant that water and sewerage service providers lacked foreign exchange, which severely limited the supply of spare parts and chemicals. At the same time, the borrowing power of both the local and national governments disappeared as arrears on existing loans caused lending agencies to cease operations in the country. Similar problems beset the electricity sector, and power supply became unreliable and infrequent. The combination of factors led to almost complete breakdown of water and sewerage services in large cities and small towns alike (See Box 1).

The concurrent collapse of the health sector meant that not only did the decline in water quality go un-monitored and un-mitigated, but small outbreaks of cholera did also. Cholera had been endemic in Zimbabwe for many years. Now increased mobility of the population, as people moved between urban and rural areas to seek employment and livelihoods, plus the nature of cholera transmission (both environment-to-person and person-to-person), meant that large-scale transmission was hard to interrupt. Hygiene behaviours were important, but the absence of running water in most households, and the unaffordability of soap, curtailed handwashing. Household water treatment was not common in Zimbabwe, as residents had been used to a regular supply of treated water. The capacity of local authorities and the Ministry of Health to provide active hygiene promotion was limited by staff shortages, and what personnel there was lacked mobility, as they had neither vehicles nor petrol.

Box 1 | Decline of water and sanitation services in Rusape Town

Rusape Town, with a population of 54,000, has two water treatment plants and a series of oxidation ponds for sewage treatment. In June 2009, a Rapid Assessment showed that the plants were operating at a fraction of design volumes, the town was collecting only 17% of billed amounts, and the system was suffering from erratic energy supply. The town had no budget for water treatment chemicals or spare parts. At the water treatment plants, much of the mechanical and electrical equipment was either missing or not working (many pumps having burned out as a result of erratic electricity supply), and without regulated dosing equipment, any available chemicals were being used in an ‘ad hoc’ way. However bad the water treatment situation was, the assessment described the sewage situation as ‘dire’, with blocked sewers, toilets overflowing, sewage flowing in the streets, and inoperative pumps at the oxidation ponds causing sewage to flow directly into the lake from which the town’s raw water was drawn (UNICEF/AusAID 2009).

THE EMERGENCY REHABILITATION AND RISK REDUCTION PROGRAMME

This complex set of factors required a response that was in the nature of a major urban infrastructure rehabilitation project rather than short term emergency interventions. The immediate emergency response – distribution of chlorine tablets, jerry cans, soap and Oral Rehydration Solution (ORS), with hygiene promotion and education about seeking timely treatment at temporary cholera treatment
centres – had been successful in halting the epidemic by May 2009. However, once the emergency personnel had packed up and left, the work started on rebuilding capacity in order to head off not just another cholera epidemic, but outbreaks of other water- and sanitation-related diseases. The epidemic had been a wake-up call to how serious the situation had become (See Box 2).

**Box 2 | Global epidemics**

Globally there are several examples of countries taken by surprise by cholera epidemics, and being obliged as a result to re-think their approaches to water and sanitation. The 1991 cholera epidemic in Peru, linked in part to contaminated seafood, spread to many other countries in Latin America, causing huge economic losses (Suárez & Bradford 1993). The 2000 outbreak of cholera in South Africa revealed gaps in municipal service delivery (Hemson & Dube 2004) and prompted the complete re-organisation of the Ministries responsible for prevention and management of waterborne disease.

The partners had to work within a unique institutional context. The development banks that traditionally take the lead on major urban infrastructure development were constrained in their activities and unable to start full lending operations due to unpaid arrears. Major donors, while keen to ensure humanitarian response and supportive of the new ‘inclusive’ government that involved both major political parties in power-sharing, were operating under political constraints. Major bilateral aid grants were not possible, and donors had to rely on using funds intended for humanitarian aid response. Moreover, the sector had inherited a complicated governance structure that meant that a multitude of ministries were involved and there was some ambiguity over which institutions actually controlled service providers.

In this environment, UNICEF took on a lead role. This came about in part because the agency was Coordinator of the WASH Emergency Cluster, the mechanism by which humanitarian agencies are coordinated during an emergency. The Cluster had played a crucial role in curbing the epidemic. The more important reason was that other agencies who usually undertake this role were simply not present or able to operate. UNICEF was aware that it had limited experience with large-scale urban rehabilitation, either in Zimbabwe or globally, and knew it would have to build its capacity very rapidly to cope.

The programming that was required lay between pragmatic emergency interventions with immediate impact, and resource-intensive long-term rehabilitation. Typically, full urban rehabilitation programmes have timeframes of many years and budgets in the tens or even hundreds of millions of dollars. In contrast, UNICEF and its partners had to tailor their activities to the resources available and a short timeframe. The threat of another cholera epidemic remained very real, and results needed to be seen within months, not years.

The UNICEF WASH team developed a method of working that took full advantage of the capacities of staff, local and international management consultants, non-governmental organisations (NGOs) already active in the country, and local and international contractors. Management consultants were engaged to design tender documents, support the procurement of commercial contracting services and assist in supervision. UNICEF entered into financing and support agreements with NGO partners in many towns and cities where they had experience and personnel on the ground. Both UNICEF and NGOs made use of commercial engineering contractors from within Zimbabwe and from neighbouring South Africa.

The urgency of cholera meant donors were willing to respond and to find ways around the political situation that limited direct support to the government of Zimbabwe. Several donors stepped forward, including the governments of the UK, Belgium, Spain, Australia and Korea, the European Community Humanitarian Office (ECHO) and the UN Office of Coordination of Humanitarian Affairs (UNOCHA). The type of funding available from each donor was carefully matched with interventions that had appropriate timelines and the Emergency Rehabilitation and Risk Reduction (ER&RR) Programme was launched.

The types of interventions fell into several categories:

*Supply of chemicals and equipment:* many utilities had immediate needs which they had been unable to fulfil
themselves due to lack of foreign currency. The rapid supply of chlorine and aluminium sulphate dramatically increased service providers’ ability to deliver treated water. Sewage pipes in many towns and cities had become blocked, causing raw sewage to overflow into the streets; the supply of sewer rods and other equipment helped utilities to unblock the pipes.

Capacity building: the departure of many trained personnel had left utilities running with very small staff numbers. Many of the people left operating the systems were long-time and loyal employees, but had little professional knowledge; they tried to keep the systems running as best they could but were often unable to keep up with the deterioration of the infrastructure and relied on guesswork and recollection of past practices. Working in collaboration with the Zimbabwe Institute of Water and Sanitation Development (IWSD), UNICEF established training for 440 operators at three levels (a practical one-week course, a certificate course and a diploma programme).

Rehabilitation of infrastructure: Works included replacement of pumps, installation of mixing and dosing equipment, repair of sand filters, replacement of valves and nozzles, installation of bulk meters and repairs to pipes.

Advocacy and policy advice: UNICEF and its partners had a voice in negotiations with government over priorities for urban water supply and sanitation, and contributed to the on-going development of urban WASH policy. A key example of this is the position UNICEF took on the relationship between power and water. UNICEF noted that many service providers were constrained by highly intermittent electricity supplies, brought about because the state electricity company, ZESA, was suffering from insufficient generation capacity and similar investment challenges as the water and sanitation sector. UNICEF documented the alarming impact which interruptions in electricity had on water and sewerage services. On average, utilities were experiencing lack of power for eight hours a day, mostly occurring at peak supply times when water was most needed. The consequences of this included reduction of volume of water, increased costs of water production, decrease in revenue, reduction in effectiveness of water treatment, increases in contamination and greater risks of pipe bursts (UNICEF 2010a). ZESA has since entered into arrangements with utilities to avoid load-shedding to key installations, and to either connect water and sewage treatment plants to nearby lines that have uninterrupted supply, or to install new lines (this has been part of the rehabilitation works in some places).

The rationalisation of the institutional framework was also a high priority. During the epidemic, government coordination mechanisms for the WASH sector had been dysfunctional, with numerous ministries involved and responsibilities fragmented and unclear. In 2010, UNICEF and partners supported the Government in organising a ministerial-level retreat. This resulted in the revitalisation of the coordination of the WASH sector with strengthened government leadership through a National Action Committee (NAC), made up of Permanent Secretaries and chaired by the Ministry of Water Resources Development and Management (MWRDM), reporting to the Deputy Prime Minister. A National Coordination Unit (NCU) was formed, and also a Donor Group, chaired by the Permanent Secretary of the MWRDM, to facilitate government-donor coordination. These national frameworks brought together fragmented authorities into a newly streamlined structure.

FACTORS IN SUCCESS AND BACKGROUND TO CHALLENGES

Several factors contributed to the effectiveness of the ER&RR programme. It is worthy of note that most of these did not relate to availability of funds, or excellence of design of infrastructure – both were present but not sufficient in themselves – but rather to getting the institutional and interpersonal context right.

A key success factor was the significant trust between the stakeholders – donors, implementing agencies and government – allowing for both flexibility and risk-taking. The urgency of the cholera situation contributed to this but also the professionalism of the individuals involved. This atmosphere of trust was bolstered by an extraordinary level of communication between the partners, and high standards of information management and dissemination. This had its origins in the approach of the emergency WASH Cluster, which had used a detailed matrix to track each partner’s activities during the height of the epidemic and
convened frequent meetings. Although UNICEF did not implement the ER&RR programme as part of its coordination role (the roles of implementing programmes and coordinating other WASH Cluster members are kept separate), UNICEF and its partners had benefited from the experience of the Cluster and brought the same practices into the ER&RR programme.

Government confidence in UNICEF and its partners allowed a high degree of delegation and facilitated even greater speed of implementation. The government trusted a UN agency to remain neutral in a politically charged environment. UNICEF and its partners ensured that the relevant government departments knew they would be acknowledged and given appropriate credit.

However, despite all these factors working to their advantage, UNICEF and its partners still had to rise to the challenge of many complex problems. Among these, perhaps the most straightforward was the fact that, once work started, the infrastructure proved to be in worse shape than expected. Works contracts had to be amended and extended. Human resource capacities were low, but even more challenging was the low governance capacity of local authorities. Local government had become highly politicised and this led to paralysis and poor decision-making in terms of water and sanitation. The Urban Councils Association of Zimbabwe (UCAZ) became an important partner, as it is working towards rebuilding an environment of good governance at local levels in the midst of Zimbabwe’s divisive politics.

Emerging evidence on the transmission routes of cholera had implications for its control that complicated the range of interventions. Recent research suggests that more than half of transmission is person-to-person, with much of that taking place within the household (Mukandavire et al. 2011). This type of transmission takes place during the short-lived, ‘hyperinfective’ state of the bacterium that exists just after it is passed in the stools of someone infected with cholera (Morris 2011). The implication is that improvements in water supply and sanitation (which prevent environment-to-person transmission) will be limited in impact unless coupled with hygiene behaviours that interrupt person-to-person transmission; furthermore, these behaviours have to be in place before a household is exposed to cholera, bearing in mind that most people infected with cholera are asymptomatic and yet still infectious. The key routine domestic behaviours are handwashing with soap, treatment of any drinking water that is kept in the home, preferably with chlorine, and the use of suitable containers for water storage that do not allow contact between the water and users’ hands. However, the capacity of the Ministry of Health and the local authorities to provide effective and sustained hygiene promotion supporting these routine behaviours needed to be rebuilt, and this proved to be challenging.

The nature of the transmission routes of cholera was also relevant with respect to a key high-risk behaviour in Zimbabwe – that of large funeral gatherings. At these gatherings, it is tradition that everyone shakes hands, and also that food is served which is then eaten with the hands. There is evidence that funerals for cholera victims were major factors in initiating the epidemic (Handzel 2009), and hygiene promotion interventions had to take this into account.

A similar challenge that is very specific to the Zimbabwean context is the impact of the various apostolic faiths on health and hygiene behaviour. A significant proportion of the Zimbabwean population follows the teachings of these evangelical groups, which stress faith healing through prayer and ritual. The more conservative of them forbid any use of modern health care such as medicine, immunisation or obstetrical interventions (M Consulting Group 2011). Mass gatherings and assemblies of as many as 400,000 people are common among apostolic congregations. The role of these types of gatherings in spreading cholera has been observed in other countries; in Ethiopia a large religious assembly in 2009 was linked to an outbreak of 9,000 cases of cholera (UNICEF 2010c). In Zimbabwe the risk to these groups was potentially augmented by the reluctance of certain sects to seek modern medical care if stricken by cholera. UNICEF provided support directly to the apostolic congregations. This included training of apostolic volunteers as hygiene promoters, providing hygiene promotion materials, and supporting provision of water and sanitation facilities at a major shrine.

The transitional nature of the programming, between immediate rapid emergency interventions and long-term rehabilitation, posed challenges. For instance, it was hoped that UNICEF would be able to withdraw as a provider of chemicals within a few months, and an exit strategy had
been discussed. However, authorities and utilities continued to request this assistance through 2011 as the economic situation remained poor and cost recovery was low. UNICEF agreed to continue supporting the supply of chemicals until March 2012, and has since concluded this type of support.

Some work which had been undertaken during the emergency phase left ‘loose ends’ that had to be addressed. An example of this was the many boreholes that had been drilled and fitted with handpumps in urban areas in order to provide water during the height of the epidemic. These doubtless saved lives, and utilities had been both grateful and willing to take on operation and maintenance in the short term. However, the ER&RR programme has had to address the long term future of these boreholes. Debate lingers over whether they will continue to be valuable to provide water for the poorest (and create a safety net in case of future breakdowns in utility services) or whether they will impede the ability of utilities to re-engage paying customers for piped water supply.

OUTCOMES AND LOOKING TO THE FUTURE

Despite the many challenges, the emergency rehabilitation programme has been highly effective. It is estimated to have reached over four million people (over 30 per cent of the population of Zimbabwe) with interventions, and an immediate and very tangible result is the fact that in the same months in 2010 and 2011 that the epidemic had raged two years previously, there were fewer than 1,400 cases of cholera and only 49 deaths. This is clearly still too many, however, and much work remains to be done. The cost of the ER&RR programme, at US Dollars (USD) 40 million, is modest compared to the USD 150 million that the emergency response to cholera is thought to have cost. However, it is estimated that the capital requirement for Zimbabwe to reach the urban water and sanitation targets set as part of the UN Millennium Development Goals (MDG) is more than USD 600 million a year between 2011 and 2015, and that half of that is needed for rehabilitation of the existing infrastructure (Water and Sanitation Program 2011). And it must be remembered that the MDG targets, at 99 per cent for urban water supply, and 77 per cent for urban sanitation, are less than universal coverage; the aspiration of the government is that the sector returns to the conditions of the 1980s, and that urban coverage once again reaches 100%.

Longer-term finance is starting to enter the sector with the establishment of an urgent water supply and sanitation rehabilitation project under a Multi Donor Trust Fund (MDTF) administered by the African Development Bank. However, the pace of development of rehabilitation projects under the MDTF will be slow, and in the short to medium term the funding flows are unlikely to come even close to the total amounts that are needed. Not only is more funding needed, but the government may have to re-think its insistence on high levels of service in urban areas, for instance piped sewerage and advanced technology for water and sewage treatment.

CONCLUSION

In conclusion, Zimbabwe presented a unique combination of factors – violent political turmoil, dramatic economic collapse, departure of development partners, extensive but decaying urban infrastructure and a deadly epidemic – that drew partners into unusual roles and shaped decision-making in uncommon ways. The ER&RR programme offers a series of lessons, both for stakeholders in Zimbabwe and for those in other countries facing similar situations.

The programme provides the WASH sector with yet another example of how difficult it is to make the transition from emergency activities to long-term rehabilitation. Decision-making in times of emergency and incipient loss of life is different from that during regular development programming; the issue of the urban boreholes illustrates this well. During the transition, actors are required to consider long term sustainability. Both the aid agencies and the government of Zimbabwe are finding the transition slow and at times clumsy. Funding for longer-term interventions moves much more slowly than the fast pace of humanitarian aid and this has caused frustration. The same is true in many other countries facing a similar transition through the disaster cycle from emergency response to recovery and ultimately development programming, whether after a major natural disaster or post-conflict.
An example of this is the difficult discussions now taking place in Zimbabwe about cost recovery and the need to review the tariff structures for water and sanitation. The context of widespread poverty in Zimbabwe needs to be reconciled with the fact that Zimbabwean water prices are some of the lowest in Africa, and utilities will not be able to provide sustainable services without higher contributions from users (Economic Consulting Associates Ltd 2011).

The decision to use a wide variety of implementing partners, mixing agencies from the NGO sector with commercial engineering companies proved to be a good one. This strategy made maximum use of the capacity available to Zimbabwe at the time, and also the comparative advantage of agencies. NGOs, for instance, had skills in hygiene promotion and social mobilisation that companies lacked.

The emphasis of the programme on the larger context of wider sector reform, policy development and capacity building was important. The programme managed to operate at a very pragmatic level (supply of sewer rods and chemicals, short training courses for operators) while remaining engaged in larger-scale, longer-term institutional issues. As the sector strengthens, UNICEF and its partners have continued to support the institutional and regulatory reform process that will lead to a comprehensive sector policy.

Tragic though it was, in many ways cholera has truly awoken the government, donors and aid agencies to the terrible cost of a slow decline in water supply and sanitation systems. The response has both saved lives and opened the door to action on a longer-term vision. New policy frameworks are now being developed, a streamlined institutional structure is in place, and major new investments are being planned. An indication of the return to normalcy is that the WASH Cluster, as an emergency coordination mechanism, is to be phased out by the end of 2012, when government coordination mechanisms will fully take over.

The experience has provided UNICEF with a useful model for engagement in other countries in similar situations; a model that does not require the agency to shift its focus significantly from the rural WASH sector. It also provides a model that can operate in parallel to UNICEF’s coordination role when the WASH Cluster mechanism is in effect. It is hoped that the experience in Zimbabwe will give UNICEF greater confidence to intervene in complex urban emergency contexts, which are predicted to become more common. It also reinforces the lesson for all agencies that a quiet but unrelenting decline in urban services, can, even in seemingly well-developed systems, lead to deadly results, and should be part of emergency preparedness and risk-reduction strategies.

The case of Zimbabwe offers valuable lessons for other countries transitioning from emergency to development, and particularly those that need to take rapid action to upgrade failing urban systems. It illustrates that there is a ‘middle path’ between short-term humanitarian aid delivered in urban areas and large-scale urban rehabilitation as undertaken by development banks. Taking this path can mobilise a full range of actors, produce swift, even dramatic, results and lay the groundwork for future investments.

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REFERENCES


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