DECLARATION

Chana Chelemu declare that this report has been compiled by me and that the work recorded is my own.

I prepared all the tables, figures and maps used and where relevant the sources have been fully acknowledged. The material in this report has not been previously submitted for any academic award.

Signed: Chelemu Date: 15. 06. 01

DEDICATION

This report is dedicated to my dad and mum for the support they have given me through out my educational endeavours. To my brothers and sisters for being there for me when they felt it necessary, thanks.

Lastly but not the least, thanks go to David, to whom I am deeply indebted for making my fieldwork bearable.

ACKNOWLEDGEMENT

First and foremost, my sincere and special thanks go to my supervisor, Mr. John Volk for his inspiration, encouragement, comments and tireless supervision through out the duration of the course.

Thanks also go to the staff in the Geography Department (UNZA) for the knowledge and skills they have imparted in me.

~~e imparted in me~~.

I would like to thank Dr Zulu of UNICEF for all the literature he provided me with. To the staff at George Clinic and George Resident Development Committee (GRDC), thank you for being ever so helpful.

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ABSRACT

This study was carried out in George compound, which is located in the western part of Lusaka. The fieldwork was carried out in August 2000. The aim of the study was to find out the effects of water and the benefits of the community- based water project. The specific objectives were to assess the approximate percentage of households using water provided by the water project; to find out the percentage of households purifying their drinking water amongst the households using shallow wells; to assess the extent of water-borne diseases affecting the community in George compound; and to find out the benefits from the water project.

A total of forty households were randomly selected and one respondent from each household each household was interviewed using a questionnaire. Other relevant information was obtained through simple observation and existing literature.

The research revealed that presently, 47.5% of the households are using communal taps whilst the remaining 52.5% are still using shallow wells.
Of those households using wells, 62% purify their drinking water whilst 38% do not. Between August 1999 and August 2000, only 30% of the households had experienced water-borne diseases in George compound. The types of diseases that were experienced during this period were diarrheoea, cholera and dysentery.

The benefits from the water project have been seen through the reduction of water-borne diseases which were previously high. The water project has also brought about convenience due to the location of taps closer to the households and other also amenities which are discussed in chapter five. Other benefits are that time and energy are being conserved since the water sources are nearer. Lastly but not the least, money is also being saved by those households that had to pay for water from vendors.

To conclude, it can be said that water levies have both positive and negative effects on the George compound community. The positive effects are those associated with the paying of levies including accessibility to clean and safe water and all the benefits mentioned above. The negative effect of water levies is that those who do not pay the levy have to use shallow wells. This usually leads to a decreased opportunity in accessing safe and clean water, especially if the water is contaminated and not properly treated. This consequently leads to an increase in the incidences of water-borne diseases.

CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

Although George compound lies above an abundance of water, it has faced water problems since its inception. Currently, the compound is being serviced by a clean and safe water supply from the communal taps installed by the Japan International Cooperation Agency (JICA). The provision of good quality water and proper sanitation are vital not only to meet the needs of every household, but also to prevent the occurrence of water-borne diseases.

Some households in George compound still obtain their water from shallow wells. The wells, usually located in the vicinity of pit latrines are a cause for concern as the two are dug close to each other since the plots are very small. In most cases, no consideration is taken concerning the minimum separation distance between the two structures. Another aspect that is not taken into consideration is the side to which the pit latrine and shallow wells should be located with respect to the slope of the land and consequently the water table. The well should be located at a higher elevation than the pit latrine to avoid the possibility of sewerage water in the pit latrine from mixing with the water in the well. This is because during the rainy season, when ground water is abundant, there is a high probability or sewerage water flowing into the wells therefore making the well users vulnerable to water-borne diseases, especially if the water is not treated or purified by either chlorinating or boiling. The shallow wells may meet the ware demands but problems of water-borne diseases such as cholera and dysentery are associated with these shallow wells. Proof that these wells are not conducive for drinking water has been shown by numerous reports of outbreaks of water-borne diseases, especially cholera, which is predominantly preventable [Times of Zambia, 25/3/1999].

Due to the increase in the cases of cholera in George compound, JICA in conjunction with the Government of Zambia and the Lusaka Water and Sewerage Company (LWSC) initiated a community-based water project, which was implemented in 1995. The projects' main objective was to provide the community with a clean and safe water supply. The project involves some community members in the management sector. The George Residents Development committee (GRDC) was set up and comprises tap leaders from the community who ensure that the taps are opened at appropriate times and also make sure that only households who have paid the levy have access to the communal taps and other facilities of that the water project provides.

For the project to be sustainable, water levies have been introduced. These water levies of K3000 have to be paid by each household every month in order for them to have access to the clean and safe water provided by the water project. However, even though some households enjoy the benefits provided by the water project, there are some households that have no access to the water project's communal taps and laundry facilities because they do not have levy cards as a result of not paying the water levy. As a result they result to drawing their water from the hand-dug wells in their backyards.

1.1 PROBLEM STATEMENT

Despite the community-based water project and its benefits some households still use water from shallow wells. To meet their water needs, they resort to drawing their water from wells dug in their backyards. In some cases these shallow wells are near pit latrines and this leads to a high possibility for the occurrence of water borne diseases.

1.2 STUDY OBJECTIVES

1.2.1 Overall objective:

To find out the effects and the benefits of water levies from a community-based water project.

1.2.2 Specific objectives:

(i) To assess the approximate percentage of households with access to the water project's communal taps.

(ii) To find out the extent of water purification within the households using shallow wells.

(iii) To assess the extent of water borne diseases in George compound.

(iv) To find out the benefits from the community water project in George compound.

1.3 RESEARCH HYPOTHESES

In order to attain the objectives the following hypotheses were tested.

(i) The majority of households in George compound have no access to communal taps.

(ii) There is an association between the water purification method used and the extent of water borne diseases in a household.

(iii) Water borne diseases are more prevalent in households using shallow wells than in households using communal taps.

(iv) The households using communal taps ~~using~~ benefit from the satisfactory service provided by the water project

1.4 RATIONALE OF THE STUDY

The importance of water cannot be over-emphasized, as water is life. This is why there is great need in looking at how households access water and to what extent the local community is involved in domestic water supply and sanitation programmes.

All over the world, water supply systems are being installed and people are beginning to wonder why the expected health benefits are not materializing [Elmendarf, 1990]. Water borne diseases are generally associated with poor water quality and sanitation and therefore focus should be put on getting rid of diseases caused by poor water supply in peri-urban unplanned settlements.

The significance of this study is therefore to bring to light the effects that non-accessibility to a clean and safe water supply can have on a community and the benefits of accessibility to a clean and safe water supply. Information generated from this research may be used to assess to what extent water levies determine accessibility to a clean and safe water supply and the extent of water borne diseases, not only in George compound but also in other compounds with similar water reticulation systems, housing and socio-economic structure. The findings from this research may help policy makers to come up with appropriate recommendations on the course of action to be undertaken to make such projects more beneficial and more successful both socially and economically to the entire community.

1.5 ORGANISATION OF THE REPORT

This report has six chapters. Chapter one is the introduction with sub-sections while chapter two looks at the study area, which is George compound. Chapter three reviews the literature that is available on the research topic and the evident gaps in literature. Chapter four deals with the study methodology including methods of data collection, data sources and the problems encountered during the study. Results and the discussion are presented in the fifth chapter whilst the sixth chapter concludes the study.

CHAPTER TWO

LOCATION AND DISCRIPTION OF THE STUDY AREA

2.0 LOCATION OF THE STUDY AREA

George compound is an unplanned settlement in Lusaka. It is located in the western part of Lusaka. It lies within the latitudes 15° 22' South and 15° 24' South and the longitudes 28° 14' East and 28° 15' East (see Fig 2.1).

2.1 CLIMATIC CHARACTERISTICS

The study area has a typical tropical characterized by four seasons namely: the rainy season (November- March); the post–rains warm season (April- June); the winter dry season (June- April); and the hot season (September- November). The annual rainfall averages 803 mm and the temperatures are moderate, the average minimum being 9.6° C and the average maximum being 31.2° C (Williams, 1983).

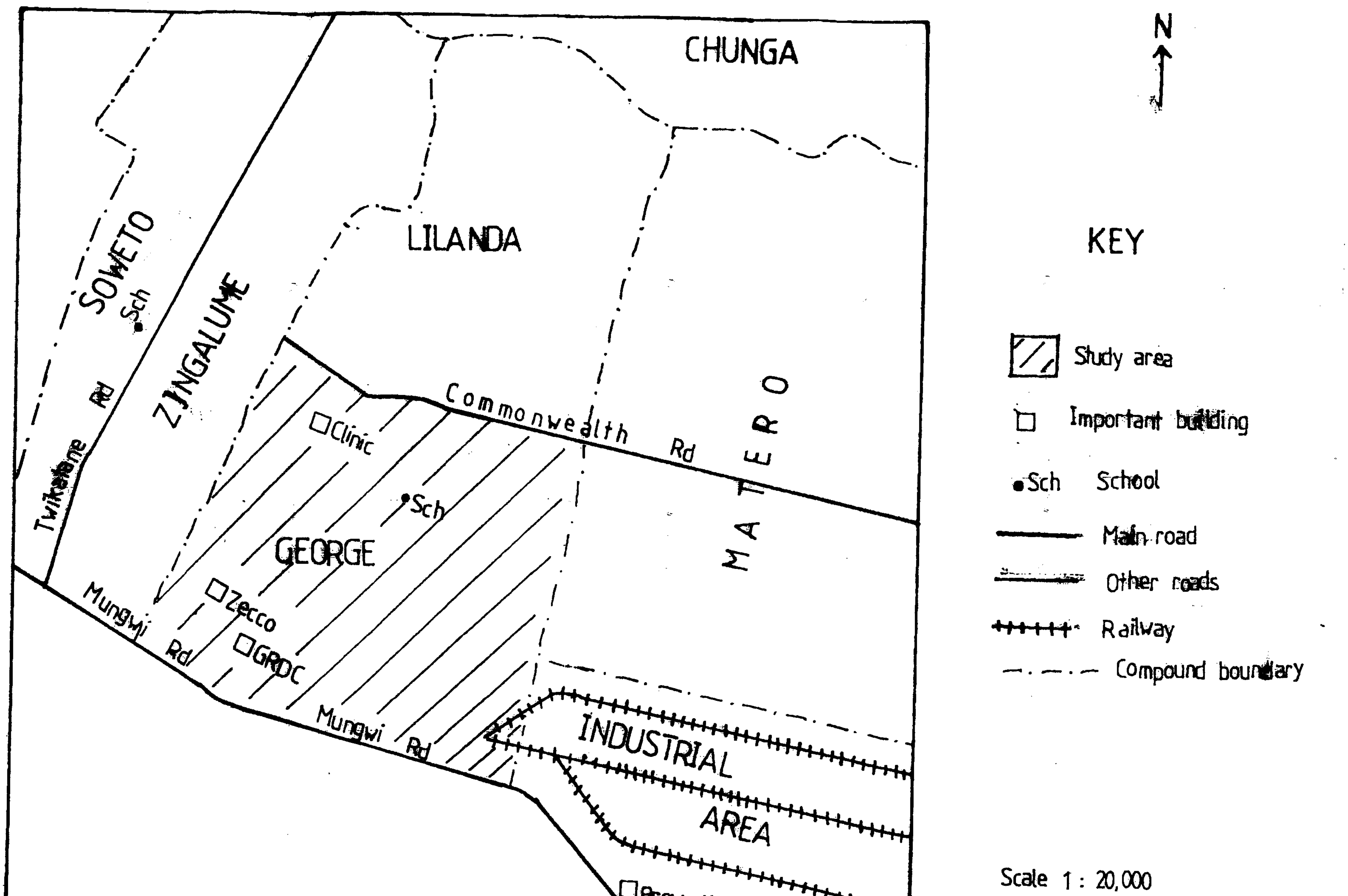
2.2 GEOLOGY

George compound area lies at an altitude of about 1300 m above sea level (Williams, 1983). It lies above an extensive outcrop of limestone. The soil is generally thin so that the rock is seen at the surface in many areas.

2.3 DRAINAGE

The limestone has no natural surface water drainage but underneath the outcrop is an aquifer with the highest ground water potentials in the country (Williams, 1986). Ground water circulates in the fissured, cavity-riddled sections common within it, with the main

FIG 2.1: LOCATION OF GEORGE COMPOUND



water yielding level being between 27 and 40 m deep (Williams, 1983 and 1986). Lacking surface water for most of the year, paradoxically the limestone can flood extensively during wet periods. This flooding occurs due to the fact that with prolonged and heavy rains, the level of the water table can rise to the surface, whilst there is no natural system of drainage lines to allow the flood waters to drain away.

2.4 POPULATION SIZE AND NUMBER OF HOUSEHOLDS

George compound is a low cost, high-density area. According to the 1990 population census, it has a population of 49,836 and approximately 5,234 housing units (C.S.O, 1990).

CHAPTER THREE

LITERATURE REVIEW

3.0 INTRODUCTION

Water is essential to all as a basic daily human need of life. It is important that people have access to clean water in order to prevent the outbreak of water borne diseases and to be able to enjoy the benefits that come with a clean and safe water supply. The central role that water plays in daily life was recognized in the International Drinking Water Supply Decade plan (IDWSSD) which was established by the general assembly of the United Nations in 1980. This provides a framework for a massive effort to bring safe water and sanitation to half of the world's population irrespective of the cost of water.

3.1 A NEW FOCUS ON WATER RESOURCES

United Nations Children's Fund (UNICEF) programs' emphasis is moving away from technology and towards aspects of water supply. The programs are now focusing on maximizing health and other benefits from water through synergistic integration of water supply with sanitation, health and education programs, and striving for long-term self-sufficiency through the empowerment of communities to manage their own water supply schemes through payment of tariffs [UNICEF, 1999,p. 1].

At the 1984 IDWSSD conference held in Lusaka, the resident coordinator of the United Nations Operational Activities for Development, Dusan Dragic gave the following speech:

"In the past, large-scale engineering and construction approaches predominated...these systems required high foreign exchange costs, which greatly inhibited their development in developing countries. However today, innovative and alternative methods are being applied increasingly, for instance, in constructive participation of the community at large to bring about low costs, their direct involvement and thus more efficient resolutions Such actions are proving not only technically viable and popularly acceptable, but also financially affordable...these innovative approaches to solving the problems of water supply and sanitation will not only mobilize more and more local communities to take part in reshaping their destinies away from the drudgery and sicknesses associated with lack of clean water and sanitation, but will also mobilize international sources of funding to assist them in their endeavor" [GRZ, 1984].

3.2 ACCESSIBILITY TO CLEAN AND SAFE WATER

Clean and safe water has been made accessible to the Zambian people through assistance from various bilateral and multilateral donors such as the European Union (EU), World Bank, the Norwegians and the Dutch. Participation of the community at large, to bring about low costs, their direct involvement and thus effective Conference held in Argentina in 1977 passed a resolution, which sets the basic need concept for safe drinking water.

The resolution stated that:

"All people, whatever their state of development and their social and economic conditions, have the right to have access to drinking eater in quantities and of quality equal to their basic needs, similar considerations apply to all the disposal of waste, including sewerage…which is main task of the public sanitation systems of each country" [GRZ, 1984].

Despite the costly investments made, the IDWSSD of the 1980s fell short of meeting its goal of water and sanitation for all…In 1994 more than 220 million urban dwellers (13 percent of the developing world's urban population) still did not have access to a safe and reliable water source, while more than 420 million (25 percent of the developing world's urban population) did not have access to sanitation services [WRI/UNEP/UNDP/WB, 1996,p. 105]. In urban areas in Zambia between 1980 and 1995, 64 percent of the urban population had access to safe drinking water and 67 percent had access to sanitation services [WRI/UNEP/UNDP/WB, 1996,p. 152].

As a result of persistent cholera outbreaks in George compound, the Government of Zambia requested for a grant from the Japanese Government for the construction of safe water and supply facilities. In this regard, the Japanese Government, through their consultants proposed an independent water supply system for the area. Each water supply system has a borehole with a 300 cubic meters storage water tank with chlorination facilities [GRZ, 1994]. [see plate 2 pg 29(b)]

From the surveys that have been carried out by JICA only about 50 percent of the households are using the water project's communal taps whilst the rest use shallow wells. Scientists collected samples of water from 24 shallow wells in George compound from JICA and out of these, 15 were contaminated with cholera germs, i.e., 65 percent. The Lusaka City Council was given a task to bury all the shallow wells within George compound but only a few have been buried [Times of Zambia, 25th March 1999].

Water levies

The economic price of water accessibility is important in any water supply program. This does not only facilitate for the maintenance of the water project but also plays an important role in the success and sustainability of any water reticulation system.

In a study conducted in Dar es Salaam and Dodoma in Tanzania, the general picture emerging from the interviews is one of respect for water quality as the user happens to perceive it and for increasing willingness to pay for better water as the user is exposed to its benefits [White et al, 1972,p. 188].

However in some countries and cultures, the collection of monthly flat-rate water charges in difficult. Generally, arrears seem to be a problem especially in Africa where water is viewed as a special gift from God and therefore always free [Saunders and Walford, 1976,p.181].

In George compound, both scenarios described by White (1972) and Saunders and Walford (1976) are seen. There are those willing to pay for water and those who are not willing to pay. The Memorandum of Agreement for the George compound JICA water reticulation states that every household should pay a user levy in order to have access to safe drinking water from the water project. This levy was initially K1000 and has gradually increased to K3000 at present.

During a tour of JICA projects, the JICA resident representative, Mr. Mitsuo Ishikawa said that it was JICA's hope that the communities would continue to maintain and sustain their water reticulation facilities for the good of their health [Times of Zambia, 25th March 1999]. This maintenance is only possible if the users of the water project's facilities pay the water levies.

Governments, especially in developing countries have historically subsidized the cost of water however; one of the lessons that have emerged from the IDWSSD is that water should be treated as an economic commodity to be paid for by users [GRZ, 1994]

3.3 WATER QUALITY AND HEALTH

Historically, the principle justification for water projects has been to improve health, and the link between water and health has long been understood. In the 1960s and 1970s, most water supply projects focused on the improvement of water quality, which, in itself, was expected to eliminate the developing world's most prevalent and deliberating diseases [UNICEF, 1999,p. 5].

The 2001 World Water Day's theme was "**water for health**," stressing how water quality is important in maintaining good health.

3.3.1 Biological quality of water

Bacteria and other pathogen are the greatest threat to the quality of water for domestic consumption. Water pathogens are difficult to detect in a laboratory and therefore water is tested to show if faecal matter contaminates it. The most commonly used indicator of faecal contamination is the presence of bacterial microorganisms called faecal coliforms. According to WHO, total coliforms in drinking water should not exceed 10 per 100 ml. In developing countries there is high faecal coliform in untreated drinking water reflected in the high mortality rates of infants from diarrhoea and gastro intestinal infections found in these areas [UNEP/ GEMS, 1991].

To ensure that contamination of water is reduced water purification either by boiling or chlorination is necessary. Both these methods kill germs in water that cause diarrhoeal diseases. A chlorine container costs K500 and this container lasts a whole month in an average household. Boiling on the other hand when a brazier is used takes up K600 per day, which is approximately K18000 per month [personal communication SFH, 2000].

3.3.2 Water and health

In the 1990s health impact studies have led to the consensus that sanitation alone has a larger impact on health than does water alone. Secondly, health education, together with sanitation, has more of an impact on reducing water borne diseases than does water alone because many of the causes of diarrhoea are not water borne. Thirdly, improvements in the quality and quantity of water is important for public health, if implemented together with effective sanitation and hygiene education programs. As the IDWSSD progressed, further studies suggested that water supply, even when combined with sanitation as was relatively ineffective as a health improvement measure without a well integrated hygiene education program [UNICEF, 1999,p. 6-7]. There are two prevalent strategies that can be used to reduce water borne diseases such as cholera, diarrhoea, typhoid and dysentery, these are by improving water quality and by preventing casual use of other unimproved water sources [UNICEF, 1999,p. 5].

Incidences of cholera in George compound have been seen in many occasions. On the 12th of March 1999, George Clinic was declared a cholera center after cholera cases shot up to 479 victims within a week [Personal communication, George Clinic 2000]. This came as a blow to the water project's officials especially since the JICA health education team conducts health talks at the communal tap sites. This health education aims at teaching people on how to maintain proper hygiene to prevent water borne diseases especially cholera.

Effects of waterborne diseases encompass the decrease in labour productivity, the increase in public cost of therapy and offsetting costs of public health preventative measures. Where completely adequate water supply is provided, deleterious effects on health would approach zero [Saunders and Walford, 1976,p. 257].

In his opening speech at the IDWSSD conference in Lusaka in 1984, the then Prime minister, Nalumina Mundia stated that:

"On average, it is estimated that a Zambian below the age of 5 years experiences three to six bolts of diarrhoea per year and by adequately improving water supply alone, there would be a drastic reduction or even elimination of more than 30 preventable water-related diseases of which ten rank amongst the contribution to mortality in Zambia," [GRZ, 1984].

3.4 THREAT TO GROUND WATER BY ON-SITE SANITATION

Winblad and Kilima (1985) outline that the following points should be considered building a pit latrine

With regard to the location:

-The position in relation to wells

-The condition of the subsoil

-The direction of wind

-The space available

In an area with limestone formations, the pit latrine must be located downhill from the well. This is because pollution from the latrine may travel long distances through limestone. To prevent groundwater and well pollution, if the latrine is not downhill from the well, it should be placed at least 15 meters away from the well [Winblad and Kilima, 1985,p. 65].

The potential for on-site sanitation to cause significant pollution of ground water has been known for many years. Various minimum safe distances separating latrines and ground water sources have been suggested. The impact on ground water from on-site sanitation is likely to be site-specific and therefore a universal minimum safe distance is unlikely to be appropriate [Waterfront, 1999, Vol. 13,p. 16].

One disadvantage of hand-dug wells is that although they are many cases of very deep ones, most of them are relatively shallow (less than 15 to 20m) and tend to tap water from the uppermost (unconfined) aquifer, and are thus more susceptible to bacteriological contaminations and the effects of falling water tables. On limestone seepage of water is very easy therefore if water at the top is polluted it easily seeps through causing pollution.

A case study in 1999 by the ARGOSS project team of UNICEF in Bangladesh in two peri-urban areas of Dhaka on an aquifer found that 95 percent of the boreholes had a pit latrine within 15m, with two latrines within 15m as the average, and 38 percent of the boreholes had a pit latrine within 5m. However, results to date do not indicate that serious microbiological contamination of ground water is widespread; most boreholes sampled showed faecal indicator bacteria to be absent or in low numbers, with serious contamination present only sporadically. However, it is possible that the pit latrines could be a source of contamination, the bacteria reaching the water source through lateral movement of leacheate at shallow depth, particularly where the unsaturated zone beneath the latrine is thin and the permeability of shallow layers is high. Providing an adequate separation distance between water sources and latrines may be relatively difficult to achieve in high-density informal settlements which form an integral part of many modern towns and cities [Waterfront, 1999, Vol. 13,p. 16-18].

UNICEF (1999), points out that there should be no sources of contaminators, such as latrines and garbage damps close to or uphill of the well.

Like many peri-urban areas, George compound is a high-density settlement with informal housing where residents provide their own sanitation facilities in terms of pit latrines. In many instances, two basic structures are seen, a pit latrine and a shallow dug out well. These two structures are almost always sited in the immediate vicinity of each other. This has resulted in the contamination of ground water especially in the shallow aquifer, which is found at depths of about 4 to 8 meters deep. As ground water percolates through bedrock it may be naturally purified but the natural purification factor of the limestone is thought to be very limited due to the shallow depth of the maximum circulation zone in the top 25 m below ground level. Once the pollutants reach the water table only a small amount of subsequent dilution can occur (Williams, 1986). Since some residents of George compound use shallow dug out wells, the result has been the persistent outbreaks of water borne diseases, especially cholera.

Williams (1986) cites that tests carried out in 1974 by the City Council on water from hand-dug ells in various compounds around Lusaka revealed that all the water tested was bacteriologically polluted. No samples collected at the end of the dry season had a high concentration of pollutants. The occurrence of heavily polluted water corresponded at the surface with the residential areas reliant on pit latrines. It is believed that pollution from the pit latrines may be exacerbated in the rainy season when surface deposits of sewerage and other organic waste are leached and especially if the pit latrines become flooded.

As cited under section 3.2 of this report, samples of water collected from a number of shallow wells in George compound showed that 65 percent of the wells sampled were contaminated with cholera-causing germs.

3.5 BENEFITS FROM IMPROVED WATER AVAILABILITY [1]

The UNICEF (1999) water handbook analyzes the complete socio-economic impact of a water supply project, whose full impact should be taken into consideration including reduction of disease occurrences. There are a number of potential benefits to improved access to water supply, in addition to the reduction of diseases; these include convenience, saving of time, saving of energy and the saving of money. A loser, cleaner source of water can produce immediate and far-reaching improvements on women's lives in any community.

Reduction in water borne diseases

This has already been tackled under section 3.3.2 were it was pointed out that access to a clean and safe water supply reduces the incidences of water borne diseases. This is one of the prime benefits of improved water supply as the disease-causing bacteria and pathogens are removed from the water.

Convenience

Most people, when identifying improved access to water as a priority, are thinking of convenience. Everybody wants water as close as possible to their home, simply because it is more convenient. As such, convenience is as important a consideration as health benefits.

Time saved

Women and children spend many hours a day collecting water from distant sources and thus the time saved by having a safe water source closer to the household can be very significant. The time saved is used for much needed leisure or, possibly activities relating to childcare, or economic production. Less time spent fetching water is one less possible excuse for not allowing girls to attend school.

Energy saved

Studies have shown that women who walk long distances to collect water can burn as much as 600 calories of energy or more per day, which may be one third of their nutritional intake. Closer sources of water can thus improve the nutritional status of women and children and hence their health and well being.

Money saved

In many communities, especially in poor urban areas, households continue to have to buy water from vendors, often at exorbitant rates. Such direct financial costs can absorb up to 30 percent of total cash income. Measures that improve water availability reduce its cost and are therefore of direct benefit to families, and particularly to women, who are often responsible for finding the funds to pay for water.

3.6 GAPS IN LITERATURE

Generally, it can be said that problems and failures encountered by the water project with respect to payment of water levies can be attributed to lack of interest by women in the water project particularly at the planning and consultation stages. The planning may not have been based on the capabilities of households to pay the water levies and the consultation team may have been done through community dignitaries such as councilors, who may not be conversant with the economic situations in households.

In this research, it was important to find out why, even when the water levy is subsidized, some households continue to use shallow wells. It is important to find out whether the key players in the Japanese funded water project in George compound have tried to find out why some households still have the perception that water levies are unaffordable or not necessary. The research also brought to light the lack of literature and research related to water tariffs in Zambia.

There is also need for more research pertaining to water and sanitation in Zambia as regards contamination of underground water. This is necessary because very little literature exists on quantitative data on biological and pathogenic contamination of ground water by on-site sanitation.

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[1]This whole section has been adapted from UNICEF Water Handbook, 1999,p. 9-10. UNICEF, New York.

CHAPTER FOUR

METHODOLOGY

4.0 INTRODUCTION

In this chapter, data collection methods and the problems that were encountered in the field research are discussed.

4.1 DATA SOURCES AND METHODS OF DATA COLLECTION

The methods that were employed in this research project included primary and secondary data collection methods.

4.1.1 Secondary sources

These were obtained from archival sources. These sources constituted literature available on community-based water supply projects and sanitation. This was done in order to find out what had already been researched upon in other places where water projects have been installed. The main sources of these records were: the University of Zambia main library where books, newspapers and journals were used; JICA Headquarters where journals and newsletters were used and UNICEF which provided the researcher with handbooks and journals.

4.1.2 Primary sources

Primary data was obtained through interviews, both structured and unstructured, and field observation.

Scheduled structured interviews

For this, a questionnaire was used (Appendix 1). The questionnaire was administered to each household taking a form of a one to one interview so that the respondent stayed in topic, and at the same time be open enough to introduce and discuss relevant issues. The interviews were conducted in vernacular in order to allow for easy communication. The main characteristics of the questionnaire included trying to find out: the respondent's characteristics; water accessibility; extent of water borne diseases; and the benefits from the community-based water project in George compound.

Unstructured interviews

Short interviews were conducted at the GRDC offices to try and find out more about the water project. This information was necessary for making comparison to what was found in this study.

Field observations

Field observations were conducted in two ways:

(a) Simple observation

This was done by looking at activities that were going on in project area and recording the necessary information, the main focus being on the water facilities, location of pit latrines and wells with respect to the separation distance and the slope. The separation distance was physically measured.

(b) Participatory observation

The researcher helped a few respondents to fetch water so as to get more involved and reduce suspicion.

4.2 SAMPLING PROCEDURE AND SAMPLE SIZE

According to the 1990 census of population and housing, George compound has a total of 5,234 households. The target population in this research consists of households using communal taps of the water project and those using shallow wells. A sample of 40 households was picked from the target population.

The sampling procedure used was simple random sampling, which provides equal opportunity of selection of each household in the target population. Since the compound has a lot of households, a random number table was used. The random numbers were first chosen as four digit numbers from 0001 to 5,233. Forty numbers under the value of 5,234 were picked from a random table and put in ascending order from the smallest to the largest number. This was done to avoid confusion when numbering the houses since most of the houses are not numbered and are not built in proper rows or streets. For easier interviewing, the houses were counted from 0001starting at the house directly opposite the GRDC (see Fig. 1.0) and when a chosen random number came about, a questionnaire was administered to avoid having to go back to the household.

The research design used is the contrasted group design. Two contrasted groups of households were chosen i.e., one group having access to communal taps and the other group having household using shallow wells. These two groups were then compared using the responses generated from the questionnaire. If differences arose based on the objectives then inferences were made.

4.3 DURATION OF DATA COLLECTION

Data collection in George compound was conducted in August 2000. The field collection lasted two weeks.

4.4 PROBLEMS ENCOUNTERED DURING DATA COLLECTION

There were difficulties and problems encountered during data collection. Although the use of random numbers is very reliable and the technique is very simple, its main limitation is its complete reliance on the existence of a complete list of all the elements of the population. This condition was not adequately met because the population and housing census was not up to date, as the 2000 census has not yet been published. In George compound, houses are being built every day and there is therefore a danger of incomplete or biased lists. The number of households was very large leading to a time-consuming randomization process.

Some respondents using shallow wells may have given false information regarding the water source they use or whether they had experienced water borne diseases for fear of victimization and embarrassment respectively.

The personal interviews were costly in terms of time as hours were spent interviewing the participants and traveling extensively to reach the households that were to be sampled.

4.5 CODING AND DATA ANALYSIS

After the data was collected coding summarized it. The data was analyzed and summarized using percentage frequency tables, bar charts and pie charts. The data was analyzed using excel computer software. Most of the hypotheses were tested using the Chi-Square test (X^2).

CHAPTER FIVE

RESEARCH RESULTS

5.0 INTRODUCTION

This chapter represents the findings of the study. To try and meet the objectives of this study, issues pertaining to the characteristics of the respondents, water accessibility, extent of water borne diseases and the benefits from a community-based water project in George compound have been analyzed and the results are presented and discussed here.

5.1 CHARACTERISTICS OF THE RESPONDENTS

The main characteristics of the respondents in this study include gender, occupation and literacy level.

5.1.1 Gender and occupation of respondents

The sample consisted of one respondent from each household i.e., 40 respondents. Out of the 40 respondents, 97.5 percent were females whilst only 2.5 percent were males. As regards the occupation of the respondents, 10 percent were in formal employment, 32.5 percent were unemployed and 57.7 percent were self-employed (see Table 5.1). A high percentage of the respondents were female mainly due to the fact that women are the ones who look after the home and are responsible for sourcing water for domestic use. Males are usually away from home during the day and return home in the evenings. All in all, 67.5 percent of the respondents were employed, either formally or informally. This means that these households have a source of income to pay for the monthly water levies.

However, despite the sources of income, some households still obtain their domestic water from shallow wells, as they do not pay the monthly water levy of K3, 000 for access to clean and safe water from the communal taps.

Table 5.1: Gender and occupation of respondents (n=40)

Occupation of respondents	Percent males	Percent females	Total
Formally employed	0.0	10.0	10.0
Self-employed	2.5	55.0	57.5
Unemployed	0.0	32.5	32.5
Total	2.5	97.5	100.0

5.1.2 Educational attainment of respondents

Out of the 40 respondents, 27.5 percent had no formal education at all. The majority, (52.5 %) had attained primary education, 12.5 and 7.5 percent had attained secondary and tertiary education respectively. Figure 5.1 shows the educational status of the respondents. Despite the fact that 20 percent of the respondents had attained higher education, there was a generally low educational status in most of the respondents, meaning that this may have contributed to the lower number of households with access to clean water from communal taps. This is because 73 percent of those respondents without formal education were still using shallow wells and 71 percent of the respondents with only primary education were using shallow wells. Of the respondents who attained secondary school, only 40 percent were using shallow wells and of those who attained tertiary education none were using shallow wells (see Table 5.2)

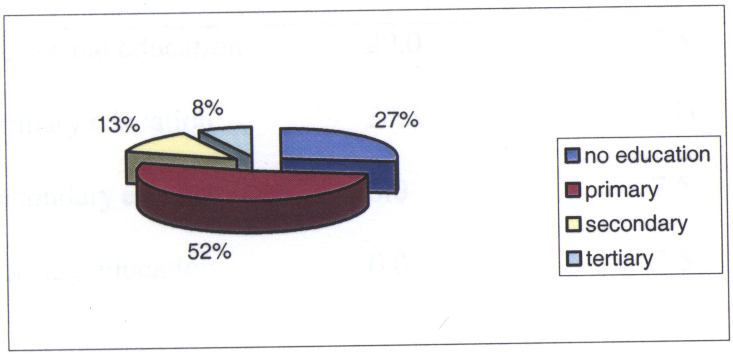


FIG 5.1: Educational status of respondents (n=40).

Those who had a low education attainment are more likely to use shallow wells whilst those who had a higher education attainment are more likely to use communal taps. This is because those with higher education have been exposed too much more knowledge and welcome change much more easily than those with lower education attainment. People with more of an educational background have a higher capacity of understanding new issues and are more likely to understand the dangers of using shallow wells.

Table 5.2: Literacy level of respondents in relation to the water source used by the households (n=40).

Educational level attained	Shallow wells (%)	Communal taps (%)	Total
No formal education	20.0	7.5	27.5
Primary education	37.5	15.0	52.5
Secondary education	5.0	7.5	12.5
Tertiary education	0.0	7.5	7.5
Total	52.5	43.5	100.0

5.2 ACCESSIBILITY TO WATER IN GEORGE COMPOUND

The United Nations (1978) states that all people, whatever their stage of development and their socio-economic condition have the right to have access to drinking water in quantities and of a quality equal to their needs.

5.2.1 Accessibility to water before and after the implementation of the water project

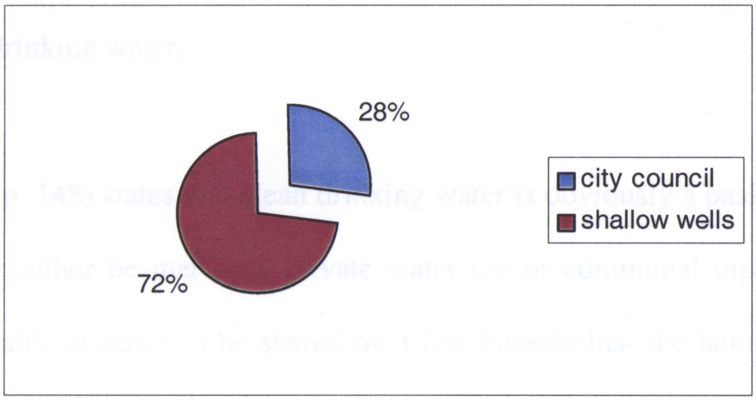
The research shows that prior to the implementation of the water project, two main water sources existed. One of the sources was the City Council taps, which were located at irregular intervals and sometimes far from some households. Out of the households interviewed, 27.5 percent obtained their water from the City Council taps. These taps usually had interrupted water supply, with the most reliable ones being in Zecco Camp. This erratic water supply meant people meant people had to travel long distances to

PLATE 1 : WOMAN FECTCHING WATER FROM A SHALLOW WELL LOCATED ONLY 3.2 METERS AWAY FROM A PIT LATRINE.

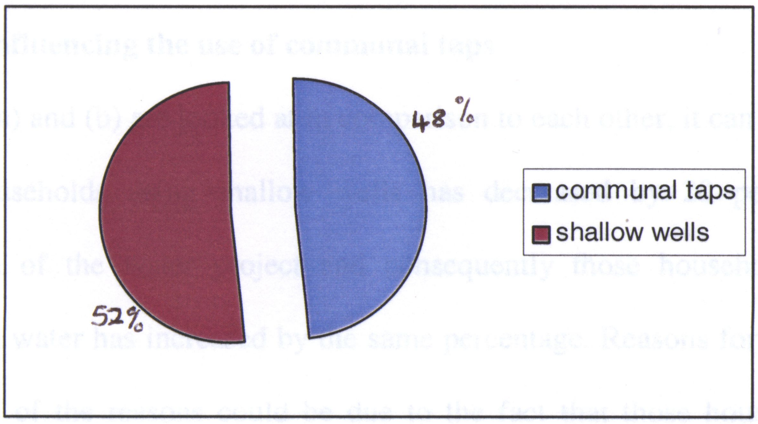
PLATE 2 : WATER TANK OF THE WATER PROJECT

PLATE 3 : COMMUNAL WATER FACILITIES AND TAPS OFFERED BY THE WATER PROJECT

source for water. The second source of water was the shallow wells from which 72.5 percent of the household obtained their water. These wells are mostly reliable except during years of low rainfall when the water table is low and the wells dry up. See figure 5.2 (a).



(a)



(b)

FIG 5.2: Water accessibility prior to (a) and after (b) the implementation of the water project (n=40).

Presently, after the implementation of the water project, 52.5 percent of the households still use shallow wells whilst 47.5 percent use communal taps operated by the community-based water project. From both scenarios, i.e. prior to and after the implementation of the water project, it can be seen that use of shallow wells is more popular in the majority of the households. The number of households using shallow wells is higher than those using communal taps even though shallow wells are associated with bacteriological contamination. Communal taps are, on the other hand synonymous with clean and safe drinking water.

The ILO (1977,p. 148) states that clean drinking water is obviously a basic need which in urban areas can either be met by a private water tap or communal piped water points within a reasonable distance to be shared by a few households- the latter being the case particularly in urban squatter areas.

5.2.2 Factors influencing the use of communal taps

When Fig 5.2 (a) and (b) are looked at in comparison to each other, it can be seen that the number of households using shallow wells has decreased by 20 percent after the implementation of the water project and consequently those households using taps providing clean water has increased by the same percentage. Reasons for this change are numerous. One of the reasons could be due to the fact that those households without shallow wells in their backyards had to buy water from those people with wells at a price of K50 per bucket drawn. This means that they spent not less than K15, 000 per month. Compared to the water levy, which was initially K1, 000 and is currently K3, 000, using communal taps rather than shallow wells means that these households are saving a lot of money. A second reason could be that the health education talks that are held to sensitize people on the dangers of using untreated water from shallow wells have had a positive impact. A third reason could be due to the increased incidences of cholera in the compound most prevalent in the households using shallow wells. The disease is not only life threatening but also embarrassing to the individual infected. This has prompted households to pay their water levies so that they may have access to safe and clean water without the fear of contracting cholera. Another reason could be that as the incidences of water borne diseases increased in the compound, the Lusaka City Council undertook the task of burying shallow wells in 1998. Even though not all the wells were buried, the burying of some wells meant that some households no longer had a water source and therefore they had to start using the water project's communal taps.

5.2.3 Factors influencing the use of shallow wells

It is important to try and find out why some households still shun communal taps in preference of shallow wells, which are associated with contaminated water, which poses a threat to their health. As earlier eluded to under section 5.1.2, educational status plays an important role in the water source used. Maingaila (2000,p. 22) further cements this view by saying that when the educational status of respondents is low; it contributes to the low participation in the water project.

This view is however debatable as the respondent is sometimes not the breadwinner and in this case the respondent's education status is irrelevant.

Some households do not use communal taps as the wells are perceived as being more convenient due to their closeness to the households compared to communal taps. Maingaila (2000,p. 26) suggests that this scenario may because the service provider so much as to ensure that the taps are conveniently located for the targeted households did not adequately carry out the extension aspect of the project.

One flimsy excuse for not using communal taps was that the water from the taps has an unpleasant taste due to the added chlorine and therefore preferred water from shallow wells, as they are accustomed to this taste. However, the main that was given as the reason for the continued use of shallow wells was the issue of the cost of the water levy, which is perceived negatively by most of the households using wells.

Forty-three percent of the households using shallow wells said they could not afford the monthly levy of K3, 000 due to their low financial statuses in their homes that has been worsened by the increasing costs of living. They said that by the time they pay their rentals, school fees, food and other basic necessities, very little money, if any, was left. Thirty-three percent perceived water as a free commodity and that purchasing water is unacceptable according to their cultural beliefs. Twenty-four percent had arrears which they could not clear off as they had to pay K6, 000 in order for them to be allowed to use the communal taps and they said they had no of raising this amount of money (see Table 5.4). Saunders and Walford adequately describe the situation presented here under section 3.2 of the literature review on water levies.

Table 5.4: Three major factors preventing some households from using communal taps (n=21)

Factors	Percentage frequency
Unaffordable water levies	43.0
Water is free commodity	33.0
Arrears	24.0
Total	100.0

How justifiable is the K3, 000 water levy?

Out of all the households interviewed (n=40), only 42.5 percent think that the water levy is justifiable (see Fig 5.3).

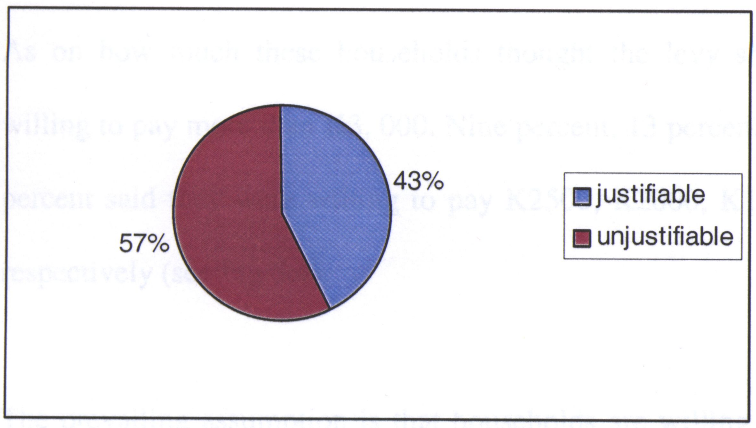


Fig 5.3: Percentage of households perceiving K3, 000 as Justifiable (n=40)

Of the respondents who said the water levy was justifiable, 70 percent use communal taps whilst 30 percent use shallow wells.

One of the lessons that emerged from the IDWSS was that water should be treated as an economic commodity paid for by the use. In developing countries, according to an analysis of the World Bank-financial projects, consumers pay only about 35 percent of the costs of supplying water, [WRI/UNEP/UNDP/WB, 1996,p. 108].

The results of the study show that 57.5 percent of all the households interviewed think the water levy is unjustifiable. All these households wanted the levy to be reduced; this was further shown by their eagerness to be interviewed as they thought that these research findings would subsequently make JICA reduce the levies. However, the JICA Deputy Representative, Mr. Ando, made it clear that the reduction of water levies is a matter that the Zambian government and LWSC must decide [Times of Zambia, 25th March 1999].

Of these households, 30 percent use communal taps whilst 70 percent use shallow wells. As on how much these households thought the levy should be no respondents were willing to pay more than K3, 000. Nine percent, 13 percent, 26 percent, 22 percent and 30 percent said they were willing to pay K2500, K2000, K1500, K1000 and nothing at all respectively (see Fig 5.4).

The prevailing assumption is that households are willing to pay about 3 to 5 percent of their income for access to clean water, yet actual studies have reveal that some are willing to pay considerably more, some less [WRI/UNEP/UNDP/WB, 1996,p. 108]. The households in George compound thinking that the levy is unjustifiable want to pay considerably less than what is being charged. All the households that are not willing to pay anything for water all use shallow wells.

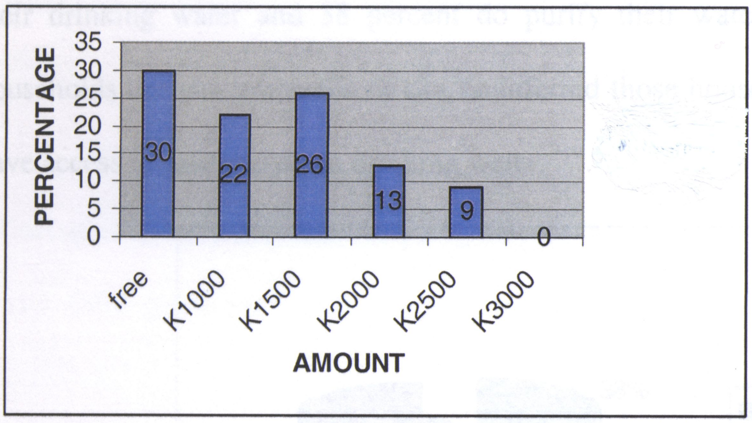


Fig 5.4: Percentage of households perceiving K3, 000 water levy as unjustifiable and the amount they are willing to pay (n=23)

5.2.4 Methods used to purify water drawn from shallow wells

" Bacteria and other pathogens are the greatest threat to the quality of water for domestic consumption. Bacteria originating from human faeces are a leading cause of child mortality, and water is a common transmission route. This faecal-oral cycle can best be broken by preventing bacteria from entering water for domestic consumption, if necessary, by purifying water which is already contaminated,"

(UNICEF, 1999,p.57). Methods commonly used to purify water that is already contaminated include chlorination and boiling. However boiling water is not a sustainable option not only because of the difficulty in obtaining firewood and the expense of other fuels but also because of the impact that the use of wood fuel has, which is deforestation.

Of the households using shallow wells, 62 percent purify their water whilst 38 percent do not, (see Fig 5.5). Twenty-nine percent boil their drinking water, 33 percent chlorinate their drinking water and 38 percent do purify their water at all. Even though some households use shallow wells, it can be inferred those households that purify their water have access to safe and clean drinking water.

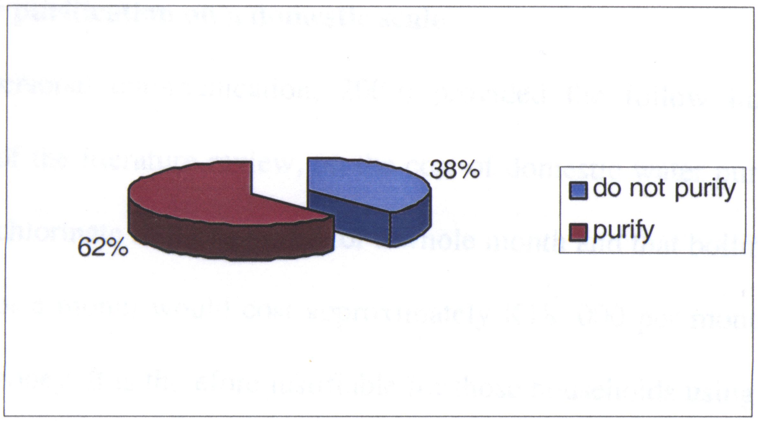


Fig 5.5: Extent of water purification in household using shallow wells (n=21).

Table 5.5: Water purification methods used in households using shallow well (n=21).

Methods of water purification	Percentage frequency
Boiling	29.0
Chlorinating	33.0
None	38.0
Total	100.0

Cost of water purification on a domestic scale

The SFH (personal communication, 2000) provided the follow information, under section 3.3.2 of the literature review, on the cost of domestic water purification. It takes only K500 to chlorinate drinking water for a whole month and that boiling drinking water on a brazier for a month would cost approximately K18, 000 per month. This is a very large sum of money. It is therefore justifiable for those households using chlorine to shun away from using communal taps because they save K2, 500 every month. However, those households that use charcoal to boil their drinking water as a means of water purification end up spending approximately five times more per month than they would if they were using communal taps. It is therefore not logical for a household not to afford a K3, 000, and yet be able to afford boiling water at a cost of K18, 000 per month. The explanation to this could be that the households boiling their drinking water on braziers have not been sensitized on the extra cost incurred. Access to this knowledge would reduce the money they spend on buying charcoal and consequently increase the amount of money available for other uses, payment of the water levy included.

Safety and cleanliness of domestically purified water

The SFH (personal communication, 2000) has shown that not all water that is purified is safe and clean. This is because boiled water car be re-contaminated whereas chlorinated water is protected from re-contamination as the chlorine remains in the water and kills germs that might try to contaminate the water. Table 5.6 shows that indeed, water that is purified is not necessarily safe and clean from bacteria and pathogens that cause water borne diseases.

Table 5.6: Extent of water purification and occurrence of water borne diseases (n=21).

	Boiling	Chlorination	None	Total
Had water borne diseases	19.0 %	5.2 %	33.0 %	57.0 %
No water borne diseases	10.0 %	28.0 %	5.0 %	43.0 %
Total	29.0 %	33.0 %	38.0 %	100.0 %

Table 5.6 shows that between August 1999 and August 2000 approximately two-thirds of the households boiling their drinking water experienced water borne diseases. During the same period, about 15 percent of the households chlorinating their water and 87 percent of households that did not use any purification method experienced water borne diseases. From these results, it can be said that households not purifying their drinking water had the highest incidences of water borne diseases, followed by those boiling their

water. Households chlorinating their water had the lowest incidences of water borne diseases.

The calculated Chi-Square (=38.5) at 2 degrees of freedom at 5% significance level shows that there is no association between the water purification method used and the extent of water borne diseases therefore we reject our hypothesis that there is an association.

It is a cause for concern that even after water was purified, some households still experienced water borne diseases. It was earlier stated that chlorinated water unlike boiled water does not risk re-contamination.

There are other reasons why these households experienced water borne diseases. For those boiling their water, the reason for experiencing water borne diseases could be as a result of not boiling their water for the sufficient amount of time needed to kill the germs or that the boiled water was not properly stored and thus became contaminated. For the households chlorinating their water, one of the reasons could have been that not enough chlorine was used. There are specified quantities of chlorine that have to be added to a specified amount of water in order to fully purify water.

Other reasons could be that the households did not purify their water on a daily basis or that they may have visited other households somewhere else where they drunk contaminated water and therefore got sick. Another reason could be that proper hygiene practices were not observed in the households that experienced water borne diseases as far as food storage and washing of hands after hand shakes and using the toilet are concerned.

White et al (1972) states that it is difficult in answering how far improving water quality will abolish water –related diseases because no matter how good the water quality, the water-related diseases do not vanish. This is because there are families with low standards of personal hygiene who still suffered from water-related disease in the study areas of Dodoma and Dar-es-Salaam… this can be allowed for, but is a warning against assuming that many ware-related diseases will disappear following improvement of water quality.

Therefore, it can be said that even though 62 percent of the households using shallow wells purified their water, only about three-fifths of these households had safe and clean water, as these did not experience water borne diseases.

5.3 WATER BORNE DISEASES

Water borne diseases include such diseases as diarrhoea, cholera, dysentery and typhoid. Water borne diseases occur as a result of drinking contaminated water and poor hygiene. Preventative strategies that can be used to reduce their occurrence include improvement of water quality, prevention of use of unimproved water sources and hygiene and educational talks (UNICEF, 1999).

5.3.1 Extent of water borne diseases in George compound

Of the total number of households interviewed, 30 percent had experienced water borne disease between August 1999 and August 2000 whilst 70 percent had not (Fig 5,6). None of the households using communal taps had experienced water borne diseases. This is not surprising as they had access to improved water quality. Health studies suggest that the degree of improvement in health to be expected in a population depends on the level of health in the first place, the economic status, cultural habits, educational level, the general environment including adequate means of waste disposal and income level [Saunders and Warford, 1976,p. 194]. These factors help in analyzing the situation in George compound. From the economic status and income level point of view, it can be said that those who are able to afford the water levies have access to clean and safe water and therefore enjoy the benefit of good and improved health. As cited by Saunders and Warford cultural habits, such as viewing water as a gift from God and hence as a free commodity is non existent in the households using communal taps as they know that water is an economic commodity. As earlier eluded to under section 5.1.2, higher educational level is associated with the use of an improved water source i.e. communal taps. UNICEF (1999) has already mentioned the importance of health education on good health. The study found out that 68 percent of the households using communal taps had attended the health education talks held by JICA officials. This góes to show that an improved water supply coupled with health education has a positive impact on the reduction of water borne diseases. Saunders and Warford also state that investing in complementary programs such as health education will increase the probability that the water supply and sanitation program will reduce the economic costs of disease treatment.

Waste disposal, such as sewerage disposal does not directly affect the water from communal taps as these taps are strategically placed and built in such a way that contamination is drastically reduced, especially since the water is piped from the water tanks after undergoing intensive purification. From this analysis, it is clear that the high degree of improvement in health in the households using communal taps is due to the fact that most of the factors influencing good health have been met. This may be one reason why there were no incidences of water borne diseases in the households using communal taps during the specified period.

All the households that had experienced water borne diseases were those using shallow wells. Reasons for the occurrence of water borne diseases are that these households were using unimproved water sources, which are likely to be contaminated by bacteria and pathogens causing water borne diseases. As earlier cited under section 5.2, some of these households do not purify their water at all and this predisposes them to all the germs in the water. Even some households that purify their water did experience water borne diseases probably due to the reasons given under section 5.2. Another reason could have been due to the fact that only 24 percent of the households using shallow wells had attended health education talks. The reason for this low attendance could be because the health talks are usually conducted at the communal tap sites where people using shallow wells are usually not present and if they are, they are very few.

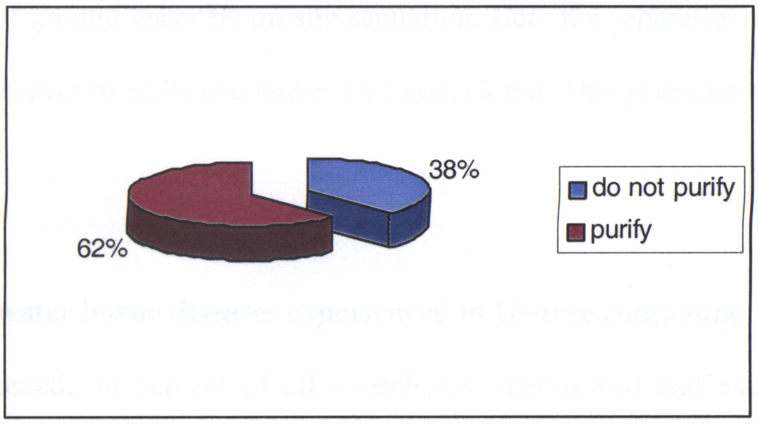


Fig 5.6: Extent of water borne disease in George compound (n=40).

Of the households using shallow wells, 57 percent had experienced water borne diseases whilst 43 percent had not (see Fig 5.7).

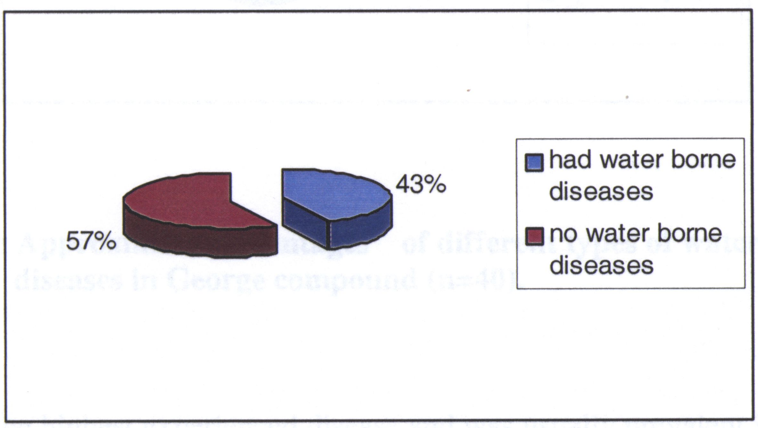


Fig 5.7: Extent of water borne diseases in households using shallow wells (n=21).

Another important factor that may influence the occurrence of water borne diseases is the contamination of ground water by on-site sanitation. Here the separation distance and the elevation with respect to wells and latrines are considered. This is discussed under section 5.3.3.

5.3.2 Types of water borne diseases experienced in George compound

As earlier discussed, 30 percent of all households interviewed had experienced water borne diseases. Seventeen and a half percent had diarrhoea, 7.5 percent had cholera and 5 percent had dysentery (see Fig 5.8).

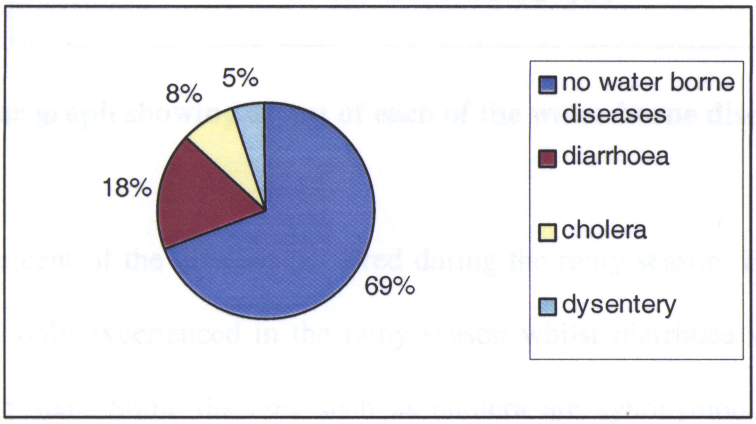


Fig 5.8: Approximate percentages of different types of water borne diseases in George compound (n=40).

Diarrhoea was the highest experienced disease and was usually prevalent in children. It is estimated that a Zambian below the age of 5 years experiences between three to six bolts of diarrhoea per year (GRZ, 1984).

Of the households with water borne diseases, 25 percent had cholera, 17 percent had dysentery and 58 percent had diarrhoea as shown in Figure 5.9.

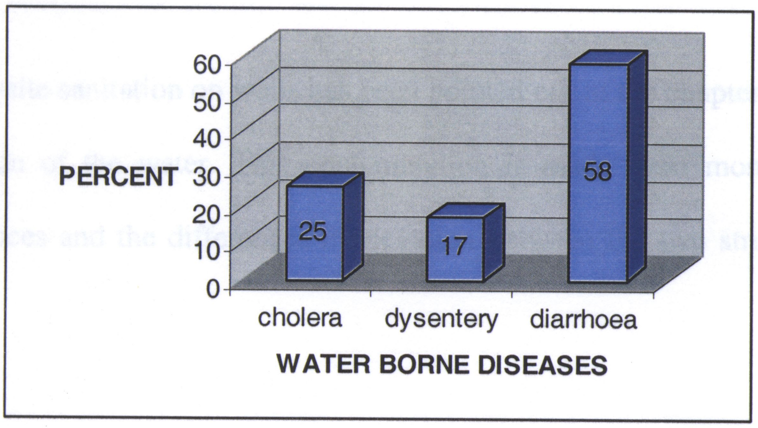


Fig 5.9: Bar graph showing extent of each of the water borne disease (n=12).

Seventy five percent of the diseases occurred during the rainy season. Both cholera and dysentery were only experienced in the rainy season whilst diarrhoea was experienced through out the year. Some diseases such as cholera are synonymous with the rainy season because the germs causing these diseases are given optimum breeding conditions as runoff and leaching increases especially with the rising water table in times of increased and prolonged rain storms.

5.3.3 Shallow wells and on-site sanitation

Fifty two percent of the households using shallow wells did not have wells in their yards but only had pit latrines. These households obtained their water from their neighbors' wells. Out of these households without wells, one-third experienced water borne diseases and reasons for this could have been due to a lack of hygiene or that the wells they were getting water from were contaminated and water purification was either poorly done or even non existent. Forty eight percent of the households using shallow wells had both structures in their yards, of these, four-fifths experienced water borne diseases.

The effect of on-site sanitation on wells has been pointed out in the chapter three as being the contamination of the water. This contamination is made even more likely if the separation distances and the differences in elevation between the two structures are not considered.

Separation distance

Waterfront (1999) states that there is no universal separation distance as this is area specific. However, Winblad and Kilima (1985) have suggested a safe separation distance of 15 m if the area lies on limestone to prevent contamination.

Table 5.7: Separation distances (m) between pit latrines and shallow wells within each plot and the prevalence of water borne diseases (n=10).

Separation distance	Had water borne diseases	No water borne diseases	Total
3-5 m	30.0 %	0.0 %	30.0 %
6-8 m	50.0 %	10.0 %	60.0 %
9-10 m	0.0%	10.0 %	10.0 %
Total	80.0 %	20.0 %	100.0 %

From Table 5.7 we see that the separation distance is between 3-10 m, which is definitely a cause for concern as it is way below most required separation distances. The reason for these short separation distances is due to the small size of the plots for each household. The table also shows that 80 percent of the households with both structures within the yard experienced water borne diseases and only 20 percent had no water borne diseases. This high incidence in water borne diseases could be as a result of contamination of the water in the wells by on-site sanitation, [see plate 1 pg 29(a)].

Elevation of wells with respect to pit latrines

Table 5.8 shows that 40 percent of the wells were located up hill with respect to the pit latrine whilst 60 percent of the wells were located down hill of the pit latrine. Half of the households with wells that were located up hill experienced water borne diseases. It is unlikely that the occurrence of diseases could have been due to leachate from the pit latrine but could have occurred as a result of either runoff during the rainy season or lack of hygiene.

The households with wells down hill of the pit latrine all experienced water borne diseases between August 1999 and August 2000, most of the diseases occurring during the rainy season as a result of seepage of leachate through the aquifer.

Table 5.8: A summary of the elevation of shallow wells with respect to pit latrines and its influence on water borne diseases (n=10).

	Wells located up hill	Wells located down hill of	Total
Had water borne diseases	20.0 %	60.0 %	80.0 %
No water borne diseases	20.0 %	0.0 %	20.0 %
Total	40.0 %	60.0 %	100.0 %

However, it should be emphasized that the analysis of the effects of separation distance between and location of wells and latrines with their respect to each other in the case of George compound should not only be that be based on one single plot but also on the surrounding plots. This is because each plot is surrounded by other plots on which there may be pit latrines which may further affect the water in the well from which that particular household depending on the slope of the terrain. Therefore the cumulative effects of pit latrines on surrounding households further complicate the separation distance-elevation analysis.

5.4 BENEFITS OF THE WATER PROJECT

To analyze the complete socio-economic impact of a water supply its successes and failures have to be looked at. The successes usually come in the form of benefits that people have seen and the failures are usually expressed by complaints towards a need to change the current scenario. This section looks mainly at the benefits that the water project in George compound has provided and tries to shade light on the complaints that the respondents expressed.

Of the households with access to communal taps, 89.5 percent find the services by the water project satisfactory whilst 10.5 percent find the services unsatisfactory. This is illustrated in Fig 5.10.

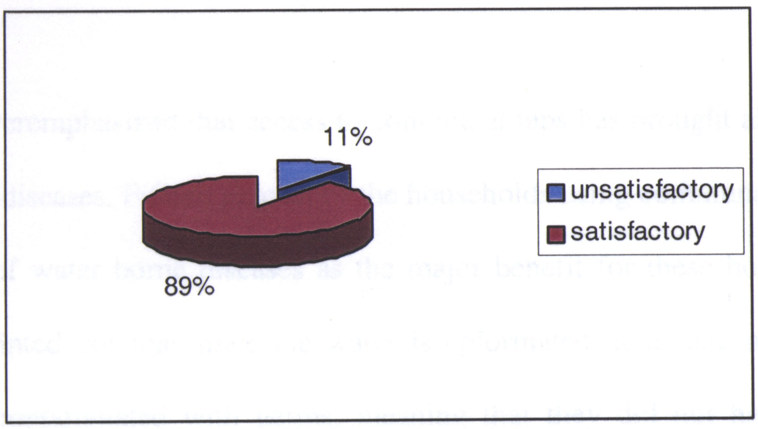


Fig 5.10: Pie chart showing perception of the community-based water project by households using communal tap (n=19)

The high satisfaction level expressed by the majority of the respondents shows that the project's benefits outweigh the failures. The benefits to the community as seen from the literature review do not only bring about a reduction in water borne diseases but also offers other potential benefits such as convenience, time saving, energy saving as well as money saving. Each household that had access to the communal taps prioritized any one of these benefits as shown in Figure 5.11.

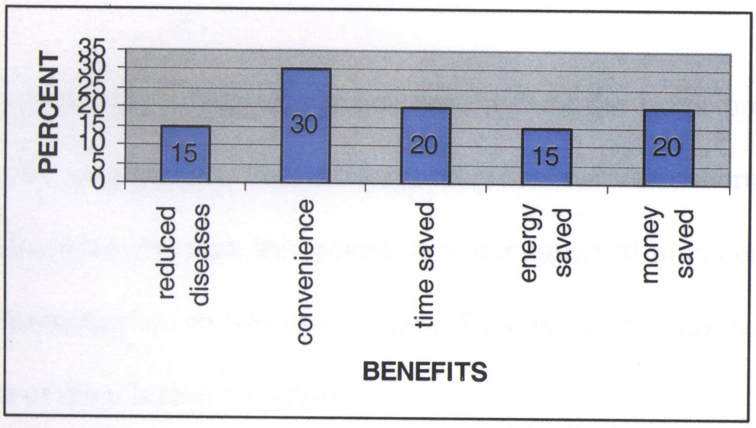


Fig 5.11: Bar graph showing benefits of using the water project's communal taps (n=19)

It cannot be overemphasized that access to communal taps has brought about a reduction in water borne diseases. Fifteen percent of the households using communal taps identified the reduction of water borne diseases as the major benefit for these households. These households pointed out that since the water is chlorinated, it is safe and clean and is therefore not contaminated with germs, meaning that they did not have to boil their drinking water.

Thirty percent cited convenience as their major benefit. This group comprised the largest number of households. They said the taps are evenly placed making water accessibility easier as the water has been brought closer to their households. Another convenience is that the water project offers washing facilities, which have made washing of clothes a pleasure, as this is evident by the cleaner appearance of children. The water project has also enhanced hygiene leading to a cleaner home environment. [see plate 3 pg 29 (c)]

Twenty percent gave time saving as a major benefit from the water project as they no longer queue up for long periods. This is because there are no water shortages since water is always available when the taps are opened. Another aspect of time being saved is that women and children now spend less time looking for water and therefore there is enough time to take care of other household chores.

Fifteen percent said a lot of energy was being saved since they did not have to walk long distances as they did prior to the implementation of the water project especially when the wells dried up during the dry season.

Another 20 percent said the major benefit from the water project was that they were saving a lot of money now, as they do not have to buy water from those who have wells at exorbitant price of K50 per bucket. They also alluded to the fact that since there was a reduction in water borne diseases, less money was spent on paying for treatment at the clinic.

The 10.5 percent of respondents who said the service was unsatisfactory gave their reasons. The major complaint was on the behavior of tap leaders whom they said needed to be taught public relations, as most of them were very arrogant. They said that the tap leaders only opened the taps once a day as opposed to the stipulated opening of taps twice a day. They complained that some tap leaders do not leave the key to let people have access to the washing facilities.

Complaints on the ever-increasing water levies were also aired. They said the levies were being increased too often and some households are not able to afford to pay. They also said that the authorities expected every household to pay between the first and fifth of every month irrespective of when one gets paid.

They also said the amount of water allowed per household was not sufficient especially for larger households. To supplement for the limited amount of water, they have to draw water from shallow wells for domestic chores other than drinking and cooking. This infringes on the rights of people to have access to ware in quantities and of a quality equal to their basic needs as stated in the 1977 United National Water Conference resolution.

CHAPTER SIX

CONCLUSION

6.0 INTRODUCTION

In the conclusion, this study tries to encompass the research findings based on the objectives raised and also tries to give an in-sight of the water project and other water-related issues in George compound.

6.1 CONCLUSION

Water levies affect the households in George compound in two major ways. Firstly, they give accessibility to a clean and safe water supply for the households that pay the water levies, consequently reducing water borne diseases and bringing about other benefits. Secondly, they leave no option to those who do not pay the water levies, but to use shallow wells which consequently lead to the prevalence of water borne diseases in cases were the water is contaminated.

Forty seven and a half percent of the households in George compound have access to communal taps. The rest use shallow wells.

Two water purification methods are used by households using wells, namely boiling and chlorinating. Sixty two percent of the households using shallow wells purify their drinking water in order to prevent consumption of contaminated water. This is because contaminated water is associated with water borne diseases such as diarrhoea, cholera and dysentery, all of which are prevalent in George compound.

Between August 1999 and August 2000, thirty percent of the households in George compound were affected by water borne diseases. Only the households using shallow wells experienced water borne diseases.

Benefits from the water project include the reduction of water borne diseases, convenience, time saving, money saving and energy saving.

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APPENDIX A

QUESTIONNAIRE

TOPIC: <u>EFFECTS OF WATER LEVIES AND THE BENEFITS FROM A COMMUNITY-BASED WATER MANAGEMENT SCHEME IN GEORGE COMPOUND</u>

QUESTIONNAIRE NO: ____________

DATE OF INTERVIEW: ____________

INSTRUCTIONS: Please tick or fill in the spaces.

1. Sex (a) Female
   (b) Male
2. What do you do for a living?
   (a) Formally employed
   (b) Self employed
   (c) Unemployed
3. What education level have you attained?
   (a) No formal education
   (b) Primary
   (c) Secondary
   (d) Tertiary
4. Do you think the current water levy of K3, 000, charged to have access to Communal taps, is justifiable?
   (a) Yes
   (b) No
5. If your answer to question 5 is No, how much are willing to pay?
   (a) More than K3, 000
   (b) K2, 500
   (c) K2, 000
   (d) K1, 500
   (e) K1, 000
   (f) Nothing at all
6. Do you obtain your water from communal taps
   (a) Yes
   (b) No*

*If your answer to question 6 is No, please proceed to question 11

7. Where did you obtain your water from before the communal taps were installed?

____

8. In your own opinion, which one of the following is the major benefit from using Communal taps?
   (a) Reduction of water borne diseases
   (b) Convenience
   (c) Time saving
   (d) Energy saving
   (e) Money saving
9. Is the service provided by the communal taps satisfactory?
   (a) Yes*
   (b) No
10. If your answer to question 9 is No, what makes the service unsatisfactory?*

*Please proceed to question 18.

11. Why do you not obtain your water from communal taps?
    (a) Levy is not affordable
    (b) Arrears
    (c) Water is a free commodity
    (d) Wells are conveniently located
12. Where do you obtain your water from?
    (a) Shallow well
    (b) Other source (pleases specify)______________________________
13. Do you have a shallow well within your yard?
    (a) Yes
    (b) No
14. Do you have a pit latrine within your yard?
15. If your answers to questions 13 and 14 are both Yes:
    (i) What is the separation distance between the well and the latrine? ____ m
    (ii) To which side of the slope is the well located with respect to the latrine?
        (a) Up hill
        (b) Down hill
16. Do you purify your drinking water?
    (a) Yes
    (b) No
17. If you do purify your drinking water, which purification method do you use?
    (a) Chlorination
    (b) Boiling
18. Have you ever attended any health education talks on water and sanitation?
    (a) Yes
    (b) No

19. Has anyone in this household experienced any water borne diseases in the past year?
    (a) Yes
    (b) No

20. If your answer to question 19 is Yes, when did the water borne diseases occur?
21. Which water borne disease(s) did you experience?
    (a) Cholera
    (b) Dysentery
    (c) Both (a) and (b)
    (d) Other diarrhoeal diseases (specify) ________________________

END OF QUESTIONNAIRE