

**WATER SHORTAGE RELATED PROBLEMS FOLLOWING THE CLOSURE OF  
MHANGURA COPPER MINE IN MASHONALAND WEST PROVINCE OF  
ZIMBABWE**

By: I. O. Manyanhaire, J. T. Matewa, E. Sivotwa, and E. Munhuwa

**ABSTRACT**

A descriptive survey of the effect of water shortage in Mhangura Town was conducted targeting randomly sampled heads of households and key informants. The collapse of Mhangura Mine has left residents in despair as the benefits of the initial triggers diminish and people desert the settlement in search of new socio-economic activities. Water scarcity has seriously affected the social life in this once vibrant mining town. Population levels in the town remain high against a dwindling stock of water available for daily utilization. The shortage has affected the normal functions of schools and hospital in the area and has worsened the workload for women who have to fetch water from dams on the surrounding farms. The environmental health situation in the community can be summarized as critical as there is no water to move human waste. Consequently, the bush system has become popular within the community. The study recommends that the responsible authority should source funds to restore proper water reticulation and sewage treatment works for the Mhangura Community. The community also has to be educated on the importance of water and ways of conserving the little water that the council is providing.

Keywords: Water shortage, diseases social effects, and water utilization

**BACKGROUND TO THE STUDY**

Settlements resulting from mining activities may become centers of attraction and stimulate economic development. They have raised the standard of living of many people enabling them to

satisfy some of their needs and wants. However, the benefits of such initial triggers can be short lived as people desert these settlements in search of new socio-economic activities. In some instances, settlements may not completely disappear but become stagnant or experience slow growth. The collapsing mining activities have left many residents in despair for a new lease of life. The people who remain in these settlements experience a host of social problems as in most cases a vacuum is created between the residents and the administration of the settlement. In scenarios where population increases with no corresponding changes in water harvesting and reticulation infrastructure the people have experienced a host of sanitation and water availability problems (Falkenmark and Widstrand, 1992).

It can be argued that the lack of financial resources to expand, operate and maintain facilities and failure to treat water as a scarce commodity lies at the heart of the challenges in water supply and sanitation (Young, 1996). The Harare City Council for example, is failing to provide the daily requirements of water for domestic and industrial use as evidenced by water cuts for long periods of time that are being experienced by areas such as Tafara, Chitungwiza and Mabvuku. Residents in these areas are being forced to obtain water from unprotected sources thereby creating a potential health hazard due to the outbreak of water and sanitation related diseases.

Inadequate water supply and sanitation are largely responsible for the high levels of water borne diseases in Southern Africa. This is particularly serious among the majority of the rural people in Southern Africa do not have appropriate sanitation systems (Hirji et. al., 2001). Not surprisingly, infectious water borne diseases such as dysentery, cholera and hepatitis are almost endemic in places where water is scarce. Most of the feces are deposited on land, providing an easy pathway for pathogens to enter surface and ground water and hence to the local population via contaminated drinking water. Thus, an epidemic may ensue due to poor sanitation, poor water supply and poor food safety. The most desirable water management system should ensure the availability of water in the right amounts and quality and right place and at the right time. Water has to be supplied in a sustainable manner particularly to small mining towns where maintenance of water infrastructure is dependent on the availability of the minerals.

The distribution network, which transports water from the place of treatment to the consumer, should always be functional and well maintained to ensure constant water supply to the consumers. Its design and size will be governed by the topography, the location and size of the community. The aim should always be to ensure that consumers receive a sufficient and uninterrupted supply and that contamination is not introduced in transit, as this is most likely to result in health hazards. A skilled human resource in the supply and distribution of water within an area is critical for consumer satisfaction. Bilateral and international lending agencies are increasingly stressing the importance of manpower development as a critical element in provision of water supplies throughout the world. Without adequate skills for management and operation, a water authority is unable to tackle the wide range of problems, which continually appear ( UN, 2003). The failure to tackle the water problems due to unskilled manpower results in disgruntlement by consumers that may cause non-payment of water bills.

Chronic water shortages in many areas have resulted in most countries and people paying an increasing high price for water (Tevera, 2004; Falkenmark and Widstrand, 1992). Especially affected by this problem are the poor, who are mostly women and children. This is because women and the children, especially the girls, have to spend most of their time carrying water from distant sources and suffer more in impaired health from exhaustion. Women tend towards having the role of family caretaker and health worker and this makes them aware of environmental problems when they occur. Women are the first to notice the strange odors of the water (Seager, 1993). Thus women, particularly rural women, directly feel the problem of water scarcity. They understand the need for water resource protection better than men do. This process of 'ruralization' of small urban centers related with mining activities has been gathering momentum in Zimbabwe since the adoption of the economic structural adjustment programme in the 1990s. It has essentially threatened the principles of sustainability in all regards (Chenje, Sola, and Placezny, 1998).

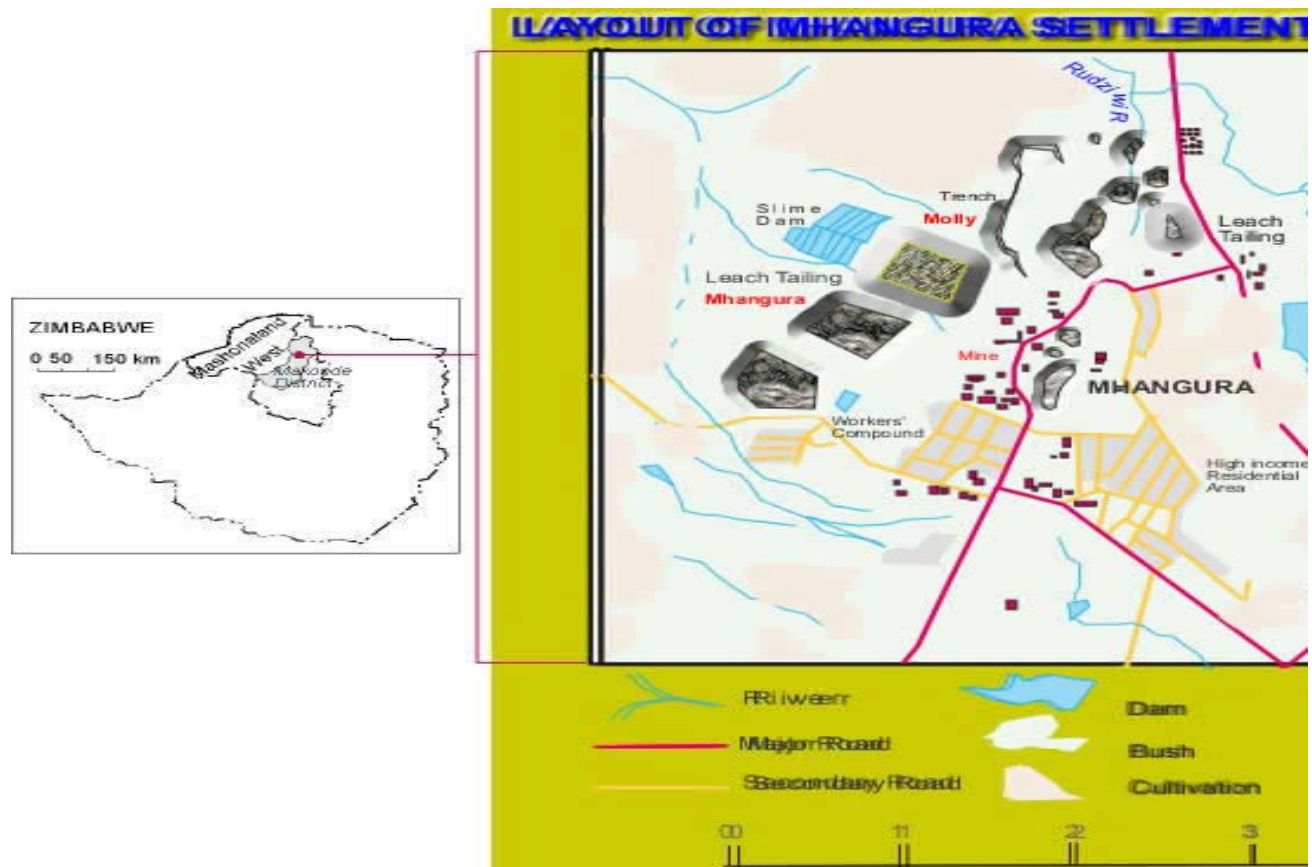
Prior to Mhangura Mine closure water supply to the residents was consistent and adequate. There was proper water reticulation from Manyame River and treatment was done according to national and international standards. Each household had adequate and safe water to use. The institutional arrangements after the mine closure saw Makonde Rural District Council with the mandate of supplying water. However, the supply system has not been efficient resulting in

water shortages. The impact of the water shortages on the communities is of great concern. Within this context an analysis of the water shortage related problems was conducted with a view to capture the perceptions of the affected communities.

## METHOD AND MATERIAL

### Study Area

Mhangura Copper Mine is located in Mashonaland West Province in Makonde District of Zimbabwe. The Mine is 165 km North West of Harare and 65 km from Chinhoyi the provincial Capital (Figure 1) at an altitude of approximately 1190 meters above sea level.



**Figure 1: The Location of Mhangura in Zimbabwe**

Source: Sango 2003

The area generally slopes to the west and is marked to the north by Ridziwi River, which flows from east to west passing through the Brenville and Victory Dams respectively and to the south

by Mangamwa River. The western part of the settlement is mainly granitic mountain ranges that run from north to south. Soils range from loams to the eastern and western sides to sandy loams to the northern and Southern parts of the settlement. Rainfall averages 960mm per year and falls between November and March. The mean maximum temperature is 24<sup>0</sup> C and the mean minimum temperature is 15<sup>0</sup> C. The dominant trees in the woodlands include *Brachystegia*, *Julbernadia* and *Globiflora* with a mixture of wild fruit trees, which include *Azanza grackeana* (Mutohwe and Marula (Mupfura)). The grass, which is commonly found in this area, is the runner and the tufted grass. We also get the spear grass and cat's tail dominant in the surrounding areas of the town.

The Town has a population of about 8,000 people (CSO, 2002) of which only a small percentage is formally employed as civil servants. Most of the people were engaged in informal sector activities. Some have benefited from the land reform program and are now full time farmers. Gold panning in nearby areas has also generated employment for some of the people in Mhangura.

## **RESEARCH DESIGN**

The overall design used was a descriptive survey of water related problems in Mhangura. The effects were measured through descriptive and analytic profiling of the complaints as given by the residents and various representatives of the key organizations in the area. This gave the basis for assessment and rating of the extent of the effects of water problems on the social life styles of the people. Informal discussions, a questionnaire and interviews with key informants and field observations were used as data collection tools.

Sampling was done at three levels. Firstly, it was stratified sampling used to select homesteads from both the high density (HD) and the low density (LD) areas of the settlement. Secondly, simple random sampling was used on 10 % of the homesteads in each of the residential zones to select a sample of 54 homesteads from a population of 540. Thirdly, purposive sampling was used to select key informants for interviews. These included heads of key institutions in Mhangura; heads of secondary and primary schools, Mhangura Hospital and Makonde Rural District Council. The data collected was then categorized and simple calculations of percentages

and averages were performed. The classifications were based on what percentage of the high density and low-density indicated water related problems on a specified variable. Data were then presented in the form of figures and tables for easy of analysis and interpretation.

## **WATER AVAILABILITY**

Table 1 shows the estimated water available for utilization by the community in Mhangura.

**Table 1: Water Availability during the Pre- and Post- Mhangura Mine Closure Periods**

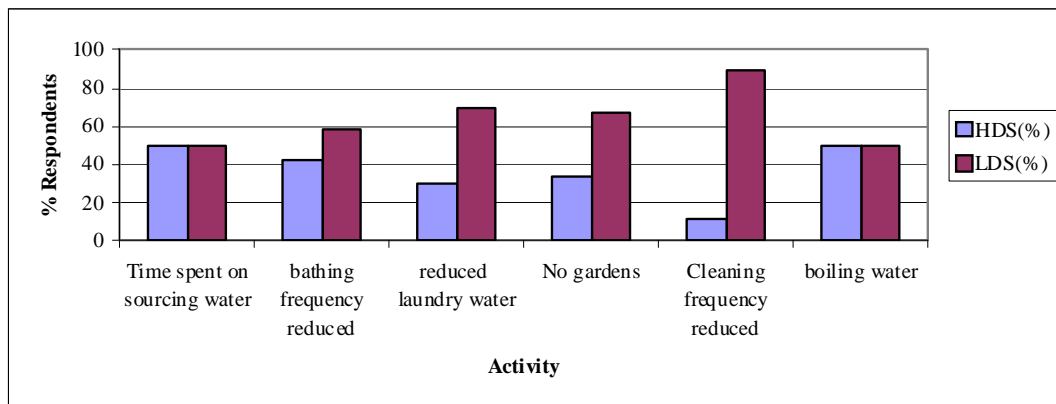
Source and period	Yield per minute (litres)	Yield per day (litres)	Mine consumption Per day (litres)	Township consumption Per day (litres)	Shortfall per day (litres)
Manyame River Pre-closure	5 265	7 581 600	2 721 600	4 860 000	None
Borehole Post-closure	130 (2.5%)	187 200 (2.5%)	Nil	4 860 000	4 672 800 (96.1%)

Source: Makonde Rural District Council

Prior to the closure of the mine most of the water was sourced from Manyame River through a 300 mm-diameter pipe, which was about 33km long from the river to the reservoir. Manyame had a pumping capacity of 7 581 600 liters per day and part of this water was used for mining activities (2 721 600 L) and the rest was for Township consumption. The existing boreholes contributed 2.5% of the daily water requirements. There was a 96.1% deficit in water allocation for daily consumption. This shortfall had to be made up for by the consumer from dams and rivers surrounding the area. The water pumping system was old and an estimated 20 000 liters was lost through leakages on a daily basis. Though there was willingness by the local authorities to supply adequate water to the residents they faced resistance in payment of rates. The residents were not willing to pay because prior to the closure of the mine water was free to the residents. Given this scenario, Mhangura Town may not continue to attract investment let alone general growth in the near future. In this regard, the mining authorities have to embark on an awareness campaign to educate the residents about the need to pay rates. These rates would go towards the development of water reticulation infrastructure.

## WATER SHORTAGE RELATED PROBLEMS

The respondents indicated a number of social variables that were related to water shortage in the town. In both the LD and HD respondents indicated that most of the time they would spend on a variety of household chores was now spent on sourcing water (Figure 2). Consequently, there has been reduction in bathing frequency, laundry, gardening and increased boiling of water. Apart from the dirty environs associated with water shortage, the notable absence of gardens, which have become a component of the modern urban mosaic, had serious social repercussions. Given that the community has generally lost incomes due to the closure of the mine, gardens would be important in supplementing food requirements and earning incomes through selling to other residents. The seriousness of water shortage was rated marginally higher in the LD than in the HD area. This mismatch in the social view of water had to do probably with the social status of the residents as well as their level of environmental awareness.



**Figure 2: Problems Related to the Shortage of Water in Mhangura**

The shortage of water in Mhangura Town aggravated the poor living conditions of the residents. The town has been transformed into a rural area. Reticulated water is cheaper to use and less time is wasted when one wants to irrigate the gardens. Women pay the heaviest price for poor water supply and sanitation as they are forced to walk long distances to fetch water. In Zimbabwe, the mean water collection trip with a heavy load on the head is estimated to be 1,4 kilometers in the wet season and 2 kilometers in the dry season (National Master Plan, 1998). In drought years, it is possible for women in the more marginal areas to travel up to 5 or 6 kilometers for domestic water. African women use 40% of their daily untraditional intake

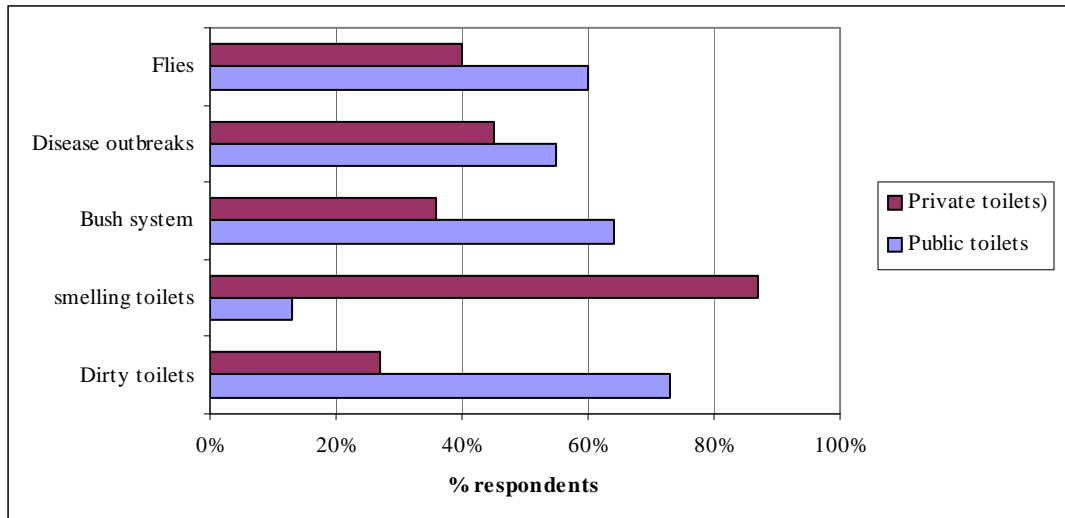
traveling to collect water (World Bank estimates). Full containers of water weigh up to 20 kilos and carrying such burdens can cause damage to the spine and pelvis creating future problems in pregnancy. The health and lives of the residents were constantly threatened by environmental hazards, as they get sick through contact with excreta in their environment. Caring for the sick adds to the already heavy workload of women. Women are often the main actors in the management of family household environmental resources. Water shortage problem affected women and the girl child since they had to spend time carrying water from distant sources to the homesteads and they suffer more from impaired health from exhaustion (Tevera, 2004). Women were greatly stressed by water shortage in Mhangura and some of the residents hired extra labor to assist them in fetching water; putting further strain on their budgets.

Water shortage has affected the normal operations of all the four schools in Mhangura. School authorities had to effect changes to their timetables. Afternoon activities, mostly, in primary schools, had to be abandoned. Most pupils had to be dismissed early hence very little time would be left for remedial as well as afternoon lessons. At times lessons had to be disrupted as shown by 54% of the respondents as pupils would be asked to fetch water for use in toilets any time when the need arose. This wasted learning time. Consequently complicating truancy in schools. This disruption has resulted in a significant loss of teaching and learning time. Teachers had to work overtime in order to catch up with their work. Thus, there is need to correct this shortage of water so as to reduce the double burden of sourcing of water both at home and school.

### **THE ENVIRONMENTAL HEALTH IMPLICATIONS OF WATER SHORTAGE**

The majority of the residents (87%) using private toilets in the LDs were greatly affected by the smell of toilets (Figure 2). On the other hand 13 % were affected by the smell of the toilets in HDS. The former had toilets within their houses whilst the latter used communal toilets.





**Figure 3: Effects of Water Shortage on Household Toilet Conditions**

The majority of the respondents (64%) in the HDs using public toilets ended up using the bush system while 36% in the LDs resorted to this bush system. Residents acknowledged frequent disease outbreaks and swarms of flies were a nuisance within the environs of dirty toilets and the homes.

Water shortage in Mhangura has generally affected human waste disposal and the state of sanitary facilities in the HDs and LDs. The provision of sufficient and accessible water supply and hygienic disposal of waste are fundamental factors in disease prevention (Nhapi, 2000). Particular attention must be paid to the provision of sanitary facilities in HDs. Enough water is needed for waste material to be deposited in the right way. Exposure to fecal pollution results in outbreak of diseases such as dysentery and cholera (Hirji et al., 2002). The presence of feces all over along roadsides in the area of Mhangura may result in the pollution of the current water sources in the town.

Diseases such as cholera, diarrhea, dysentery and others were common among residents in the high-density suburbs who used public toilets. When vibrio cholera is introduced into a community with poor sanitation, poor water supply and poor food safety, an epidemic might ensue (Hirji et al., 2002). Shortage of water supply and ill functioning of the sewerage system aggravate the risk of contracting diseases. Where there is water shortage a tendency to reuse

water in homes develops and is health threatening if not properly done. Water has to be used sparingly but the residents seem to lack the knowledge and capacity to properly dispose of dirty water. Human waste remains untransformed for a long time such that flies and other disease carrying organisms find breeding grounds. Pressure on water resources around the town turned watering points into places of gossip and conflict.

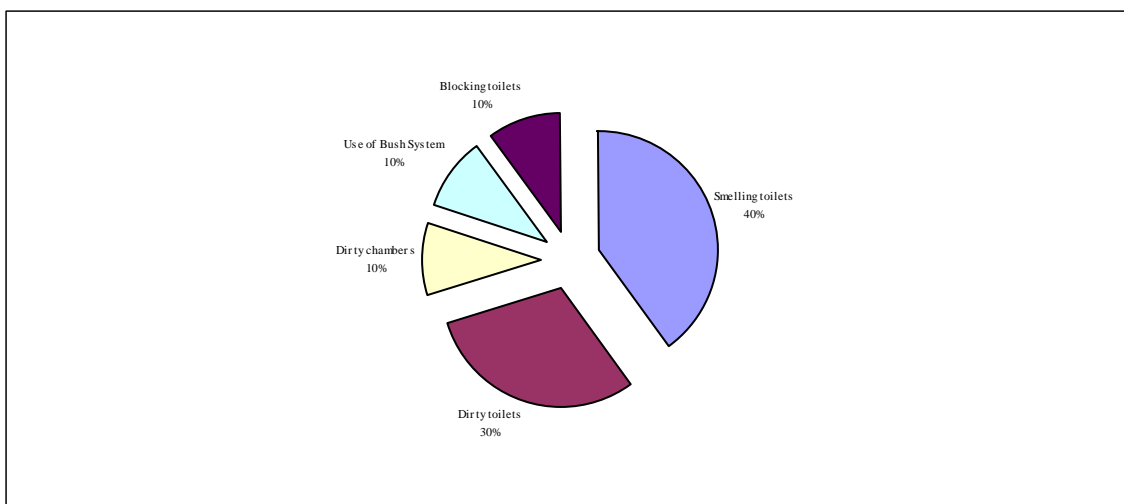
**Table 2: Respondents’ Perceptions of Water Related Disease Outbreaks**

Disease	Strongly agree	Agree	Disagree	Strongly Disagree	Total
Scabies	22 (41%)	24 (44%)	7 (13%)	1 (2%)	54(100%)
Dysentery	24(44%)	25 (48%)	3 (5%)	2 (3%)	54(100%)
Cholera	32 (60%)	16 (30%)	3 (5%)	3 (5%)	54(100%)

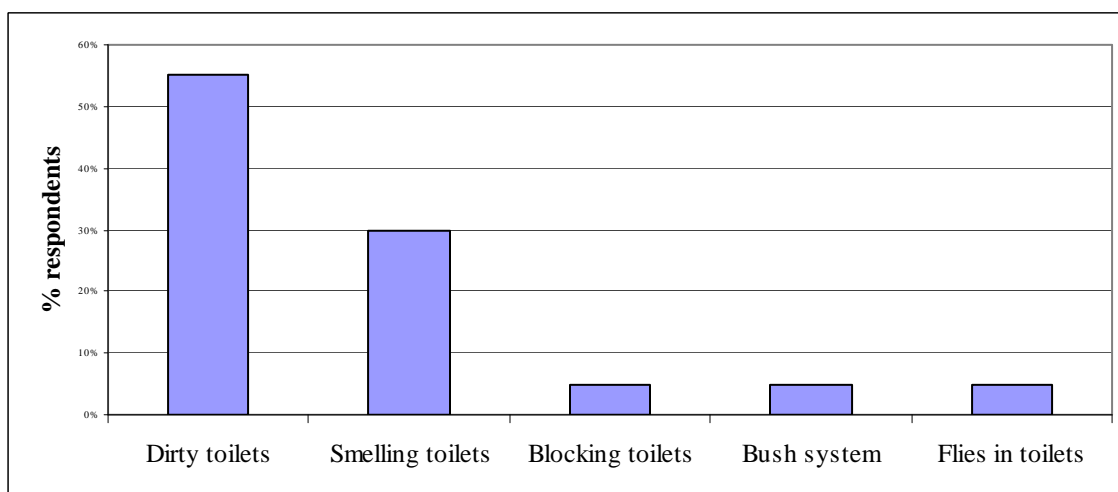
**N=54**

Table 2 indicates that the majority of the respondents, 85% of them, showed that water shortage led to the outbreak of diseases such as scabies. In support of this 40% of the pupils interviewed indicated that they also suffered from such diseases especially scabies due to lack of or limited water for bathing. A greater proportion of the diseases that were treated at the local hospital (70%) were scabies and gastrointestinal especially in children. The findings confirmed observations by Hirji et al. (2002) as in Rollis, 1996, that diseases like diarrhea and dysentery in southern Africa affect children under 5 years of age living in settlements with rudimentary access to water supply and sanitation (Faggie and Rabie, 1992).

Figure 5 shows that 40% of the respondents were of the opinion that school toilets always smelled due to inadequate water for use in the flushing system whilst 30% complained about toilets being dirty. Other respondents complained about the blockages, dirtiness of toilet chambers and the use of the bush system within the environments of the schools. Water shortage in Mhangura also affected the toilet conditions in the schools and in hospital. Thirty percent (30%) of the respondents in the schools cited the fact that toilets were always dirty and there was not enough water to clean toilets. Due to limited water to drain waste materials these toilets were always blocked. Even Nhapi (2000) also cited that fecal disposal diseases erupt when sanitation is defective. So there is need for proper sanitation so that outbreaks of diseases among children are avoided.



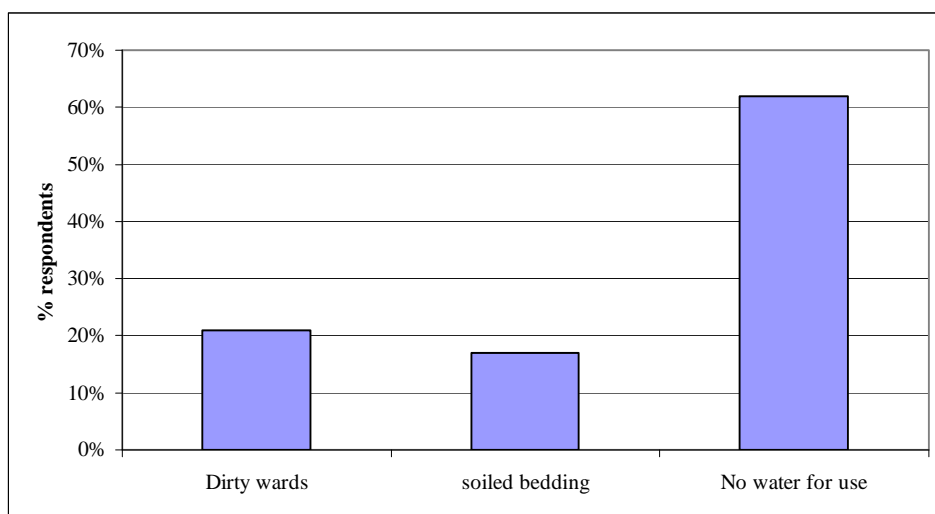
**Figure 4: Effects of Water Shortage on School Toilets**



**Figure 5: Effects of Water Shortage on Hospital Toilet Conditions**

The unhygienic conditions that prevailed at schools and other public places were confirmed by the state of toilets. Water shortage has also caused unhygienic conditions at the hospital. Twenty one percent of the respondents (21%) complained about the dirty wards as they were only cleaned once in the morning and also soiled bedding, which was kept for too long without being changed due to water crisis. As a result, patients indicated that they were asked to bring containers full of water for bathing and drinking as well as their own linen. All departments had constrained operations due to the shortage of water.

The conditions of the toilets forced patients to use the bush system thereby worsening the environmental health conditions around the hospital and the general public as a whole. The dirty wards and linen compromised the health of the patients. Hospitals are supposed to be centers where the mental and physical health of the patients is adequately and efficiently managed to guarantee recovery. The institution has to exhibit conditions that inhibit the spread of diseases.



**Figure 6: The State of Hygienic Conditions at Mhangura Hospital**

## **CONCLUSIONS AND POLICY IMPLICATIONS**

This study assessed the social effects of water shortages in Mhangura. In areas where water is in scarcity due to human incapacity like Mhangura the area usually lags behind in development. Investors are scared from such environments and this may lead to the decline and decay of the quality of infrastructure. Water shortages in Mhangura had serious implications on the normal day-to-day activities of the community. As such, there is need to address those concerns. Most women and children spend time searching for water and this has also made it difficult for the schools and health institutions in the area to operate effectively.

Water shortage had negative effects on the social life of human beings especially the women in Mhangura. The reason for this was that, on a daily basis, women were often the main actors in the management of household environmental resources. Women are family caretakers and health

workers and this makes them aware of environmental problems when they occur. Thus, women in Mhangura are directly affected by the problem of water scarcity. The provision of clean water is important in reducing the daily burden on women.

They do most of the fetching of water in the town. From a social point of view, the shortage of water means that women and children, who traditionally collect water, have to walk longer and longer distances to find these in the nearby farms and Ridziwi River. In essence, Mhangura Town is now rated as a rural community where cooking and fetching of water account for most of the women's time. This does not help in liberating the women from the homestead traditional entrapment to the more modernized format where women have to play a greater spatial role.

Chronic water shortages in many areas have resulted in most countries and people paying an increasing high price for water. Especially affected by this problem are the poor, who are mostly women and children. This is because women and the children, especially the girls, have to spend most of their time carrying water from distant sources and suffer more in impaired health from exhaustion.

Makonde Rural District Council lacked financial resources to reticulate water from distant sources. Part of the water was lost along the way due to leakages and the breakdown of equipment. The introduction of high water charges only aggravated the water situation as the residents resisted payment of rates. The cost of producing and delivering a unit of water has escalated and the council was having problems with non-cooperating residents.

## REFERENCES

- Chenje, M.; Sola, L.; Placezny, D. (1998). (Eds) The State of Zimbabwe's Environment. Ministry of Environment and Tourism, Harare.
- The Central Statistical Office(CSO,2002).Population Census 2002. Government of Zimbabwe.
- Falkenmark, M. and Widstrand, C. (1992). Population and Water Resources: A delicate balance in Population Bulletin Vol.47 No. 3 Washington USA.
- Faggie, R. F. and Rabie, M. A. (1992). Environmental Management in South Africa. Juta Company, Cape Town.
- Hirji, R. et. al (2001). Water Resources and Environmental Management. World Bank Environment Strategy Paper 2 World Bank Washington D.C.
- Hirji, R. et. al. (2002). Environmental Sustainability in Water Resources Management in Southern Africa. SADC
- Falkenmark, M. and Widstrand, C. (1992). Natural Resources Conservation and Management. Zimbabwe Open University, Harare.
- Nhapi, I. (2000). Environmental Pollution and Control. Zimbabwe Open University, Harare.
- Sango, I. (2003). The social Impacts of the closure of Mhangura Copper Mine. A Dissertation submitted to the university of Zimbabwe, Geography Department. Unpublished Masters Thesis.
- Seager, R. (1993). Earth Follies: Coming to Terms with the Global Environmental Crisis. Routledge, New York.
- Tevera, D. S. (2004). Regional Geography of Southern Africa. Zimbabwe Open University, Harare.
- The National Water Master Plan (1998). The Government of Zimbabwe.
- UN (2003). World Water Projects, Water for the People, Water for life: World Water Assessment Programme, UNESCO and Berghm Books.
- Waugh, D. (1995). Geography: An integrated Approach; Nelson, Surrey.
- Young, R. A. (1996). Measuring Economic Benefits for Water Investments and Policies. World Bank Technical Paper 338. World Bank Washington.