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NORTHERN UGANDA WATER SUPPLY SERVICES (NUWATER)

CONSULTANCY SERVICES FOR THE BASELINE SURVEY OF WATER SUPPLY SYSTEMS AND SERVICES IN KITGUM

February 2010
This publication was produced for review by the United States Agency for International Development. It was prepared by ARD, Inc.

This report was prepared for the United States Agency for International Development (USAID), Contract No. 617-C-00-08-0014-00, Northern Uganda Water Supply Services, in association with the External Services Unit of the National Water and Sewerage Corporation of Uganda

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FEBRUARY 2010

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ACRONYMS AND ABBREVIATIONS

ADC	Austrian Development Cooperation
CV	Contingent Valuation
LRA	Lord's Resistance Army
MWE	Ministry of Water and Environment
NGO	Nongovernmental Organization
NURP	Northern Uganda Reconstruction Programme
NUSAF	Northern Uganda Social Action Fund
NUTI	Northern Uganda Transition Initiative
NUWATER	Northern Uganda Water Supply Services
NWSC	National Water and Sewerage Board
O&M	Operation and Maintenance
PIRS	Performance Indicator Reference Sheets
PMP	Performance Monitoring Plan
SPSS	Statistical Package for the Social Sciences
UMEME	Electricity; Electricity Utility Provider
UPDF	Uganda People's Defense Forces
USAID	United States Agency for International Development
WSSB	Water Services and Sewerage Board
WTP	Willingness to Pay

EXECUTIVE SUMMARY

INTRODUCTION

This report contains the findings of the Baseline Survey on Kitgum Water Supply Systems and Services, carried out by BEC Engineers, subcontracted by ARD Inc. to undertake the assignment. The report comprises 13 chapters and eight annexes.

ARD commissioned the baseline survey to examine a range of variables and indicators relevant to provision of improved water supply in order to establish benchmarks to be used for continuous project monitoring and final evaluation of the Northern Uganda Water Supply Services (NUWATER) project. Further, drawing upon the findings of the baseline survey, ARD would update NUWATER's Performance Monitoring Plan (PMP). In particular, the survey considered three interrelated aspects:

- Collecting and analyzing socioeconomic data on existing and potential pipe water consumers in Kitgum Town;
- Verifying, updating and validating the data presented in the Performance Indicator Sheets (PIRS) of the PMP; and
- Investigating willingness and ability to pay for water services in Kitgum.

KITGUM PIPE WATER SYSTEM

Kitgum Pipe Water Supply was installed in the 1960s. During its early years, the system was a small service, supplying only a handful of institutions using a mono pump. Its turnaround came in 1997 when the first comprehensive rehabilitation was carried out under the Northern Uganda Reconstruction Program (NURP). NURP installed four boreholes: KTI, YY Okot, K-Flag and K-New. Currently the system has five boreholes (the fifth, Langalanga was recently installed).

However, in spite of significant capital investments into the system, the majority (over 80%) of the population in Kitgum Town Council still use other water sources—such as point source boreholes and the Pager River for their domestic water. About 80 point source boreholes dot the town and at each of the boreholes are long lines of jerrycans.

NUWATER will assist Kitgum Town Council to revamp the pipe water supply system, based on an incentive-based management contract recently signed with the new operator.

SURVEY METHODOLOGY

The study adopted a mixed method approach. The mixed-method combined the detailed insights and understanding obtained from using qualitative approaches with the ability to generalize to a wider population offered by quantitative data collection.

DEMOGRAPHICS AND SOCIOECONOMIC PROFILE

The largest portion of the population is under the age of 19 and more than 80% is under 38. The household survey found a mean household size of 5.4 persons in Kitgum. The primary household income-

generating source is salaries and wages (31.05%), followed by other sources (23.02%) which include a number of activities categorized under casual labor. The town parish has about 70% of households earning over UGX 100,000, the highest income earners on average, followed by Pongdwongo and Westland.

EXISTING SYSTEMS

Estimates based on the study findings showed that borehole water is used by over three-quarters (82.2%) of the population in Kitgum Town, while only 11.9% use water from the pipe-borne system. The general sanitation facilities in Kitgum include mud pit latrines, cement pit latrines, flush toilets and open defecation (open space or nearby bush, or inside the river).

About 10% of the households considered pipe water poor for drinking, cooking, while about 57% considered pipe water good for drinking, and cooking. Overall, users of point boreholes are more satisfied than those relying on the pipe system.

Currently, almost three-quarters (71.1%) of households in Kitgum pay for water from their main sources. Of these, the majority (85.8%) pay for operation and maintenance (O&M) of point source boreholes, while very few buy from water vendors (3.8%) and pipe water systems such as water kiosks (1.6%) and private yard connections (8.8%).

WILLINGNESS TO PAY

A public stand post is the most preferred water option. More than half (55.6%) of surveyed households chose this option first, followed by a yard connection at 22.6% and house connection at 11.3%. Approximately 89.5% of all households had considered changing to an improved system of water supply. Altogether, the surveyed households were willing to pay prices ranging from UGX 15 to 100 per 20-liter jerrycan of pipe water.

WATER DEMAND

According to the household survey, the average household consumption of water per day is 89 liters, implying that the projected total of approximately 9,600 households in Kitgum Town consume 854.4 m^3 per day. The population demand analysis on the other hand, reveals a current household demand of 1185.1 m^3 per day, implying there is a suppressed demand of 330.7 m^3 per day (approximately 28%).

TECHNICAL DESCRIPTIONS OF THE WATER SUPPLY SERVICE

A new operator was appointed in August 2009. The evaluation of tender bids for operation of the system was reported to have been a rigorous process based on the National Water and Sewerage Corporation (NWSC) standard appraisal procedures for managing area systems. The private operator's office is located in an improvised 20-foot container near the district headquarters, outside the central business area of Kitgum Town. It has no signpost and from the outside, it can be mistaken for an abandoned workshop. Its view is not aesthetically pleasing and inappropriate for an institution that handles critical customer care matters such as a water office.

The new operator has some staff in place and reports that it was soon embarking on recruitment of more personnel to fill up all vacant positions. The system, which has over the years undergone a number of improvements, extends to almost all the parishes of the town. Currently it is debt ridden with a huge outstanding electricity bill for its pumping stations. At any single time, there is one or two pumps disconnected for nonpayment of accumulated Umeme (local electricity provider) bills. Regarding availability of land for laying water infrastructure, the Water Authority only lays pipes along the road

reserves and other open public spaces, while it is the responsibility of the individual customers to identify where the lines to their sites (or premises) should pass.

VERIFYING DATA PRESENTED IN THE PERFORMANCE INDICATOR SHEETS OF THE PMP

The system has five motorized pumps. The survey noted that their pumping rates (also indicated as installed capacities in most of the reviewed documents) are obsolete. These rates were for the mono pumps that operated in the 1990s. Since then several improvements have been made to the system. Their actual pumping rates are presented in Table 1 below.

TABLE 1. CURRENT CAPACITY OF PUMPS (AS AT NOVEMBER 2009)

PUMP	ORIGINAL PUMPING RATES	CURRENT PUMPING RATES
K-Flag	10 m³/ hr	5 m³/ hr
K-New	10 m³/ hr	8 m³/ hr
YY Okot	15 m³/ hr	6 m³/ hr
KTI	17 m³/ hr	8 m³/ hr
Langalanga	Not confirmed	5 m³/ hr
Total for all pumps		**32 m³/ hr**

All subsidies (operational subsidies, capital costs, O&M grants) previously received were indicative of an erratic trend of transfers or expenditures that did not appear to have been founded on a systematic planning process with clear outcomes. Thus, subsidies, which were received over a period of seven years (up to 2008), were mismanaged, lacked accountability or did not serve a purpose. Further, in view of the inadequate technical expertise at the time and lack of collated data, it is also possible that the subsidies were not sufficient to cover necessary O&M work.

Analysis of 10 water samples showed good bacteriological and satisfactory physical-chemical characteristics for all 10 samples. However, color was slightly higher than the national standards for portable water quality for all three point source boreholes and at KTI and K-New motorized pumps.

In all, the baseline data for all 11 Performance Indicators of the PMP were updated.

CONCLUSION

The water situation in Kitgum Town is pathetic. What is embarrassingly obvious is that a significant percentage of the population with the ability to fully rely on the pipe service for their main water needs have been inconvenienced for years by having to depend on overcrowded point source boreholes, because the system is unable to supply them with water. The inhabitants of the town have become accustomed to living distressed livelihoods characterized with many problems—one of them is water shortage. Improving the network service in Kitgum is long overdue. In addition, a public education campaign is recommended to include a component to redress misconceptions about the quality of pipe water.

The baseline findings have shown demand for water in Kitgum will continue to leap; by 2017, for instance, the current water demand is expected to double. Thus, the project should focus more on adequate investment in infrastructure and the capacity of the operator to manage and grow the improved system.

A combination of two factors (perceived lower quality and irregular supply) has in effect facilitated the steady (and complete) loss of confidence in the system by the Kitgum community, including connected customers, users of water kiosks and those who do not use the system. On a good note however, the survey results suggest that the system can effectively operate regardless of the functioning of the point source boreholes. Currently, there is need to decongest the point boreholes.

To get the best out of the private operator, Kitgum Town Council should exercise some form of "arm's length regulation"—the operator receives some form of operational freedom while the authority carries out regulatory oversight to ensure improved service delivery and system sustainability. Thus, it is recommended that the Water Office relocate to the central business area, a relatively more accessible place for potential and current customers. The operator's staff (especially the meter readers and plumbers) should be easily identifiable with up-to-date identity cards, tools and uniforms.

The medium- to long-term goal of the system should include extending the pipeline and distribution to all parishes and villages without discriminating against remote areas (such as Nyikinyiki and Ginnery), because property developments are on the increase throughout the entire area. Coupled with the above, the operator should consider introducing flexible financing schemes for low-income segments as a means of offering more households the opportunity to connect to the pipe network.

1.0 INTRODUCTION

1.1 ABOUT THIS REPORT

This report contains the findings of the Baseline Survey on Kitgum Water Supply Systems and Services, carried out by BEC Engineers, the company subcontracted by ARD Inc. to undertake the assignment.

The report comprises 13 chapters and eight annexes. Chapter 1 is the introduction, providing the background to the water supply service in Kitgum Town, including the issues that prompted the baseline survey, while Chapter 2 gives a description of the study area. The third chapter describes the consultant's approach and methodology for the survey. Chapter 4 profiles the household characteristics in Kitgum Town, while Chapter 5 presents the households' incomes and expenditures. Chapters 6 and 7 report on the existing water sources, the people's perception of those sources including their preferences, as well as sanitation practices, and health and hygiene behaviors; while Chapter 8 analyzes the willingness to pay (WTP) for water in the town. Chapter 9 provides the consultant's characterization of the household survey findings. In Chapter 10, the demand for water is derived based on cross-tabulated data of the ability and WTP. Chapter 11 presents the technical characteristics of the water supply and sewerage service as well as a demand analysis of the current system. Chapter 12 reviews the data on the indicators of the Performance Monitoring Plan (PMP) for the Northern Uganda Water Supply Services (NUWATER). Chapter 13 is the conclusion to the report highlighting a few issues for the attention of NUWATER.

The terms of reference for the baseline survey were as follows:

1. Review the assessments of the water systems in Kitgum and Pader to have a good understanding of the project.
2. Design and conduct a baseline survey based on a methodology that would integrate the project's monitoring and evaluation requirements as outlined in the attached project's PMP. The consultant will verify, update and validate the data presented in the Performance Indicator Reference Sheets (PIRS) of the PMP.
3. Investigate willingness and ability to pay for water in the two towns and recommend the collection of any other useful and relevant data that would assist in project monitoring and evaluation.
4. Prepare a baseline report describing the methodology, key variables investigated and main findings.

1.2 BACKGROUND TO THE BASELINE SURVEY

1.2.1 BRIEF BACKGROUND TO KITGUM WATER SUPPLY SYSTEM

Kitgum Pipe Water Supply was installed in the 1960s. During its early years, the system was much smaller, supplying only a handful of institutions using a mono pump. Its turnaround came in 1997 when the first comprehensive rehabilitation was carried out under the Northern Uganda Reconstruction Program (NURP). NURP installed four boreholes: KTI, YY Okot, K-Flag and K-New. Currently the system has five boreholes (the fifth, Langalanga was recently installed).

According to the staff in the Urban Water Office, the capacity of the system was initially adequate but following the insurgency that engulfed the region at the end of the last decade, many people flocked to Kitgum Town from the surrounding sub-counties, thus overwhelming the service.

Consequently, in 2001, the Austrian Development Cooperation (ADC) embarked on a phased financing of comprehensive rehabilitation and improvement work on the system. During the first phase (in 2001), the pipeline and distribution were extended, the old GI and asbestos pipes were replaced with PVC pipes, and some replacements of the pumps and spares were carried out. In 2004, further extensions to the pipeline and distributions were made and sanitation improvement programs were pioneered. Sanitation improvements included activities introducing eco-san latrines.

In 2008, another cycle of improvements to the system commenced with funding from Northern Uganda Transition Initiative (NUTI) under the ongoing Emergency Water Project. The project has completed rehabilitation of two pumphouses at KTI and K-New. The two pumps are fully functional. KTI works on both solar and Umeme-provided electricity, while K-New works on solar only. The project also trained the operator's staff in equipment maintenance and system installation. In addition, NUTI handed a set of electrical tools and small machinery over to the operator for maintenance of the system.

In a period of four years, the system has had three different operators. According to the town council staff, the two previous operators mismanaged the water service through poor revenue management, poor recordkeeping and inadequate operation and maintenance systems. The system is currently debt-ridden with cumulative unpaid water bills totaling UGX 72,176,904 and an outstanding pump electricity bill of about UGX 30,000,000. These problems and more were attributed to the bad procurement practices through which incompetent firms were selected to operate the system.

Thus, in spite of significant capital investments since 2001, the majority (over 70%) of the population in Kitgum Town Council still use other sources such as boreholes and the Pager River for their domestic water. The town has 80 point source boreholes, and at each of the boreholes are very long lines of users with jerrycans. The overall water situation is not sufficient for a big town with a population estimated at 55,405.[1] Yet, provision of pipe water to the majority of households would enable Kitgum Town Council to fulfill its mission "to provide and facilitate quality service delivery, economic empowerment of the urban poor and to ensure orderly infrastructure development".

1.2.2 NORTHERN UGANDA WATER SUPPLY SERVICES PROJECT

Meanwhile, toward the end of 2008, the United States Agency for International Development (USAID) and the Ministry of Water and Environment finalized a Memorandum of Understanding under which USAID will avail resources for repair and/or augmentation of water supply infrastructure as well as strengthen system O&M in northern Ugandan towns. The range of interventions planned by USAID constitutes the Northern Uganda Water Supply Services (NUWATER) Project. USAID contracted ARD Inc. to manage NUWATER, and ARD designed an incentive-based supply and operating contract program for water and sanitation services in northern Uganda. ARD also prepared a PMP for NUWATER that spells out the Results Framework, logical linkages, and indicators and targets (among others) for USAID's support to the system. The incentive-based management system and the PMP were in part based on preliminary assessments of water systems in Kitgum and other towns that were carried out by the External Services Unit of the National Water and Sewerage Corporation (NWSC) on behalf of ARD.

NUWATER will assist the Kitgum Town Council to revamp the pipe water supply system on the basis of the incentive-based management contract that was recently signed with the new operator. NUWATER support will also include limited rehabilitation of the existing system to ensure that the water supply is of adequate capacity and reliability to support financial sustainability of the utility.

[1] The projected population of Kitgum town (based on 2002 Population and Housing Census) is 55,405.

1.2.3 COMMISSIONING THE BASELINE SURVEY FOR KITGUM

The baseline survey on Kitgum Water Supply Systems and Services was subcontracted by ARD to examine a range of variables and indicators relevant to provision of improved water supply in order to establish benchmarks to be used for continuous project monitoring and final evaluation of the NUWATER project. Further, drawing upon the findings of the baseline survey, NUWATER's PMP would be updated. In particular, the survey considered three interrelated aspects:

- Collecting and analyzing socioeconomic data on existing and potential pipe water consumers in Kitgum Town;
- Verifying, updating and validating the data so far presented in the PIRS of the PMP; and
- Investigating willingness and ability to pay for water services in the town.

2.0 DESCRIPTION OF THE PROJECT AREA

2.1 THE STUDY AREA

2.1.1 KITGUM TOWN COUNCIL

Kitgum Town is the metropolitan core of Kitgum District and serves as the district headquarters and commercial center. It is strategically situated on the transit routes to the rural sub-counties of Kitgum District, as well as other districts such as Pader and Gulu, and even to southern Sudan. It has the largest share of the district population, representing about 14.8%. The town covers an approximate area of 30 km^2 administered by Kitgum Town Council (a Local Council III Urban Authority).

Kitgum is located in Chua County with 11 parishes, which are split into 40 villages (Table 2.1). Sub-counties along its border are Padibe to the north, Mucwini to the northeast, Kitgum Matidi to the east, Acholibur to the south and Pajimu to the west. It is positioned approximately 452 km (281 miles) north of Kampala, Uganda's capital by road, and about 105 km to the northeast of Gulu town.

TABLE 2.1. PARISHES AND VILLAGES IN KITGUM TOWN COUNCIL

Parish	Village
Westland A	Lamdogi 1st Jenge Lowalinga Acut Omer A
Westland B	Konypaco Westland African Village 2nd Jenge
Pager A	Lamit Kapim North Lamit Kapim Central Lamit Kapim South
Pager B	Ayur A South Ayur A North Ayur B Ayur C Ogwal Woo
Pandwong	Go Down Acut Omer B Auch Hilltop
Greenland	Lemo Bongoo Lewic South Lemo Bongoo Lewic East Lemo Bongoo Lewic West
Pongdwongo	Nyikinyiki Nyanya Latiti

Parish	Village
Town	Central Langalanga Apollo Ground
Alango	Alango East Alango West Camcam Tangi Agoro
Guu A	Ginnery East Ginnery West Oryang Ojuma
Guu B	East Village A East Village B Upland Village East Village C

Source: Kitgum Town Council Approved Three Year Development Plan 2008/2009-2010/2011

The town is steadily expanding, and the infrastructure for a growing population is increasingly building up. For instance, there are five banks, two referral hospitals, eight markets, three radio stations, over 70 guesthouses (lodges), telecom coverage, and a fair representation of central and local government departments including the Uganda National Roads Authority, post office and the Uganda People's Defense Forces (UPDF) 4th Division headquarters. Educational institutions in the town include 17 primary schools, 13 secondary schools, two tertiary institutions, 10 nursery schools, seven tailoring and vocational institutions, and one daycare center. The town has a good network of other infrastructure such as roads but they are poorly maintained, and is connected to the national electricity grid though with rampant load shedding. Tables 2.2 to 2.6 list some of the key institutions in Kitgum Town.

TABLE 2.2. PRIMARY SCHOOLS

	School	Number of Pupils
1.	Kitgum Prison School	1,090
2.	Kitgum Public School	1,918
3.	Kitgum Girls	1,226
4.	Horizon Primary School	624
5.	Kitgum Primary School	1,701
6.	Kitgum Demonstration	600
7.	Bethel Primary School	95
8.	Uganda Martyrs Central	271
9.	Kitgum Boys	1,637
10.	Ojuma Primary School	703
11.	Padwong	1,930
12.	Kitgum Italia Solidarity	314
13.	NUCBACD Special School	112
14.	Childcare International	3,056
	Total	**15,277**

TABLE 2.3. SECONDARY SCHOOLS

	School	Number of Students & Teachers
1.	Kitgum Alliance College	246
2.	Okot Memorial College	1,151
3.	Kitgum Vision College	413
4.	St. Bakhita Girls	109
5.	Green Light College	187
6.	Kitgum Girls	78

	School	Number of Students & Teachers
7.	Kitgum Progressive	357
8.	Antonio Vigato	337
9.	Jabulo Issoke College	557
10.	Kitgum Integrated	715
11.	Kitgum Town College	745
12.	Kitgum Comprehensive College	1,863
13.	Oxfard College	243
	Total	**7,001**

Source: Statistics provided by District Education Office

TABLE 2.4. HEALTH FACILITIES

	Health Facility	Population (in patients)
1.	Kitgum Government Hospital	200
2.	St. Joseph Hospital	300
3.	Town Parish Health Center	
4.	Pandwong Health Center*	

* Still under construction
Source: BEC Engineers

TABLE 2.5. OFFICES

NGO Offices			
1.	Child Care International	15.	World Vision
2.	War Child Holland	16.	ACORD
3.	International Medical Corps	17.	UNICEF
4.	Norwegian Refugee Council	18.	Catholic Relief Services
5.	International Committee of Red Cross	19.	Lutheran World Federation
6.	Kitgum Concerned Women Organization	20.	Acholi Private Sector
7.	AVSI	21.	National Farmers Association
8.	CARITAS	22.	ARALPI
9.	OXFAM	23.	AMREF
10.	Meeting Point	24.	Food for the Hungry
11.	International Rescue Committee	25.	Uganda Red Cross
12.	Concerned Parent's Association	26.	ANPPCAN
13.	KICWA	27.	Kitgum NGO Forum
14.	Jesuit Refugee Service		

Source: BEC Engineers

Business entrepreneurs, traders and jobseekers from various areas of the country (such as Mbale, Soroti and Kampala) and even beyond (from Asia) are gradually streaming into the town. As a result, new buildings are cropping up to accommodate the increasing population. However, business and growth in the town is mainly dependant on relief programs run by international nongovernmental organizations (NGOs) with field offices in the area. The most common businesses include wholesale and retail outlets, metal and wood workshops, grain milling, bars, guesthouses, lodges, and hair dressers, among others.

TABLE 2.6. MARKETS

	Parish	Market
1.	Town	Kitgum Central Market
2.	Pondwongo	Corner Mission
3.	Pager	Mondongo (Ayul)
4.	Guu	East Ward
5.	Pandwong	Gangdyang (Tee Atoya)

	Parish	Market
6.	Pandwong	Corner Alango (Monbunyu)
7.	West Ward	Lulojo
8.	East Ward	Ginnery

Source: BEC Engineers

Kitgum Town was affected by the insecurity in the region that lasted for about 16 years (1990-2005). During this period, the protracted conflict in northern Uganda brought widespread loss of household livelihoods that resulted in a great influx of people into the town, putting a lot of strain on available infrastructural facilities, especially water and sanitation. The town's people experienced many shocks such as fear and panic due to insecurity caused by the Lord's Resistance Army (LRA) rebel attacks and abductions, especially of children.

Since 2007, there has been some form of real peace due to the cessation of hostilities between the rebel LRA and the Government of Uganda. Thus, with support from different development agencies as well as the local and central government, the town's population is slowly getting on with rebuilding their lives.

The baseline survey was carried out in all the parishes of Kitgum Town: Westland, Guu, Pondwong, Pager Ward, Pandwong, Town Ward and Alango.

2.2 RELIEF

Kitgum Town lies at an altitude of 973 meters above sea level. The topography consists of gentle sloping plains rising out of two hills, Hill Top and Guu. Pager River is the main surface water while Alango, Okello, Auch, Pongdwong, Bunaladyel and Ojuma are small streams.

2.3 VEGETATION

The vegetation is typical savannah type, mainly characterized by grass cover. The trees normally shed their leaves during the dry season. Much of the natural vegetation has been felled for economic activities, including charcoal burning and farming.

2.4 SOIL

The soil varies from place to place but is generally well-drained sandy loam and clay. Clay loams occupy areas along the river and streams while sandy loams are dominant in Guu, Pongdwongo and Pager parishes. The soils are high productive and especially suitable for agriculture. The soils along Pager River mostly consist of reyasols and cilhosols which are poorly developed and prone to water logging.

2.5 CLIMATE

Kitgum Town has both dry and rainy seasons. The climate is hot throughout the year with two marked rainy seasons from March to June and August to November. It receives average annual rainfall of 1130 mm with peaks in April and August. It is dry-hot and windy from December to mid-March. The maximum temperature is 31.8˚ C and the annual minimum temperature is 17.3˚ C giving a mean annual temperature of 24.6˚ C.

3.0 SURVEY METHODOLOGY

3.1 APPROACH

The study adopted a mixed-method approach. The mixed-method combined the detailed insights and understanding obtained from using qualitative approaches with the ability to generalize to a wider population offered by quantitative data collection.

The study involved three key steps: a) preparation, b) data collection, and c) data analysis.

The **preparation step** entailed: (i) a comprehensive literature review and consultations on appropriate survey methodologies (ii) identification of indicators and preparation of qualitative and quantitative data collection instruments; and (iii) refinement of data collection instruments.

The **data collection step** involved: (i) collection of secondary data at district headquarters, town council offices, the new private operator and selected institutional users; (ii) qualitative interviews with key informants and informal discussions or meetings with the town residents; (iii) collection of household-level data based on face-to-face interviews with male and female household heads; (iv) observational walks or inspections (observation of selected social and behavioral patterns such as latrine usage, etc.); (v) an observational survey of selected water sources and water needs in the parishes and selected institutions; and (vi) data entry, verification and triangulation and preparation for data analysis.

The **data analysis step** involved subjecting data to appropriate qualitative and quantitative analysis. Data from the household questionnaires was processed and analyzed in SPSS (Statistical Package for the Social Sciences). A number of post-fieldwork checks and audits were in place to ensure that survey results were accurate and consistent. Any questionnaires with incomplete or inconsistent data were returned to the supervisor or interviewer to recontact the respondent.

The study collected data at four levels: individual, household, village and institution. Individual-level data included knowledge, attitude and practice of health, hygiene and sanitation behavior in adults and children and water supply issues. At the household level, data was collected to reflect the socioeconomic status of household members. At the village level, data was gathered on community attributes such as the types and coverage of water and sanitation facilities, current mechanisms for operations and maintenance of water and sanitation systems and facilities, as well as health and sanitation awareness activities. The institutional level involved qualitative interviews with the water authority (town council), district officials, private operator, and other institutions such as NGOs and commercial outlets.

3.2 SAMPLING STRATEGY

The desired sampling size was agreed upon earlier in Kampala before setting off to the study area in Kitgum. However, the decision on what sampling method to use was made after the study area had been examined, and the available time and resources ascertained.

The sampling strategy selected for the baseline study was based on one major requirement. It had to ensure that the selected sample was a fair representation of households from different geographical areas within the study area and not only from the center or most populated areas.

3.2.1 SAMPLE DESIGN

A three-stage sampling procedure (involving three common sample designs) was used in the sample selection for the household survey. The three sample designs were Proportional Quota Sampling, Purposive Sampling and Systematic Random Sampling.

In **proportional quota** sampling, each parish in Kitgum Town Council was designated quotas from which respondents were selected. The purpose of this was to represent the major characteristics of the population by sampling a proportional amount of each area.

In the second sampling stage, using **purposive sampling**, three villages from each parish were selected for household interviewing. At this stage, the survey team, together with selected inhabitants of the study area, ensured that all the different social, economical and cultural elements of the community in Kitgum Town are included in the sample. Local leaders and inhabitants were asked to identify areas populated by specific socioeconomic categories, that is, the very poor and the well off.

In **systematic random sampling**, the survey team, together with local leaders, confirmed the number (N=10,260) of the households in the town from which a sample size of 9% (n=960) was decided.[2] The number of households was divided by the sample size (N/n=10,260/960) to determine the interval size (10). In this case the interval size was equal to N/n = 10,260/960 = 10.7. Then, a random integer from 1 to 10 was selected. In this survey, 5 was selected. Following this, the enumerators begun their interviews with the fifth household following a predetermined route in each village and took every k^{th} household (every tenth). Therefore, they interviewed households 5, 15, 25, 35, and so on.

3.2.2 SAMPLE SELECTION

The sample comprised 960 household interviews among the general population in the seven parishes that constitute Kitgum Town Council. For the purpose of sample selection, the Town Council was divided into seven locations or strata. These locations were defined in terms of the parish units and were designed to ensure fully representative cross-sections of the town population were included in the sample.

The next step was to obtain estimates of the number of households in each of the parishes. The sample size required for each of the seven parishes was then calculated in direct proportion to the distribution of households based on the 2002 Population and Housing Census Analytical Report (see Table 3.1).

At the beginning of 2008, some of the parishes and villages were split and four more parishes were created. There are currently 11 parishes and 40 villages. The survey team, however, opted to stick with the old arrangement of seven parishes and 28 villages just for purposes of sampling and data collection, because the new demarcations were not very clear even to the local inhabitants and interviewers.

[2] Using the 2002 Population and Housing Census results, the projected 2009 population for Kitgum town is 55,504 (based on a population growth rate of 4.1). Thus with a household size of 5.4, the estimated number of households is 10,260.

TABLE 3.1. SAMPLING FRAME FOR KITGUM TOWN COUNCIL

Parish	Total Households (at 2008; Local Council Register)	Total Households (at 2002 Census)	% Parish Total of 2002 Census	Sample Size
Westland 789		1,394	20	192
Guu 1,387		1,260	18	173
Pongdwongo 1,334		1,064	15	144
Pager Ward	776	1,035	15	144
Pandwong 1,459		996	14	134
Town Parish	915	803	11	106
Alango 1,579		558	7	67
Total	**8,239***	**7,110****	**100**	**960**

* 8,239 was reported to be the total households in the town for the year 2008 based on Kitgum Town Council's Local Council Register.

** 7,110 was the total number of households in Kitgum Town Council as found by the 2002 Population and Housing Census.

The local council register was unreliable for sampling purposes because the survey team felt it contained several contradictions when compared with the 2002 census results. For example, the register shows that the population of Alango parish had tripled while in Westland parish it had reduced by almost a half since the 2002 census, which actually is not the case.

3.3 FIELD WORK PROCEDURE

Field work for the baseline survey was an intensive exercise that consisted of holding preparatory meetings to ascertain study villages, as well as resources and time required to accomplish the assignment within the approved budget; training interviewers and data entry clerks; designing the SPSS database; collecting data; and analyzing the data using SPSS (SPSS tabulated data is presented in Annex A of this report). Two half-day training sessions for six interviewers and four data entry clerks were conducted on 30 August and 1 September 2009 respectively.

All the activities involved in data collection (such as the household survey, key informant interviews, institutional interviews, observational walks or inspections, and informal discussions) were conducted over a period of 10 days starting August 31, 2009 through September 9, 2009.

A field team comprising six interviewers with a fine grasp of Luo, the local language, conducted the household survey. The interviewers were locally recruited young men and women with university degrees and some are employees of Kitgum District local government. One other local person was hired to administer a brief institutional checklist to selected NGOs, schools and guesthouses. The key informant interviews, observational walks and informal discussions were conducted by the Sociologist, sometimes with the help of an interpreter.

During data collection, standard quantitative and qualitative methodologies and tools were employed:

a. Observation

Extended field visits to all parts of the study areas introduced the local circumstances. A quick view of the state of livelihoods, of the existing water supply and sanitation facilities and their use patterns, were easily achieved. Basic information necessary to understand statements made later in discussion with interview partners was obtained.

b. Household Survey

In the household survey, 950 households (not 960 as earlier planned), representing 99% of the sample, were interviewed. These interviews gave good insight into the situation at the household level

and garnered individual personal opinions. However, some questions such as “how much was income from the main source” and “household expenditure” were simply overwhelming for some respondents.

c. Interviews with Key Persons

Interviews with key persons were not only a powerful tool for getting detailed information about the study area and the water service, but also helped the survey team to understand and get to know underlying socioeconomic issues of the community.

d. Institutional Interviews

A checklist for capturing water needs and concerns of institutions in the study area was administered to a number of selected NGO offices, schools and guesthouses.

e. Review of Documents

Different materials and existing data relevant to the survey were reviewed. These were collected from institutions such as the Kitgum District Planning Unit, the Kitgum Town Council Urban Water Department, and the private operator.

f. Sharing Interviewers' Impressions & Observations

At the end of the work in the field, there was a half-day debriefing session to deliberate on the impressions and observations made by the interviewers. The debrief was attended by all the interviewers, two data entry clerks and the Sociologist.

3.4 DATA ANALYSIS

Nine hundred and fifty verified questionnaires were entered by four data entry clerks into a customized SPSS database for the baseline survey using one computer for a period of 12 days. The data entry clerks were split into two teams of two persons each, working in shifts. The first shift started at 8 am and ended at 2 pm while the second shift begun at 2 pm until 7 pm. A statistician designed the SPSS database, comprising 59,520 entries, in Kitgum. Only one computer was used to enter data into the database because the SPSS version (v16) used does not allow merging of data entered from more than one computer. All the four data entry clerks were locally recruited university graduates with experience in using SPSS databases.

After making all the entries in the database, the data was cleaned before making the analysis. The actual analysis involved frequencies, mean, mode, median and valid percentages for each variable.

3.5 LIMITATIONS OF THE SURVEY

- Some important information for the baseline about the water service was not obtained because it was either misplaced or the previous operators disappeared with the records. Thus, it was difficult to compute some of the required benchmark indicators such as collection rates.
- Some respondents were irritated by personal questions in the questionnaire such as household income, age and number of children. They saw no relationship between such questions and water supply. They felt the organizers of the survey had ulterior motives other than improved water supply.
- Many respondents expressed their exhaustion from participating in endless studies by the town council without “tangible outcomes”. The interviewers wasted time explaining repeatedly the purpose of the baseline survey to these respondents.

4.0 HOUSEHOLD CHARACTERISTICS

These household characteristics can assist in understanding the basic dynamics of family structure, household composition and ethnicity in Kitgum Town.

4.1 GENDER AND AGE OF HOUSEHOLD HEADS

Approximately 87.9% of the respondents were household heads while the other 12.1% are closely related to the heads of households and involved in decision making concerning their households. The overall distribution of the respondents by gender disclosed that 41.7% and 58.3% were male and female respectively (Table 4.1).

TABLE 4.1. DISTRIBUTION OF THE RESPONDENTS BY GENDER

Gender of the Respondent		
	Frequency	**Valid Percent (%)**
Male	395	41.7
Female	553	58.3
Total	948	100.0

Source: BEC Engineers

The average age of participants responding to the questionnaire was 44. The average age of all males who responded to the questionnaire was 49, females 42. Further analysis shows the majority of respondents (76.8%) are 15–50 years (Table 4.2). The lowest age was 15 while the highest was 86.[3]

TABLE 4.2. AGE OF RESPONDENTS

Number of Households Heads on Basis of Age Group (%)		
Age range	**Frequency**	**Valid Percent (%)**
15 – 30	320	34.9
31 – 50	384	41.9
51 – 70	182	19.9
70+	30	3.3
Total	916	100.0

Source: BEC Engineers

[3] The sample included child-headed households.

4.2 ETHNICITY AND MIGRATION

Household heads were asked about their ethnic origins, and the findings show that the Acholi are the most dominant, accounting for 97.3% of the population (Table 4.3). The Langi, Itesot, Baganda, Bagisu and Madi are also represented, as well as the Sudanese from southern Sudan and other Ugandan tribes (Alur, Lugbara, Banyankole, Basoga and Banyoro) to a relatively smaller extent. In addition, survey observations revealed a steady presence of non Africans, especially Europeans and Americans working for international NGOs, and Asians who are increasingly getting involved in retail trading.

TABLE 4.3. MAJOR TRIBES IN KITGUM TOWN

Parish	Percentage (%) Households on basis of Tribe						
	Acholi	Langi	Itesot	Madi	Baganda	Bagisu	Others
Westland	99.3	0.2	0.1	0.1	0.1	0.1	0.1
Guu	99.8	0.1					0.1
Pongdwongo	99.5	0.2	0.1	0.1			0.1
Pager Ward	99.8	0.1					0.1
Pandwong	99.8	0.1					0.1
Town Parish	99.3	0.1	0.2	0.1	0.1	0.1	0.1
Alango	99.8	0.1					0.1
Total	**97.3**	**0.9**	**0.4**	**0.3**	**0.2**	**0.2**	**0.7**

According to the study findings, it appears a significant percentage (23%) of household heads migrated to the study area. Most of these migrations occurred during the last eight years. Figures 4.1 and 4.2 provide a breakdown of household heads' total years of residence in the study area. About 77% of all household heads interviewed were born in the study area. Furthermore, some 17.3% of the emigrants have been living within their communities for one year or less, and 23% have been resident for nine or more years.

FIGURE 4.1. HOUSEHOLD HEADS BORN IN THE STUDY AREA

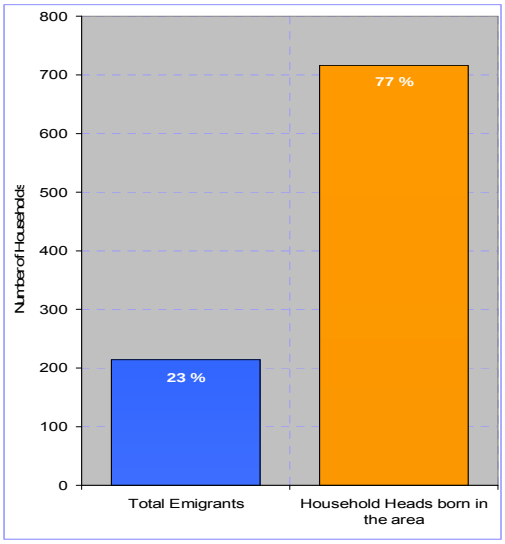
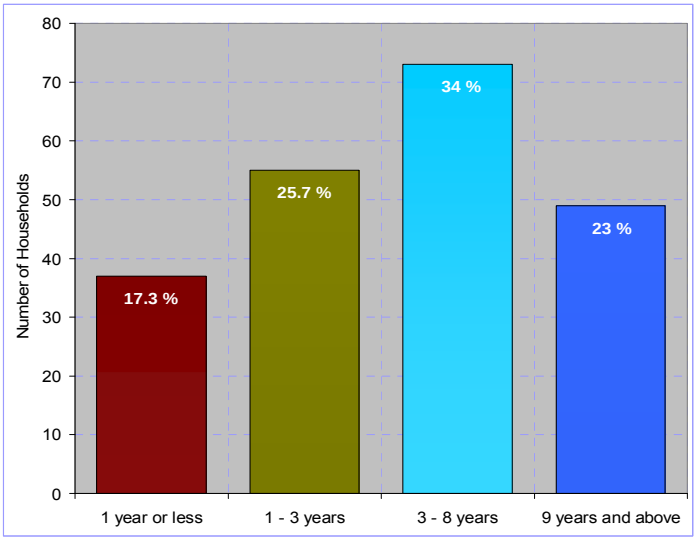
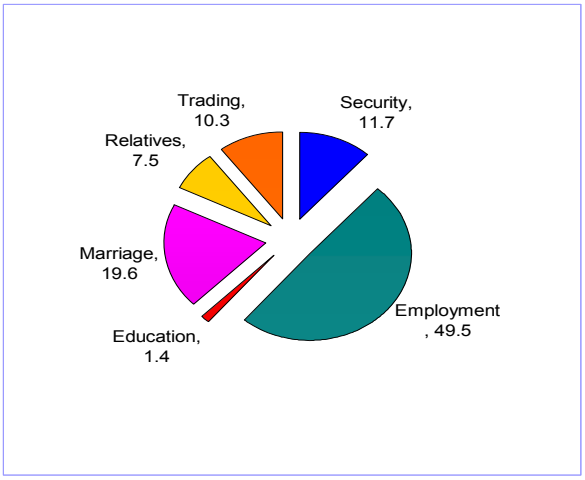


FIGURE 4.2. NUMBER OF EMIGRANTS ON BASIS OF YEARS LIVED IN THE TOWN (%)



The main reasons given by household heads for migrating to Kitgum were mainly to find employment (49.5%) and to get married (19.6%). However, it is estimated that a significant number (11.7%) of the emigrants to the town, whatever their length of residence thus far, originally moved there because of insecurity in their rural homes. They wanted a safe haven where they could protect their families from the insurgency, especially the abduction of children into rebel ranks. However, the attraction to economic opportunities such as trade or other job possibilities are particularly strong drivers to the town (Figure 4.3).

FIGURE 4.3. REASONS FOR MIGRATION TO KITGUM TOWN



4.3 EDUCATIONAL BACKGROUND

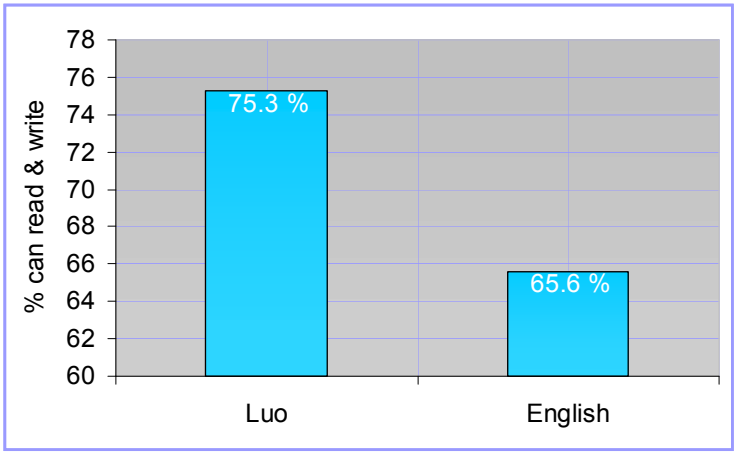
The survey data suggests that approximately 79% of household heads have had at least some minimum exposure to formal education. When the data is disaggregated according to gender, female household heads have tended to less access overall to basic formal educational opportunities than males. About 87% of male household heads have at least some school experience, while about 74% of the female household heads had attended school.

In specific terms, about 26.2% of the female respondents had no formal education, 34.4% had primary education, 17.3% secondary education, 14% college training and 6.4% were university graduates. About 1.7% had other qualifications.

About 13% of the male respondent had no formal education, 23% had primary education, 33% had secondary education, 21.2% had college training, and 8% had university degrees. Approximately 1.8% had other qualifications.

Further analysis shows overall, 75.3% of household respondents could read and write Luo, while 65.6% could read and write English (Figure 4.4).

FIGURE 4.4. LITERACY RATE OF RESPONDENTS



Overall, Alango parish, with 31.2 and 42.7% who could not read or write Luo and English, respectively, had the highest illiteracy rates. Ginnery (in Guu parish) and Lulojo (in Westland parish) had the highest number of illiterate respondents—over 60% who could neither read nor write English.

4.4 POPULATION AND HOUSEHOLD DENSITY

Table 4.5 shows the population of the surveyed households. The largest portion of the population is under the age of 20 years old and more than 81% is under 39. The total population in the surveyed households (950) is 5,111 persons.

TABLE 4.5. POPULATION OF SURVEYED HOUSEHOLDS

	Age Range					Total
	0 – 19	**20 – 38**	**39 – 57**	**58 – 76**	**77 +**	
Male	1,316	664	278	84	42	2,384
Female	1,448	733	411	102	33	2,727
Total	2,764	1,397	689	186	75	5,111
% Total	**54.08**	**27.33**	**13.48**	**3.64**	**1.47**	**100**

Household density is significant for estimating the demand for water consumption. The household survey found a mean household size of 5.4 persons in Kitgum Town. These figures are higher than the average district household size of five, and the national average of 4.7 persons.[4] The highest number of persons in a household is 25 while the lowest is one person. However, key informants attributed the big family sizes to the Acholi traditional family structures, which are characterized by the extended family systems. In many families, there are more dependants than the nuclear members.

Kitgum District and the town council have also made independent projections for the town's population. Using local council registers, the council put the 2008 population at 52,380, whereas the projection by the District Planning Unit for 2008 was 50,667 persons. The annual growth rate was estimated at 4.1%. Table 4.6 presents Kitgum Town Council's estimated population at May 2008 by parishes, as relayed from the Town Council Development Plan for 2008/09 -2010/11.

TABLE 4.6. KITGUM TOWN COUNCIL POPULATION AS MAY 2008 BY PARISHES

	Parish	**Households**	**Population**
1.	Alango	1579	6914
2.	Westland	789	9991
3.	Pandwong	1459	10,337
4.	Guu	1387	6449
5.	Pondwongo	1334	7170
6.	Pager	776	6014
7.	Town Parish	915	5505
	Grand Total	**8,239**	**52,380**

Source: Kitgum Town Council Three Year Rolling Development Plan 2008/09-2010/11

The official population growth rate issued by the Uganda Ministry of Finance, Planning and Economic Development is 4.1% based on the 2002 population census. Use of this population growth rate, projects the 2008 population of Kitgum Town as 53,223 and the 2009 population as 55,405, which is slightly higher than the figure given by Kitgum Town Council. For planning purposes, the official government population growth rate was adopted for this study.

4.5 HOUSES AND DOMESTIC ITEMS

Kitgum Town has two distinct housing patterns. Each of the seven parishes has a core zone with urban characteristics such as permanent commercial buildings lining the streets or district roads; as well as fringe areas with more or less rural characteristics in terms of settlement patterns. In the core zone, the houses are usually bigger and close together. The front rooms are bigger and normally used for business while the back rooms are smaller, and usually rented out. These buildings in the core areas are built from

[4] See 2002 Population and Housing Census Analytical Report.

a variety of materials but are mostly brick with iron sheet roofs. Almost all the buildings were constructed by private developers for own business or rental space.

Beyond the core areas of the parishes, field observations clearly showed that the villages consist of tightly clustered settlements. These settlements are characterized by mainly semi-detached grass thatched huts very close to each other.

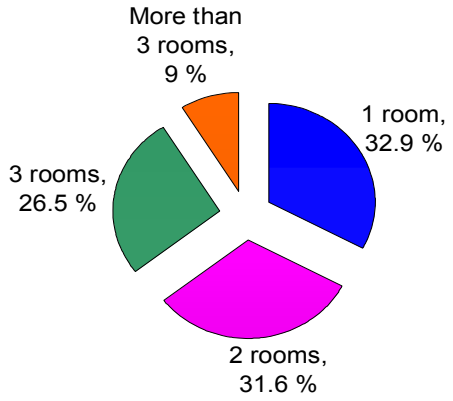
Overall, the study findings show that it is in the permanent and semi-permanent houses that most people (about 58.5%) live (Table 4.7). A significant number of households (41.5%) are sheltered in mostly one-roomed semi-detached huts with mud walls and grass thatch material.

TABLE 4.7. TYPE OF HOUSE OCCUPIED BY FAMILIES IN THE STUDY AREA

Type of House	Number of Households
Hut: *(Mud Walls & Grass Thatched Roof)*	41.5
Semi-Permanent House: *(Mud Walls & Iron Roof)* 11.6	
Permanent House: *(Brick Walls & Iron Roof)* 46.9	
	100.0

About 32.9% of households occupy one room, 31.6% occupy two rooms, while 35.5% have three or four rooms (Figure 4.5). The average number of rooms occupied by households is two. Most (66.3%) of the houses are owner-occupied, 32.1% are rented, while 1.6% are occupied by non-paying tenants (working for NGOs).

FIGURE 4.5. NUMBER OF ROOMS IN HOUSEHOLD



The survey also sought to investigate the presence of key household items in the area. Table 4.8 shows household ownership of key assets including radios, TVs, bicycles, motorcycles and motor vehicles. Estimations from the findings show that about 26% of households have a bicycle while 5.4 have a motorcycle. Approximately 84% of households report having radios.

TABLE 4.8. HOUSEHOLD ASSETS

	Radio	Color TV	Black & White TV	Bicycle	Motorcycle	Vehicle
Yes, Own/ Personal	83.7	11.2	4.3	24.7	4.7	1.4
Yes, Government				1	0.2	0.6
Yes, NGO				0.3	0.5	0.8

Kitgum Town is connected to the national power grid but about 29% of households reported having electricity. More than three-quarters of households depend on firewood and charcoal stoves to meet their cooking needs. The heavy reliance on such cooking technologies obviously poses a serious environmental threat. It was reported that firewood is scarce—all the forests and trees have been cut leaving the land barely protected.

5.0 HOUSEHOLD INCOME AND EXPENDITURE

Household incomes and expenditure are important in understanding the ability of the people to pay for key services or facilities in Kitgum Town.

5.1 EMPLOYMENT AND INCOME STATUS

The employment status of household members is important for the assessment of ability to pay for improved water services facilities. The occupation of household heads varied, with public servants (16.5%) and peasants (16.2%) comprising the largest single occupational groups in Kitgum Town (Figure 5.1). Other occupational categories identified are petty retail traders (13.3%), casual laborers (12.5%), traders (11.7%), housewives (10.8%) and NGO employees (9.6%), while other occupations constituted 9.4%. Included among other occupations are artisans, piggeries, beekeeping, millers, drivers, motorcycle (bodaboda) riders, poultry or livestock keepers as well as non-public service employment. Public servants include central and local government employees, teachers, medical staff, etc.

FIGURE 5.1. OCCUPATIONS OF HOUSEHOLD HEADS

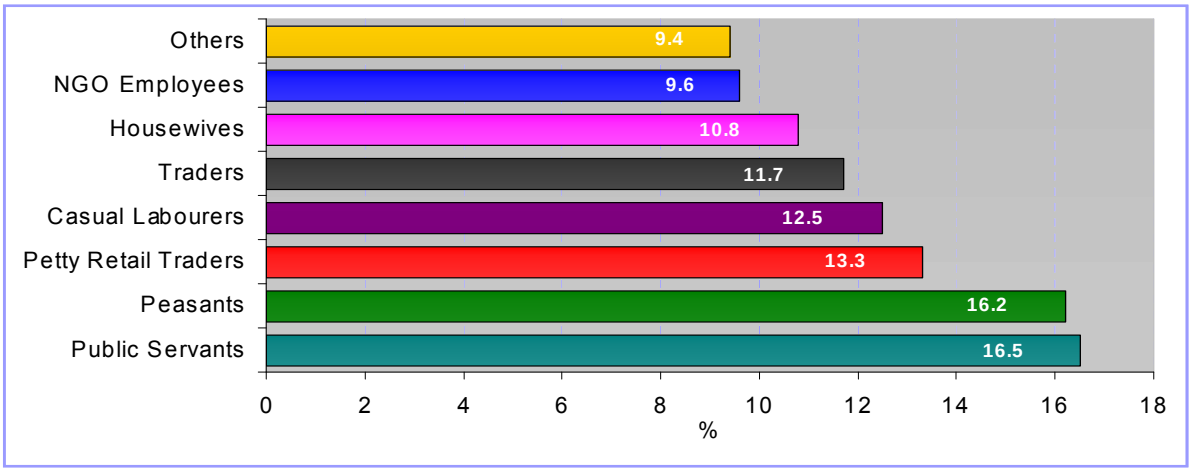
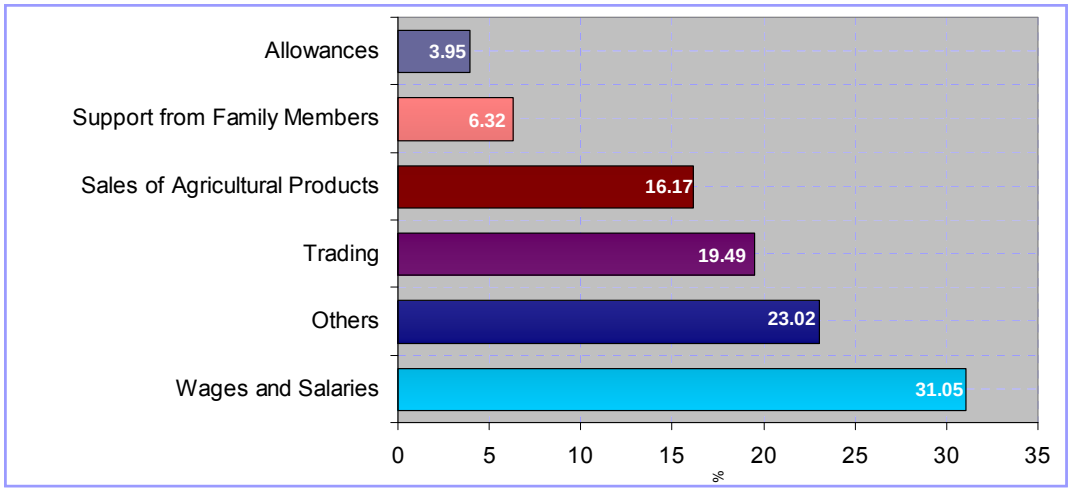


FIGURE 5.2. HOUSEHOLDS MAIN SOURCE OF INCOME



The primary household income-generating source is salaries and wages (31.05%), followed by other sources (23.02%) which include a number of activities categorized under casual labor (see Figure 5.2 above). Trading (19.49%) and sales from agricultural products (16.17%) are also important income sources while a significant number of households depend on support from family members (6.32%) and allowances (3.95%). People were also asked about monthly incomes, but understandably enough, this information is one of the most difficult to obtain. Almost half of the households (49.65%) reported a monthly income below UGX 100,000 (Table 5.1). About 31.5% of NGO employees and 33.7% of traders have incomes above UGX 200,000 making them the highest earners on average while 77.2% of housewives earn less than UGX 100,000 per month, making them the lowest income earners.

TABLE 5.1. AVERAGE INCOME LEVELS OF DIFFERENT OCCUPATIONAL CATEGORIES

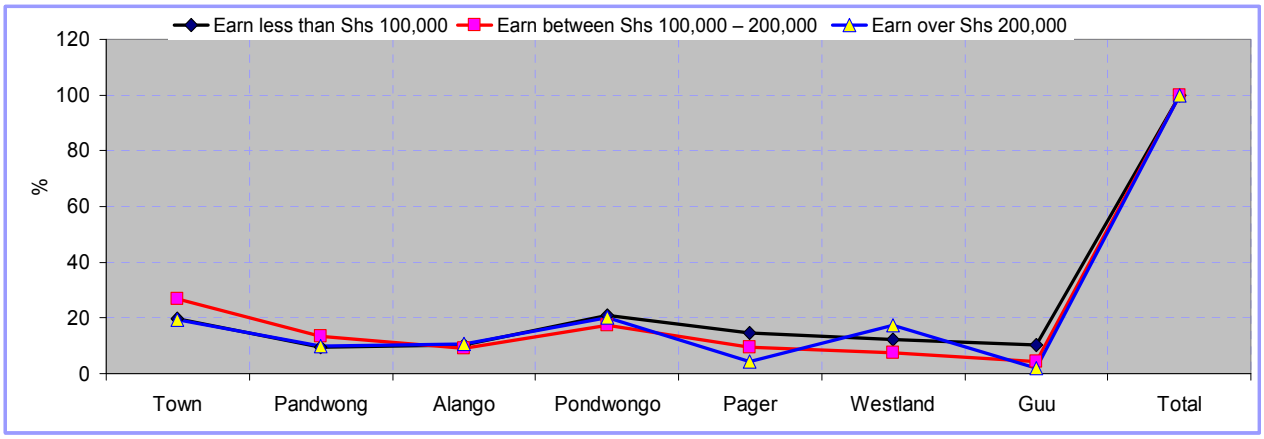
Occupational Category	Percentage of respondents practicing activity	Percentage of Households on the Basis of Monthly Income (UGX)		
		Less than 100,000	100,000-200,000	Above 200,000
Peasants	16.2	60.5	20.1	19.4
Casual laborers	12.5	65.0	27.2	7.8
Petty retail traders	13.3	62.9	22.9	14.2
NGO employees	9.6	12.3	56.2	31.5
Traders	11.7	22.1	44.2	33.7
Public servants	16.5	39.0	41.8	19.2
Housewives	10.8	77.2	13.9	8.9
Others	9.4	58.2	26.2	15.6
Total for all categories	100	49.65	31.56	18.79

Source: BEC Engineers

Overall, 49.65% of the households reported a monthly income of less than UGX 100,000; 31.56% earn between UGX 100,000 and 200,000, while 18.79% reported earning over UGX 200,000. About 19.25% reported receiving a monthly income less than UGX 50,000. The highest income reported was UGX 800,000 while the lowest was UGX 15,000. Town parish, with about 70% of households earning over

UGX 100,000, has the highest income earners on average, followed by Pongdwongo and Westland. Guu and Pager parishes have the highest percentage of households earning less than UGX 100,000 monthly. Figure 5.3 below presents average income levels for all seven parishes (as a proportion of total incomes for the sampled households).

FIGURE 5.3. AVERAGE INCOME LEVELS OF DIFFERENT PARISHES



5.2 HOUSEHOLD EXPENDITURE

The monthly expenditure levels for different households were surveyed in order to obtain some understanding of the potential ability of people to pay for important services such as water supply. The respondents were asked to compute household monthly expenses for their different categories of expenditure items. In Table 5.2, the participating households are categorized into three expenditure groups:

- *Less than 100,000*: The lowest group of households that spend less than UGX 100,000 monthly;
- *100,000 – 200,000*: The middle level group that spends amounts ranging from UGX 100,000 to 200,000 monthly; or
- *Over 200,000*: The upper group that spends over UGX 200,000 monthly.

TABLE 5.2. TOTAL HOUSEHOLD MONTHLY EXPENDITURE

HOUSEHOLD MONTHLY EXPENDITURE (U SHILLINGS)	
Expenditure range	**Percentage of households spending**
Less than 100,000	64.1
100,000 – 200,000	18.9
Over 200,000	17
Source: BEC Engineers	

About 64.1% reported spending less than UGX 100,000 monthly. Food, education and health-related needs seem to account for the greatest share of routine household expenses for communities in the study area, according to discussions with different respondents. Respondents consistently identified these items as making the heaviest inroads on their domestic budgets. Other expenses include travel, entertainment, and water.[5]

[5] See Section 7.4.1 for payment of water.

The survey data indicates that 80.1% of all households purchase their main food items from the market and shops. About 15% grow their main food items, while the rest get free food from relatives or parents in the villages (1.6%) and relief aid (1.3%).

In addition, approximately 21% of the respondents reported paying rent. Of these, 2.6% paid monthly rent of less than UGX 10,000, 6.6% paid UGX 10,000 to 30,000, 7.1% paid over UGX 30,000 to 50,000, 4.3% paid over UGX 50,000 to 80,000, while 0.5% paid more than UGX 80,000.

6.0 REVIEW OF EXISTING FACILITIES

6.1 TYPE OF WATER SUPPLY USED BY HOUSEHOLDS

Estimates based on the study findings showed that borehole water is used by over three-quarters (82.2%) of the population in Kitgum Town, while only 11.9% use water from the pipe-borne system (Figures 6.1

FIGURE 6.1. MAIN SOURCE OF WATER FOR DRINKING AND COOKING

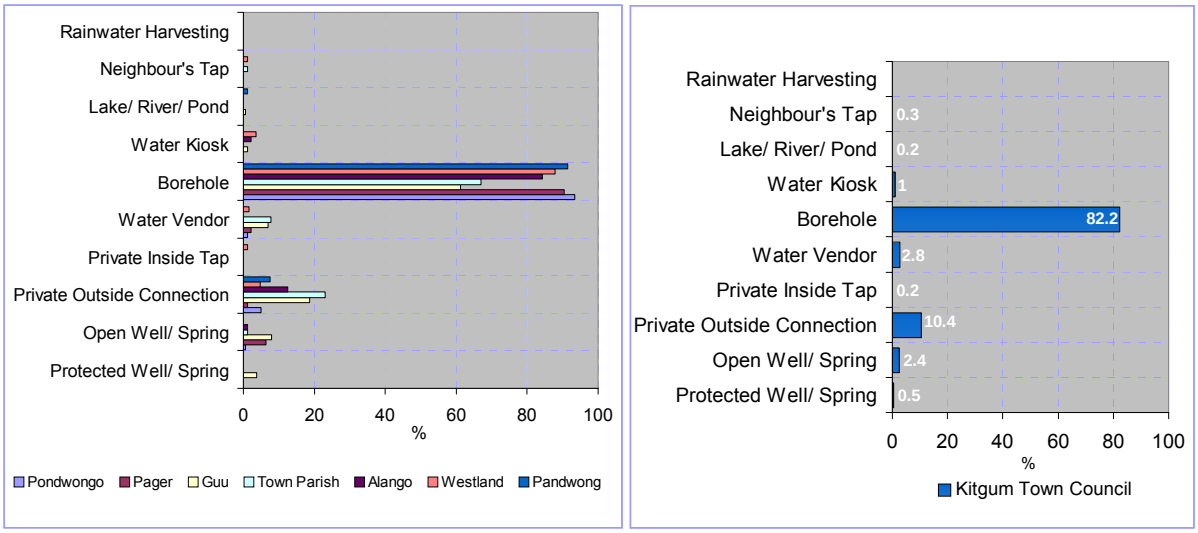
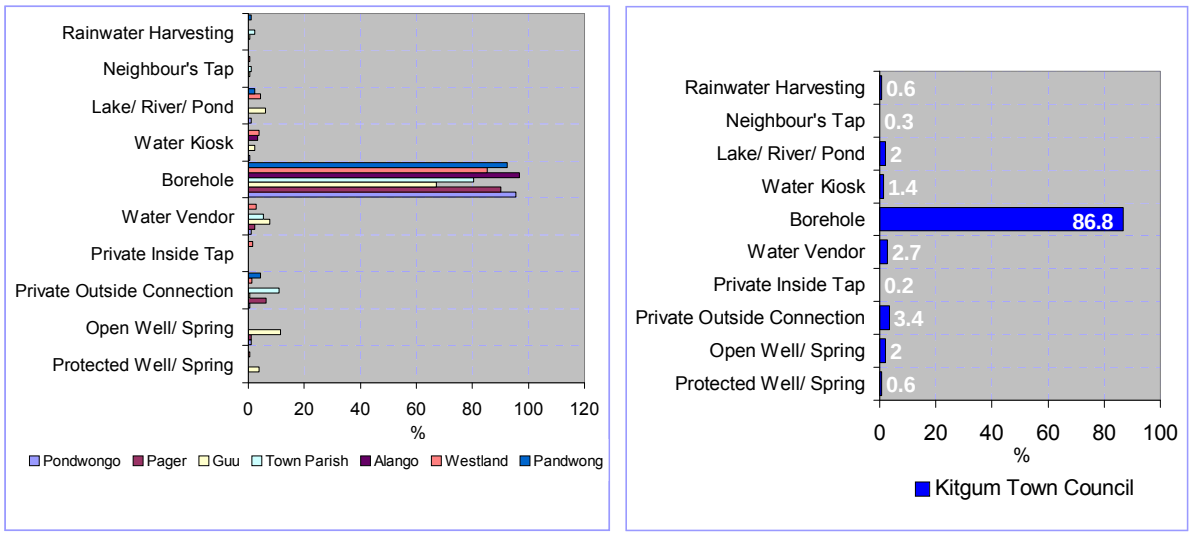


FIGURE 6.2. MAIN SOURCE OF WATER FOR BATHING AND LAUNDRY



and 6.2).[6] The rest of the population depends on water vendors (2.8%), springs (2.9%) and the river (0.2%). Surprisingly, the number of households that practice rain harvesting during the wet season is negligible (0.6%), and rightly so; the most popular sources of water in the town do not vary during the dry and wet seasons.

The study team confirmed that the point source borehole was the most dominant source of water throughout the study area. The majority of households use this source for all their water needs, including drinking and cooking as well as bathing and laundry. Approximately 12.7% of households reported using more than one source for their water needs. There are 80 boreholes, 27 water kiosks and 478 yard connections in the town. About five boreholes are not functional,17 kiosks are working and a significant number of other pipe connections (about 169) are either without flowing water or disconnected (see Table 12.1). The government owns the public boreholes while the District Water Officer is mandated with the overall responsibility for operation and maintenance of the facilities. Table 6.1 below shows the distribution of public water sources in Kitgum Town.

TABLE 6.1. DISTRIBUTION OF PUBLIC WATER SOURCES BY PARISH

Parish	Water Sources			
	Water Kiosks	Boreholes	Shallow wells	Total
Westland 7		7	4	18
Town Parish	3	10	0	13
Alango 1		9	1	11
Guu 5		11	5	21
Pandwong 5		13	4	22
Pager 3		11	5	19
Pandwong 3		19	4	26
Total 27		80	23	130

Source: Urban Water Department, Kitgum Town Council

In addition, the survey observed private point source boreholes in use in 10 of the institutions visited during the survey period (see Table 6.2 for a list of institutions with private boreholes).

6.2 AMOUNT OF WATER USED BY HOUSEHOLDS

Using survey data, the amount of water currently consumed by households in Kitgum Town was computed. About 11.6% of households use less than three jerrycans, 23.5% use three jerrycans and 64.9% use more than three jerrycans of water.[7] The total number of jerrycans used per day in the surveyed households was 3,559 or about 85 m^3.

The survey findings also show that about 4.6% of households use water for livestock feeding and another 0.5% for small-scale irrigation.

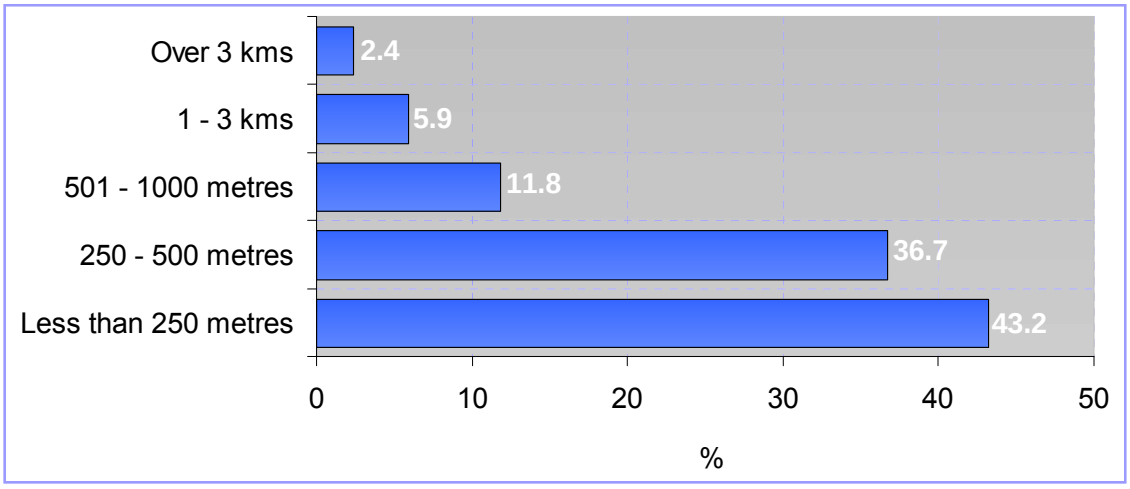
6.3 DISTANCE TO WATER SUPPLY

The majority of households (79.9%) in Kitgum Town cover a distance of 500 meters or less to get water (Figure 6.3). About 8.3% of the households are 1 km or farther from their water sources.

[6] Pipe-borne system includes neighbor's tap, water kiosk, private inside tap and private outside connections.

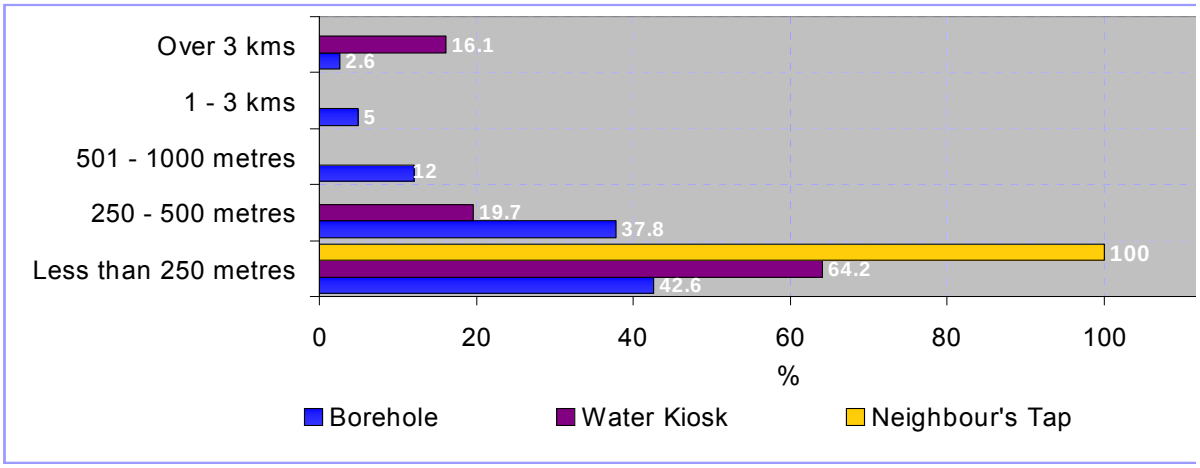
[7] Each jerrycan carries about 24 liters of water.

FIGURE 6.3. DISTANCE TO MOST FREQUENTLY USED WATER SOURCE



Further analysis shows that over three-quarters of those using pipe-borne water (100% neighbor's tap and 64.2% water kiosk) were less than 250 meters to a water tap. In contrast, only 42.6% covered a similar distance to the nearest borehole.

FIGURE 6.4. COMPARISON OF DISTANCE TO BOREHOLE, WATER KIOSK AND NEIGHBOR'S TAP



Further, the survey revealed that adult women (62.1%) and girls (28.7%) fetch water most. Few adult men (4.8%) and boys (4.4%) participate in fetching water for the households. The majority (56%) of the people who fetch water spend 30 to 60 minutes on one trip. About 30.1% spend less than 30 minutes while 13.8% use over 1 hour.

Over three-quarters (86.4%) of households collect water from their main source on a daily basis. Further, over a half (54.1%) of all households conduct three or more trips for water every day, 30.5% travel twice while 15.4% collect water less than two times per day. The number of water collection trips reduces during the wet season. The majority (64.5%) of these households collect their water in the morning. However, a significant number (16.2%) collect water before sunrise and about 5.5% after sunset, while 13.7% in the afternoon.

6.4 ACCESS TO WATER BY INSTITUTIONS

During the survey, a number of institutions were visited to understand their water problems and needs. Interactions with various institutions revealed that inconveniences of unmet water needs coupled with the continuous failure of the water system to supply adequate water prompted some large volume consumers to devise own coping mechanisms. As a result, some hotels, schools and the two referral hospitals in Kitgum Town set up their own motorized systems or boreholes. Many other institutions (including guest houses, schools, offices) get their water from the boreholes. Most of these institutions that get water from point source boreholes have full time employees who collect water using specially made wheel carts that carry a total of ten 20-liter jerrycans in one trip.

Table 6.2 below shows that out of 39 surveyed institutions 16 (41%) use the pipe system, 6 (15%) have their own motorized boreholes and 15 (38%) use only manual boreholes.

TABLE 6.2. MAIN SOURCE OF WATER FOR SURVEYED INSTITUTIONS IN KITGUM TOWN

	Institution	Number of people	Number of jerrycans used/day	Main Source of water	Connected to pipe system
1.	YY Okot Memorial College School	1151		• Pipe system	Yes
2.	Kitgum High School	1200		• Pipe system	Yes
3.	Kitgum Public School	1918		• Pipe system	Yes
4.	Horizon Nursery and Primary	624		• Pipe system	Yes
5.	Kitgum Hospital	200 (Inpatients) 400 (Outpatients)		• Own motorized borehole	Yes
6.	Timbo Hotel	50		• Own motorized borehole	Yes
7.	Boma Hotel	100		• Own motorized borehole	Yes
8.	Afrimak	48		• Own motorized borehole	Yes
9.	Uganda Red Cross Society	10		• Borehole	No
10.	World Vision Uganda	18		• Borehole	Yes
11.	Food for the Hungry Uganda	35		• Own motorized borehole	No
12.	ANPPCAN Field Office	7	2	• Pipe system	Yes
13.	Kitgum NGO Forum	6		• Borehole • Pipe system	Yes
14.	CARIT AS Kitgum	20	80	• Pipe water	Yes
15.	Meeting Point Kitgum	15		• Water Vendor	No
16.	Jesuit Refugee Service	15		• Pipe system	Yes
17.	Kitgum Concerned Women's Association	30		• Pipe system	Yes
18.	AVSI Kitgum	76		• Own borehole	Yes
19.	LWF Kitgum	55		• Pipe system • Borehole	Yes
20.	International Medical Corps	47		• Borehole	Yes
21.	Odunglee Primary School	890	110	• Borehole	Yes
22.	Pagen Primary School	1442	50	• Borehole	No
23.	Kitgum Alliance College	500		• Borehole	No
24.	Kitgum Boys Primary School	1668	120	• Borehole	No
25.	Pand wong Primary School	1960	200	• Borehole	Yes
26.	St. Joseph's Hospital	25,200		• Own motorized borehole	Yes

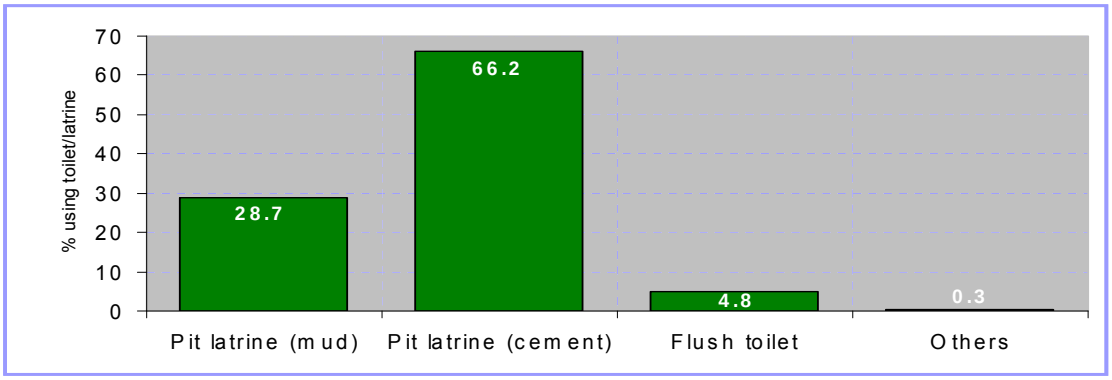
	Institution	Number of people	Number of jerrycans used/day	Main Source of water	Connected to pipe system
27.	Ox fard College	300	130	• Pipe system	No
28.	Kitgum Comprehensive College	1700	200	• Borehole • Pipe system	Yes
29.	Kitgum Primary School	1800		• Own borehole	No
30.	IRC Kitgum	140		• Pipe system	Yes
31.	Child Care Nursery School	250	10	• Pipe system	Yes
32.	St. Joseph Nursery School	521	12	• Own borehole	No
33.	St. Bakhita Girl's S.S	115	20	• Borehole	No
34.	Rev. Jabuloni Issoke Memorial College	530		• Own borehole	No
35.	Kitgum Integrated College	683		• Pipe system • Borehole	Yes
36.	Good Foundation Nursery and Day Care	107 30		• Borehole	No
37.	Los Angeles Guest House	20		• Borehole • Pipe System	Yes
38.	Jamahuri Guest House	15		• Borehole	No
39.	OJ Guest House	20		• Borehole • Pipe system	Yes

6.5 TYPE OF TOILET FACILITY USED BY HOUSEHOLDS

The general sanitation facilities in Kitgum Town include mud pit latrines, cement pit latrines, flush toilets and open defecation (open space or nearby bush, or the river). Estimations based on the survey data show that 92.03% of the interviewed households reported using either a toilet or latrine for defecation purposes. The cemented pit latrines (66.2%) were the most dominant, followed by the mud pit latrine (28.7%) while 4.8% use the flush toilets (Figure 6.5). The flush toilets do not have water connections to septic tanks. About 0.3% of the households reported using other sanitation facilities such as eco-san. The very few number of households using flush toilets may be attributed not to the cost of installing such systems, but the absence of reliable pipe water in the area.

The findings also reveal that 44.5% of the households above share latrines. Approximately 52.6% share a latrine with one other household, 28.1% share with two other households, while 19.3% share with more than two households.

FIGURE 6.5. TYPE OF LATRINE USED



Those households without access to a toilet or latrine (7.97%) use risky defecation systems (such as open areas or river); standing a high chance of suffering from sanitation-related diseases like cholera and Hepatitis E.

6.6 OBSERVED SANITARY PRACTICES

Interactions with various respondents as well as general observations of the study area reveal poor sanitation conditions. The intensity of the problem varies from area to area with the core zones of the parishes being relatively better off and the fringe villages the worst. Although the majority of households reported using some form of sanitation facility, most of the observed latrines were poorly constructed and maintained. In the core zones of the town, including the central business area, property owners have constructed pit latrines in the alleys and behind the commercial properties lining the streets giving off nasty fumes and a non-aesthetic view to passersby. In most areas of the town, pit latrines are just built anywhere, for instance many roads in residential areas have latrines on the sides. Usually the atmosphere around most of these latrines is very smelly.

In the fringe villages, many latrine structures were built with improvised materials such as reeds, tarpaulin, and scrap metal. Many latrines have dangerous and narrow entrances (collapsing or hanging doors), and are often dark inside, and without slabs and covering pans.

No latrines observed during the household survey had hand-washing facilities nearby, implying that there is no use of soap and water after using the latrine. Incidentally, some households with flush toilets do not use them because there is no water in the pipes. Similarly, many institutions (including some district offices) stopped using flush toilets because water stopped flowing into the pipes. In most of the guest houses equipped with flush toilets, after use, water from the vendors or boreholes is poured manually.

In a number of areas (such as Quarters B and parts of Pager) the pit latrines are not deep enough because of a high water table. Most of the latrines are water logged. People explained that they use these facilities while contaminated water inside the pits splashes on their bodies.

Previously the town council had introduced eco-san latrines but the system failed due to poor maintenance. During the survey however, three households in Quarters B village were observed with eco-sans. One of the houses is a teachers' quarters recently built by the Northern Uganda Social Action Fund (NUSAF). Its eco-san looked well maintained from a distance but as one gets closer, it gives off a bad stench. The user families were not educated on how to maintain the facility. Even more worrying, the eco-san is a two-stance structure and both stances are currently in use by the two teachers' families. It is likely that both stances will fill up at the same time and the two families may be caused much inconvenience since they will not have alternative sanitation facilities. The survey observations revealed that all the three households (using eco-sans) would possibly afford installing flush toilets but currently there is no pipe water extension to the area. The NUSAF design would also have incorporated inside flush toilets in the architectural designs, but perhaps since the area lacked a pipe water network this option was not considered.

6.7 HOUSEHOLD HYGIENE

The survey sought to establish current practices relating to general household cleanliness (encompassing a number of issues such as discharge of gray water, disposal of solid waste, as well as personal hygiene practices). About three-quarters (73.6%) of the households discharge gray water into the open areas, while 17.3% into household gazetted disposal areas. A few (9.1%) reported discharging gray water into the drainage system and other places. The household survey findings indicate that 81.2% of the households dispose of solid waste into garbage pits, 13.6% into gazetted collection points and 5.2% into open areas.

A total of 73.3% of the survey respondents reported treating their water before drinking by mainly adding chemicals. Water for domestic use is mostly kept in 20-liter jerrycans, and for commercial purposes in 100-liter jerrycans. Some households with connection to the pipe network have storage tanks. Usually the domestic jerrycans are kept clean and most of the observed households handle and transfer water without dipping into the storage container. However, the households or commercial entities with larger (100 or 200 liter) containers for water used in drinking and cooking were observed not to be protected and transfer water by dipping into the storage containers.

However, inspections and observations during the survey revealed undesirable latrine and hygiene practices in the study area, especially in the fringe villages. For example, it was evident that the majority of people do not wash their hands with water and soap after using latrines. The majority of bathrooms outside the central business area are improvised structures of mostly mud, wood or polythene, usually built halfway to the waist level, without doors. Many people bathe outside at night under the cover of darkness. Gray water is poured anywhere outside the houses. The surroundings of most households are very dirty, usually filled with polythene and other household waste. Winds keep blowing the dirt around the households back and forth. A few households were observed with composite pits where they collect and burn household waste. The majority of the households drop their refuse on the roadsides where garbage collects and is constantly blown and littered around by the winds. The town council has garbage collection trucks but their activities seem concentrated in the central business area and around key facilities such as hospitals, district headquarters and NGO installations.

To obtain a deeper insight and understanding of water, sanitation and hygiene issues, on 13 September 2009 the survey team carried out an inspection walk through a cross-section of villages. The walk was to observe latrine structures, hygiene practices as well as water points. Table 6.3 on the following page presents notable observations from the walk.

6.8 HEALTH TRENDS IN THE STUDY AREA

Respondents were asked about the prevalence of waterborne diseases in the month preceding the baseline survey. Survey findings indicate that malaria affected people in 71.86% of the households in July 2009 and still remains the most prevalent water-related disease in Kitgum Town, followed by typhoid (18.21%). Also cited are intestinal worms and diarrhea diseases such as dysentery, bilharzia, and cholera (Figure 6.6).

FIGURE 6.6. WATER-RELATED DISEASES IN THE LAST 30 DAYS PRECEDING THE BASELINE SURVEY

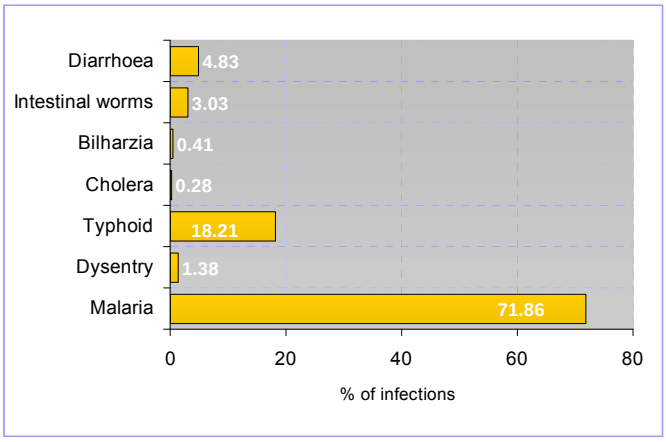


Table 6.4 below shows that the 1-17 age range was most affected by waterborne diseases (76.3%), while old people aged over 60 years were least affected (1.5%). This data confirms the 2007/08 district records that show malaria was the most common cause of morbidity (30%) and mortality (34%) among children under five years. Intestinal worms, diarrhea and skin diseases were also among the 10 major causes, together accounting for 15.7% of morbidity and 20% of mortality among children under five years.

TABLE 6.3. INSPECTION TOUR OF WATER POINTS, LATRINES AND BATHROOMS

Village:	**Westland**		**Second Jenge**	**Apollo Ground**	**Central**	**Quarters**	
Parish:	**Westland**		**Westland**	**Town Parish**	**Town Parish**		
Brief description of area observed	Village extends to the bushy stretch bordering with Pager River on the western fringes of the town			Quarter		A	Quarter B
	The extreme western end (around Mr. Oyet Nelson's household)	Moving eastward	Village with rural characteristics	A core urban area with permanent buildings usually used for commercial purposes	A core urban area with permanent buildings usually used for commercial purposes	Largely residential area with mostly permanent and semi-permanent houses, and a few huts	Largely residential area with mostly permanent and semi-permanent houses, and a few huts
Cleanliness inside the houses and the surroundings	Inside the houses and surroundings are usually untidy. Utensils are kept outside and meals are prepared in the open or in makeshift kitchens not far from the latrines or feces on the ground.	Permanent houses are clean inside while the semi permanent are dirty. The surroundings are filthy.	The houses are relatively tidy and the surroundings are normally kept clean	In most alleys (spaces between buildings) there are pit latrines giving off an unpleasant atmospheric odor. The alleys and behind the buildings are littered with garbage.	In some of the alleys there are makeshift kitchen's for restaurants and guesthouses (such as Acholi Pride and Los Angeles Guest House) which give the surroundings an unpleasant sight	The surroundings of most households are very filthy	The surroundings of most households are very filthy
Water source	Use borehole, about 300-500 meters away	Borehole No. 19532	Water kiosk located less than 50 meters from the Second Jenge borehole. Long lines at the borehole and only 3 jerrycans at the kiosk. Kiosk is closed –there is no power to run the pumps because electricity has been off since morning. Kiosk charges UGX 100 per three 20-liter jerrycans. Borehole users pay a monthly lump sum of UGX 1,000.	Borehole Inside house connections but availability of water is not reliable	Borehole at Boma grounds. Inside house connections but availability of water is not reliable	Borehole at Quarter A Long lines at the boreholes. Some working people bring jerrycans very early in the morning and pick them up late in the evening after work.	Borehole at Quarter B The borehole was previously condemned because water was mixed with feces. This problem was identified after people contracted typhoid. However, people still use it because there is no alternative. Usually women fight at borehole for water because of overcrowding.

Village:	Westland		Second Jenge	Apollo Ground	Central	Quarters	
Parish:	**Westland**		**Westland**	**Town Parish**	**Town Parish**		
Latrine structures	Latrines here could be some of poorest in town. Most latrines are filthy tiny structures built of mud, with grass or polythene roofs. Some latrines are constructed half way, without doors or with hanging doors. Latrines with doors are very dark inside. Feces can be seen on the ground, in the bushes and in open areas along the margins of the western boundary.	The area has relatively better latrines. Some latrines are cemented but without vent pipes and covering pans. The inside of the latrines is dark and smelly. Some latrines have slabs but the majority are without (slabs).	A mix of improved and poor latrine structures. Many of the latrines are built of mud.	Pit latrines inside the commercial buildings Flush toilets (in some buildings) but after use water collected from the boreholes is poured manually because there is no flowing water inside the pipes	Pit latrines inside the commercial buildings. Pit latrines built in the spaces behind the commercial buildings. Some children defecate in the bushy areas. Flush toilets (in some buildings) but after use water collected from boreholes is poured manually because there is no flowing water inside pipes	The semi-permanent houses and huts have pit latrines with poor structures and a bad odor. The lower road to Ginnery has several poorly built pit latrines on the sides giving off a nasty smell. Most permanent houses have cemented pit latrines. A few permanent houses have flush toilets.	Latrines are barely 3 feet deep because of a high water table – people use them while water is splashing. Three houses have eco-sans. The semi-permanent houses and huts have pit latrines with very poor structures and usually with a bad odor. Most permanent houses have cemented pit latrines.
Bathrooms	Bathrooms are improvised structures of worn out tarpaulin, or wood, or mud, normally built half way to the waist level without doors. Many people bathe outside at night under cover of darkness.	Most of the bathrooms are improvised structures of wooden material, worn out tarpaulin or mud. Many people bathe outside at night under cover of darkness.	Many bathrooms are built of wooden or other improvised materials. Many people bathe outside at night under cover of darkness.	Bathrooms inside the buildings. Some have showers but availability of water is not guaranteed. Some people were seen bathing with water in plastic basins in front of the buildings at night with lights off.	Bathrooms inside the buildings. Some have showers but availability of water is not guaranteed	Most of the semi-permanent houses have either mud bathrooms or improvised bathrooms made of scrap metal or other materials. Permanent houses have better bathrooms	Most of the semi-permanent houses have either mud bathrooms or improvised bathrooms made of scrap metal or other materials. Permanent houses have better bathrooms.
General Odor	Atmosphere is filled with an irritating stench.	Immediate surroundings to the latrines are smelly.	Environment is filled with fresh air.	The alleys with pit latrines are very smelly.	The areas with latrines behind the buildings are a bit smelly.	The areas surrounding pit latrines are smelly.	The areas surrounding pit latrines are smelly.

TABLE 6.4. WATER-RELATED DISEASES IN THE 30 DAYS PRIOR TO SURVEY BY AGE GROUP OF AFFECTED HOUSEHOLD MEMBERS

Disease	Age Group of Members of Household Affected Most (%)				
	0-1	1-9	10-17	18-60	Over 60
Diarrhea	2.9 45.7	28.6	20.0		2.9
Malaria	3.5 53.9	28.5	13.0		1.2
Typhoid		9.8 43.9	43.2		3.0
Dysentery	25.0	50.0	25.0		
Cholera				100.0	
Bilharzia		66.7	33.3		
Intestinal worms	45.5	36.4	18.2		
Total	**2.6**	**44.4**	**31.9**	**19.5**	**1.5**

In some villages (such as Ginnery and Quarters), people mentioned the existence of worms in the borehole water. Most of the water point sources are close to residential houses and pit latrines yet the water table was said to be high in much of the town area. There is a likelihood of contamination of some point sources with feces, especially in parts of Pager and Quarters.

6.9 PSYCHO TRAUMA CASES

The two decades of LRA insurgency in northern Uganda left many people battling with trauma, depression and psycho-traumatic stress disorders. In July 2009 (the month preceding the baseline survey), a psycho-trauma center was launched at Kitgum Hospital to deal with the rising cases of trauma among former displaced persons. According to the Ministry of Health, if these people are not helped to deal with trauma, they will remain unproductive. The staff at the center revealed that the highest number of cases they deal with involves epilepsy, depression, schizophrenia, mania and substance abuse. Between January 2008 and June 2009, 1,730 epilepsy cases were registered at the hospital, with female patients at 866 and male at 870. The majority of patients with epilepsy are children under five years, because during the war, medical facilities were inaccessible to many people. Many mothers delivered their at home in the hands of unqualified birth attendants which exposed the babies to brain damage. Between January and July 2009, depression cases registered at the trauma center numbered 86, schizophrenia cases 93, mania 67, suicide attempts 13, and substance abuse 31.

The survey team also learned that there are numerous cases of war-affected children in the town whose psycho-social needs should be addressed. Since 1997, however, the local government, UNICEF and NGOs such as AVSI (an Italian NGO) have been implementing a psycho-social program in the area. Many different people have been trained in psycho-social awareness, including community development assistants chosen by their communities and primary school teachers. Awareness assessments have been conducted for parents, teachers, community leaders and students. To date, there is a formal psycho-social program in the district which encompasses Kitgum Town Council; increased collaboration between different local and international agencies as well as the Ministry of Health; and expanded activities including new responses to address increasing cases of psycho trauma in the area.

7.0 PERCEPTIONS ABOUT EXISTING FACILITIES

It is important to know the perceptions of people in Kitgum Town about existing facilities in order to understand fully their desire for change.

7.1 WATER PREFERENCE BY SOURCE

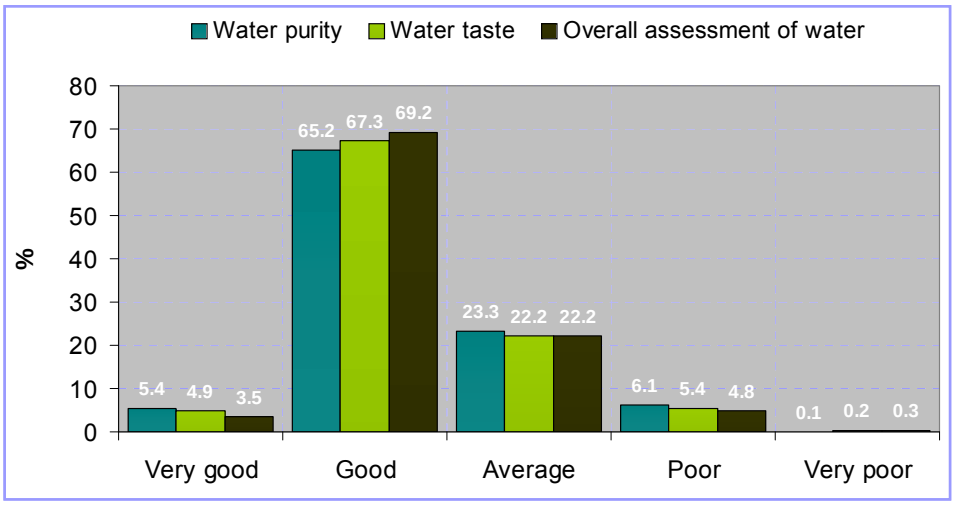
The survey findings show that a majority (88.7%) of households expressed preference for the point source boreholes. About 3% preferred the protected spring, 2.7% the water vendor, 1.8% the water kiosk, 1.2% rainwater, 0.7% rivers, 0.2% their neighbor's tap, while 1.7% preferred other sources.

The survey respondent's reasons for the preferences above were varied. However, a significant number (36.5%) gave short distance and convenience as the most dominant factor for their water source preference. Other drivers for households' preferences included good taste (27.6%), perceived quality (19.8%), price (12.4) and other reasons (3.8%).

7.2 QUALITY OF WATER

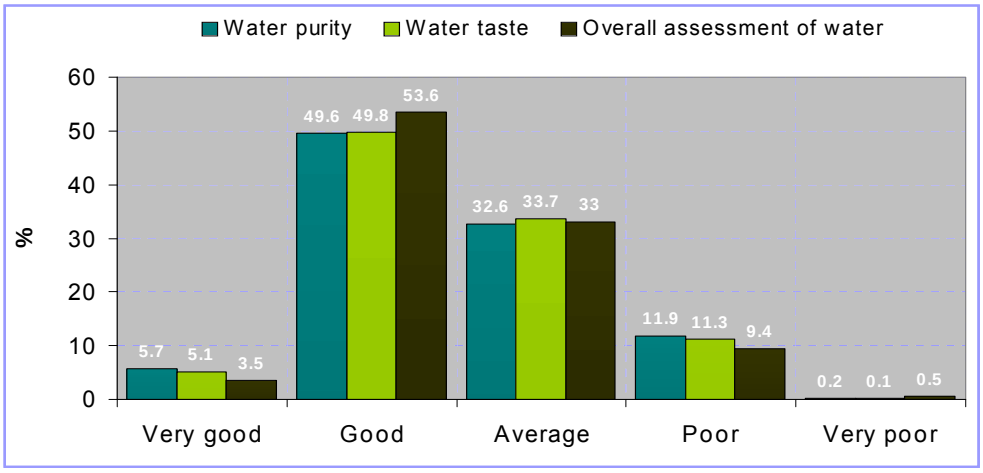
When asked about the quality of their main sources of water (whether good for drinking and cooking or not), about 5% of the households considered their current water to be poor for drinking and cooking, while about 69% considered the water good for drinking and cooking (Figure 7.1). The reasons given for good quality of the currently used water sources include good taste and color. On the other hand, households that found their current water sources unsuitable gave various factors responsible for the poor quality of water including presence of particles, bad odor, taste and color.

FIGURE 7.1. QUALITY OF WATER USED FOR DRINKING AND COOKING IN KITGUM



Further, respondents were asked specifically about the quality of pipe water (whether good for drinking and cooking or not), about 10% of the households considered pipe water to be poor for drinking and cooking, while about 54% considered pipe water good for drinking and cooking (Figure 7.2). Kitgum households scored pipe water lower than borehole water on the quality scale mainly because of perceived health issues. During interactions with the survey team, most people believed tap water causes typhoid, although it is ground water just like water from point source boreholes used by the majority of households. Some respondents also expressed reservations about the level of hygiene in the water tanks and the water pipeline.

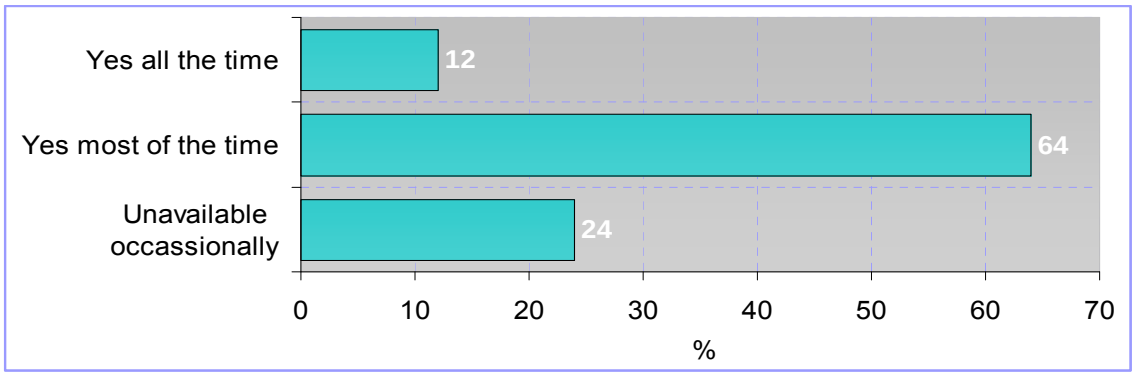
FIGURE 7.2. QUALITY OF PIPE WATER SUPPLIED IN KITGUM



7.3 SATISFACTION WITH CURRENT WATER SUPPLY SYSTEM

A further analysis of the findings reveals that over three-quarters (76%) of the households expressed satisfaction with their current water supply systems (Figure 7.3). However, when asked specifically about pipe water, the number of satisfied households reduced to 50% (Figure 7.4). Reasons given for dissatisfaction with the pipe water supply system mainly revolved around its irregular supply.

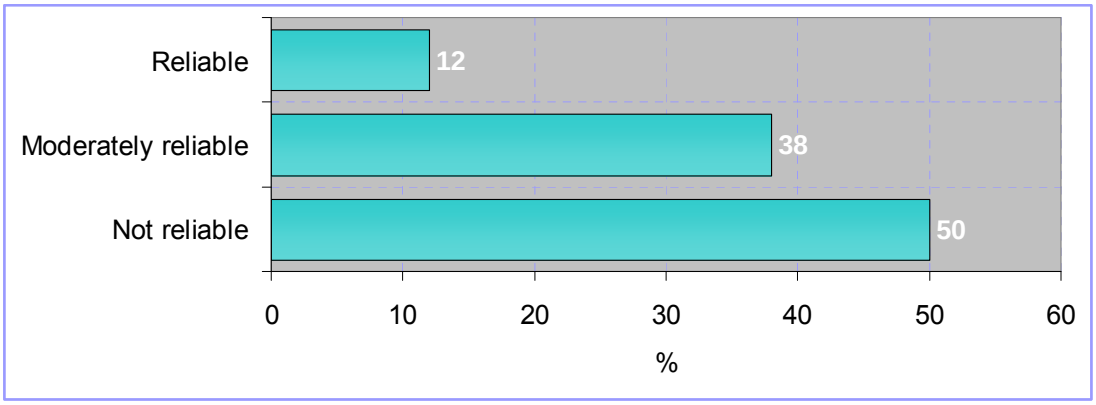
FIGURE 7.3. AVAILABILITY OF WATER FROM MAIN SOURCE



During the household survey, a number of respondents physically showed the interviewers the non-functional taps or taps with intermittent flow of water within their areas. According to the town residents, it is normal to see people with pipe water connections rushing to line for water at the boreholes. Many people actually felt that those households with pipe connections were not any better: “There is no

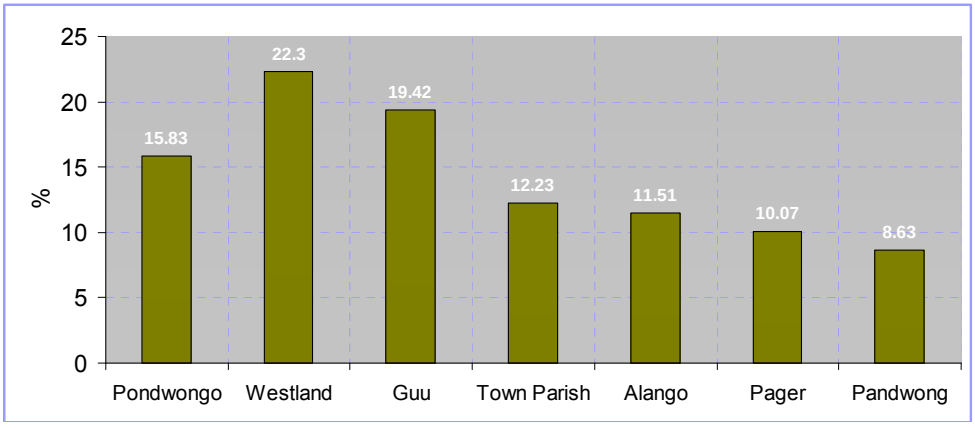
difference between one having pipe water connection and one without. In fact those with pipe connections suffer more than us (who rely purely on other sources)". This was echoed by many voices during the survey.

FIGURE 7.4. RELIABILITY OF WATER FROM PIPE SYSTEM



Household perception about the amount of water consumed from their main sources and whether water from their main sources is available at all critical times further suggest that users of boreholes are more satisfied than those relying on the pipe system. For instance in Figure 7.5 below, the parishes with few water kiosks and more boreholes (Alango, Pager, Pandwong) had fewer complaints about unavailability of water at critical times. Parishes with more water kiosks (Westland, Pondwongo, Guu) registered more complaints regarding unavailability of water at critical times. People felt it is impossible to have a constant flow of pipe water, and that if a household did manage that have a constant supply of pipe water, then the household had bribed the operator's staff.

FIGURE 7.5. HOUSEHOLDS WITHOUT WATER SUPPLY AT CRITICAL TIMES



However, in all the parishes, the fringe villages were more dissatisfied with their current water supply than the core urban areas. The box below presents the case of Ginnery; a fringe village in Guu parish which best illustrates this case.

BOX 7.1. GINNERY VILLAGE – A WATER-STRESSED COMMUNITY

Ginnery is a remote village on the eastern fringes of Kitgum Town. The village has a large population but only two boreholes, which according to residents have hard water and long red worms. There is only one kiosk in the village—it was not functional and no one in the village knew why water was not flowing in the tap. As a result, the village uses borehole water for washing and bathing only, and fetches drinking water from a spring. The spring is silted, however, and people step inside the spring and stand in the water while filling their containers. While a few people said they treat their drinking water with water guard, the majority do not treat their water. One out of every 10 households complained of repeated typhoid infections.

7.4 PAYMENT FOR EXISTING FACILITIES

The cost of existing facilities in Kitgum Town could be important for determining their willingness and ability to pay for improved services.

7.4.1 PAYMENT FOR WATER

Currently, almost three-quarters (71.1%) of households in Kitgum Town pay for water from their main sources. Over a quarter of households (28.9%) do not pay for the water they use. The criteria for payment for water differed with type of water source and amount or use of the water:

- Payment for O&M, and
- Payment per jerrycan.

7.4.2 PAYMENT FOR OPERATION AND MAINTENANCE

Of the paying households, the majority (85.3%) pay for O&M of the point source boreholes, which are their main water sources. Each household pays a monthly lump sum fee of UGX 1,000 for O&M, while high volume users such as bricklayers, restaurants, schools and guest houses pay more monthly, usually ranging from UGX 3,000 to 5,000. About 12.7% of households paying for O&M of point source boreholes also buy supplementary water from vendors or water kiosks.

7.4.3 PAYMENT PER JERRYCAN

Of the paying households, a few buy from water vendors (2.8%) and pipe water systems such as private outside connections or yard taps (10.7%) and water kiosks (1%). The vendors sell a jerrycan of water at prices ranging between UGX 100 and 300, while the price varies at water kiosks. Approximately 54.1% of households pay UGX 20 per jerrycan, 37.8% pay UGX 25 and 8.1% pay more than UGX 25. Although the official water tariff at the kiosk is UGX 100 for five jerrycans, some kiosk operators were reported to charge UGX 100 for three jerrycans and others UGX 100 for four jerrycans (see Table 7.1).

TABLE 7.1. COMPARISON OF DIFFERENT WATER PAYMENT SYSTEMS IN KITGUM TOWN

	Borehole	Water vendor	Water kiosk	Yard tap	House Connection
Paying households (%):	85.3 2.8		1	10.7	0.2
Of the paying households those who buy water from all available sources:	12.7				
Payment structure:	Monthly	Per jerrycan	Per jerrycan	Per jerrycan	Per cubic meter
Tariff structure:	Differential rates	Flat rate	Flat rate	Flat rate	Flat rate

	Borehole	Water vendor	Water kiosk	Yard tap	House Connection
Amount in UGX:	• 1,000 (for households) • 3,000 – 5,000 (for high volume users)	100 – 300	20 – 30	20 - 30	1,000

Those households that use vendor water already pay a lot for water supply (Figure 7.6 below). About 64.29% pay UGX 200 or 300 per 20-liter jerrycan of water.

According to the table below, most people who buy water from private vendors in Westland, Pondwongo, Guu and Town Parish pay not less than UGX 200. In the parishes of Padwongo, Pager and Alango quite a number of people pay UGX 200 or more for water from vendors.

Overall, borehole users make regular payments for operation and maintenance of the boreholes while households who get their main water from water sellers understandably pay for water more than other households.

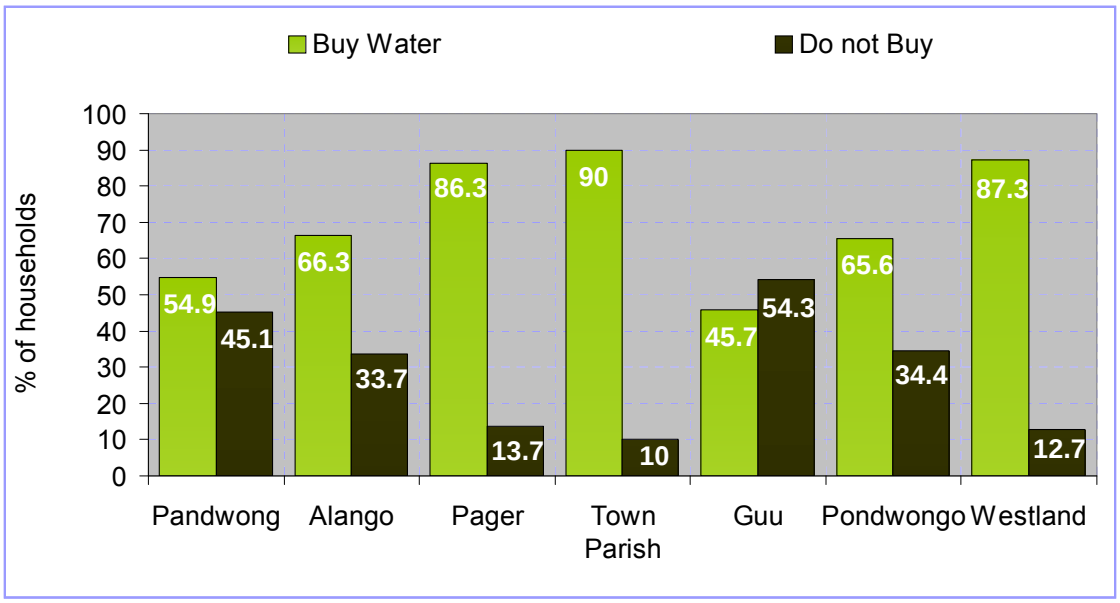
FIGURE 7.6. COST OF WATER FROM PRIVATE VENDORS

	Vendor water cost per 20 liters (in UGX)		
	Less than 100	100 - 200	200 - 300
Total for Kitgum Town Council	9.52%	26.19%	64.29%
Pandwong			
Alango			
Pager			
Town Parish			
Guu			
Pondwongo			
Westland			

NOTES: The shaded cells indicate the price of 20 liters of water.
***1 shaded cell*:** less people buy water at the specified price
***2 shaded cells*:** quite a number of people buy water at the specified price
***3 shaded cells*:** most people buy water at the specified price

Figure 7.7 below provides an illustration of the above findings (the majority of households in all the parishes except Guu parish pay for water). In the parishes of Westland, Town parish and Pager there are only a few households that do not pay for water.

FIGURE 7.7. DISTRIBUTION OF HOUSEHOLDS THAT BUY WATER



7.4.4 PAYMENT FOR OTHER UTILITY SERVICES

Survey findings indicate that 29.1% of the households visited were connected to electricity. Of these (households with electricity) 89.4% had a functioning meter, while 10.6% were without a meter.

Further, about 1.8% of the households visited have a connection to a septic tank. Of these households connected to a private sewer system only 12.5% pay for sewerage disposal services. There are about four cesspool disposers in the town operated by private businesses.

8.0 DESIRE FOR CHANGE AND WILLINGNESS TO PAY FOR PIPE WATER SUPPLY

8.1 INTRODUCTION

The viability and sustainability of the revamped water system in Kitgum Town depends on the desire of the people in the town to change from using other water sources (such as point source boreholes) to the pipe-borne system.

Willingness to pay (WTP) is the maximum amount that a household would be prepared to spend to secure access to a given quantity of the service. Thus, in economic terms, it represents the limit of affordability of the service.

Preference methods such as Contingent Valuation (CV) was used to gauge household demand for improved pipe water by presenting respondents with a contingent scenario in which they had the opportunity to obtain the described service. Households were also asked separately to consider attributes of the service, including costs, and to choose between scenarios that present different combinations of service levels and costs. WTP data from CV surveys measure the amount of monthly income that the household could give up after obtaining the improved network service and be just as well off as in a situation without an improvement in water supply. Thus, the CV survey is a measure of the households' economic value. This data is related but not equivalent to demand or the revenues earned from households. Maximum WTP and CV response data define household values that underlie their demand for service improvements and therefore, may be used to inform tariff design (see SPSS data in Annex A).

8.2 PREFERRED WATER SUPPLY

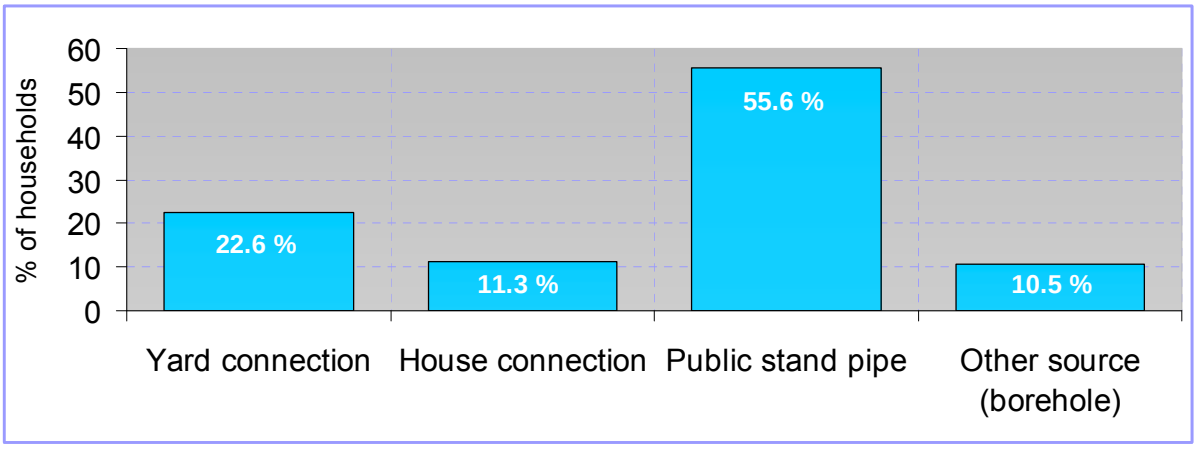
Respondents were presented with three options of pipe water sources; house connection, public stand pipe and yard connection, and asked about their willingness and desire to pay for installation and usage of the water sources as in the Table 8.1 below.

TABLE 8.1. WATER SUPPLY OPTIONS FOR KITGUM HOUSEHOLDS

No.	Option	Price per jerrycan (20 liters) In UGX	Connection charge in UGX	Monthly metered bills
1	House connection	20	50,000	Yes
2	Yard connection	20	50,000	Yes
3	Public stand post	25	0	No
4	Water from another source	0	0	No

A public stand post is the most preferred water option. Over half (55.6%) of surveyed households chose this option first, followed by a yard connection at 22.6% and house connection at 11.3%. About 10.5% of the households still preferred water from another source (specifically the point source borehole) other than the improved options. Figure 8.1 below shows that 89.5 of all households had considered changing to an improved system of water supply.

FIGURE 8.1. PREFERRED WATER CONNECTION



The household's preferences were purely based on cost and convenience. They indicated their preferences in view of reducing the overcrowding at the boreholes which are currently the most dominant water sources in Kitgum. The household data on the indicators in Section 6.3 of this report further reinforces the preferences for pipe-borne systems in Kitgum Town. For instance, over half of the households make three or more trips to their main water source to collect three or more 20-liter jerrycans of water every day and spend not less than 30 minutes per trip. These households would prefer improved water supply options for a number of reasons including shorter distance to collect water and the possibility of using more water.

8.3 WILLINGNESS TO PAY FOR INSTALLATION OF PIPE WATER

Table 8.2 shows the number of surveyed households willing to pay for installation of pipe water at the specified amount, listed in the table.

TABLE 8.2. WILLINGNESS TO PAY FOR INSTALLATION OF PIPE WATER

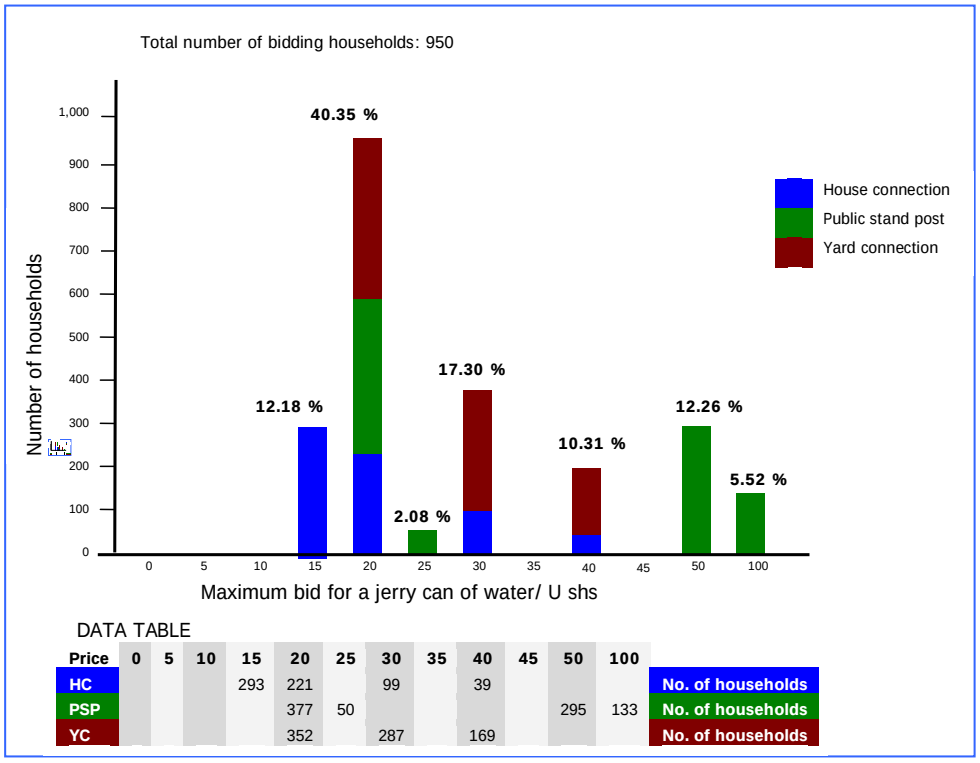
Full sample n=731 for house connections; 754 for yard connections				
If maximum payment for installation is (UGX)	**Frequency of Households willing to pay for house connection**	**% for house connection**	**Frequency of Households willing to pay for yard connection**	**% for yard connection**
Less than 10,000	309	42.3		
Less than 50,000	484	66.2	182	24.2
50,000 142		19.4	430	57.0
100,000 55		8	142	18.8
Over 100,000	50	6.4		100.0
Source: BEC Engineers				

The findings show that 75.8% of households were willing to pay for installation of yard connections at an initial installation fee of not less than UGX 50,000. About 33.8% of households were willing to pay for installation of house connections at an initial installation fee of not less than UGX 50,000.

8.4 WILLINGNESS TO PAY PER JERRYCAN OF WATER

Altogether, the surveyed households were willing to pay prices ranging from UGX 15 to 100 per 20-liter jerrycan of pipe water. Further analysis shows that 40.35% of the surveyed households were willing to pay UGX 20 for a 20-liter jerrycan of pipe water supply. About 17.30% were willing to pay UGX 30, 10.31% to pay UGX 40, while 12.26% were willing to pay UGX 50 and 5.52% to pay UGX 100 per jerrycan (see Figure 8. 2).

FIGURE 8.2. WILLINGNESS TO PAY (PER JERRYCAN OF WATER)



DATA TABLE

Price	0	5	10	15	20	25	30	35	40	45	50	100	
HC				293	221		99		39				No. of households
PSP					377	50					295	133	No. of households
YC					352		287		169				No. of households

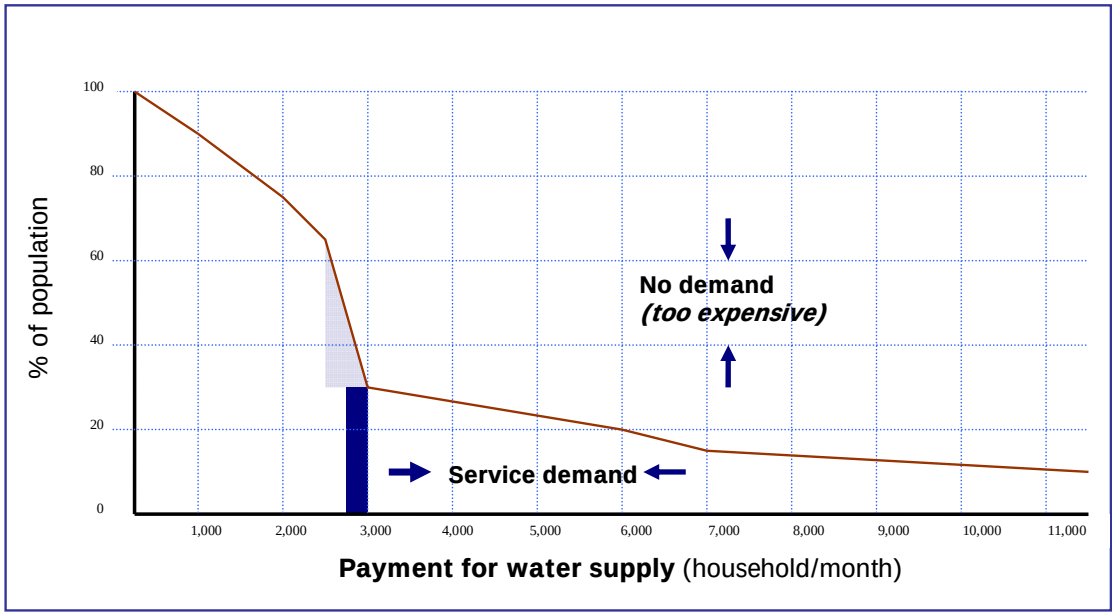
8.5 WILLINGNESS TO PAY PER MONTH

Figure 8.3 shows what people are willing to pay as a percentage of all people interviewed.

The shaded portion below the demand curve represents the amount people would be willing to pay per month. About 27.1% of the households say they are willing to pay UGX 3,000 monthly for water. About 20% are willing to pay UGX 6,000 per household per month. House connections could easily cost more per month and relatively few people would be able to sustain this.

Households currently connected to the pipe water system specifically expressed their desire to use more water than the amount currently supplied by the service. They requested replacement of the small pipes with bigger pipes that could hold a higher volume of water.

FIGURE 8.3. WILLINGNESS TO PAY FOR PIPE WATER



9.0 CHARACTERIZATION OF HOUSEHOLD SURVEY FINDINGS

9.1 INTRODUCTION

This chapter presents a characterization of the household survey findings for the water supply systems and services in Kitgum Town that has been created using descriptive statistics calculated for the overall sample. These results provide information on demographics, water sources, water consumption, water supply, sanitation coverage, hygiene behaviors and health in the study area.

9.2 DEMOGRAPHICS AND SOCIOECONOMICS

Table 9.1 shows that 97.3 percent of the sample is of the Acholi ethnic group and about 77% of all household heads were born in the study area. The average family size is 5.4 members, with 2.9 children under 19 years of age. The typical household head is 44 years old (49 years for male and 42 for female) and has at least some years of formal education. Over three-quarters (75.3%) of the household heads can read and write Luo, the local vernacular. The typical household spends UGX 100,000 per month or less, of which food, education, and health-related needs account for the greatest share.

TABLE 9.1. DEMOGRAPHICS AND SOCIOECONOMICS

Demographics and socioeconomics	Overall (n=950)
% Acholi	97.3
% Household heads born in the study area	77
Family size	5.4
Total population of surveyed households	5,111
% of household population under 20 years	54.08
% of household population 20 and above years	45.92
Household head's education attainment:	
% household heads who have attended primary education	79
% can read and write Luo	65.6
% can read and write English	75.3
Primary occupation of household heads:	
% Public servants	16.5
% Peasants	16.2
% Petty retail traders	13.3
% Casual laborers	12.5
% Traders	11.7
% NGO workers	9.6
% Housewives	10.8
Average income levels:	
% with income below UGX 100,000	49.65

Demographics and socioeconomics	Overall (n=950)
% with income between UGX 100,000 and 200,000	31.56
% with income above UGX 200,000	18.79
Monthly consumption:	
% spend UGX 100,000 or less	64.1
% spend between UGX 100,000 and 200,000	18.9
% spend over UGX 200,000	17
% purchase main food items from market and shops	80.1
Housing conditions:	
% have mud walls and grass thatched roofs	41.5
% have mud walls and iron roof	11.6
% have brick walls and iron roof	46.9
% pay rent	21

Source: BEC Engineers

The dwellings for the majority (88.4%) of families in the town are of two major categories: huts built of mud walls and grass thatched roofs, and permanent houses built with brick walls and iron roofs. The average household owns at least a radio.

Although Kitgum Town gives an impression of a busy commercial area, its economy is largely dependent on the relief operations based in the area. Operations of many international relief agencies for the United Nations and from European Union countries are based in Kitgum and to a larger extent their activities fuel the local economy. Many people are employed directly by the NGOs while others work in the many commercial outlets that service their operations such as shops, restaurants, guesthouses, motor vehicle garages, beauty shops, etc.

However, overall, the findings indicate that people's earnings in Kitgum Town are low. Many of the people in salaried employment have low monthly earnings compared to their obligations, while traders operate in a community with low purchasing power. There are few employment opportunities available for men and youth. For example, the majority of Luo-speaking NGO staff are from Gulu. In some households, women who carry out petty trade on the roadside (selling oranges, cassava, maize and other cheap merchandise) have become the families' breadwinners. Due to the high unemployment, alcohol abuse has become a big problem. Unemployed youths and adult men start drinking early in the morning in bars spread around town. The result of high unemployment is idleness, especially among young men, and depression appears to be common. Coupled with the above, the number of young girls engaging in early sex and prostitution as well early pregnancies is rising dramatically.

Clearly people in Kitgum Town are experiencing hardships, and living standards have been declining over time (especially during the duration of the insurgency), and there are no signs that this trend is being reversed. The town is within northern Uganda, a region that has remained poorer than other regions, largely because of insecurity and a long history of social, political and economic marginalization from the center that underpins the poverty and insecurity in northern Uganda.[8] The LRA insurgency led to loss of property, disability, death and abduction, physical and psychological trauma and displacement. It also created fear in engaging in socioeconomic activities, such as cultivation, sending their children to school or accessing markets, all activities that help people emerge from poverty. Women have, in addition, been prone to gender violence and have had to take on, in addition to their own roles, the extra roles that were in the past the preserve of men.

[8] Ministry of Finance, Planning and Economic Development (2004): Poverty Eradication Action Plan: 2004/2005- 2007/8, Kampala, Uganda.

Other causes of hardships (or poverty) mentioned by respondents included high disease incidence, with frequent occurrences of epidemics such as Hepatitis E and Cholera as well as the HIV/AIDS pandemic; and famine due to drought, especially in the months of January to July, with many households reducing on the number of meals.

9.3 WATER SOURCES AND CONSUMPTION

Major sources of water for our sample households were point source boreholes, private outside connections (yard taps), water kiosks, water vendors and open wells/springs (Table 9.2). A typical household does not use the pipe-borne system, but other sources dominated by the point source borehole. Most households feel that water from point source boreholes is of a better quality than pipe water, yet both systems supply from the same ground water. The surveyed respondents felt point source borehole water is clean, tastes fine, does not smell bad and poses no serious health problems. On the other hand, these households perceived pipe water to cause disease, especially typhoid. Further, water from the pipe network connections is deemed to be irregular and unreliable by 50% of households. Typically, a household uses just one source of water. About 12.7% of households use water from a number of sources (including point sources and the pipe system). All the households (11.9%) whose main water is from the pipe-borne system also rely on the point source boreholes because of either no water flowing in the pipes or little water flowing or breakdown in the service due to frequent power failures.

TABLE 9.2. WATER SOURCES AND CONSUMPTION

Water Sources and Consumption	Overall (n=950)
% use the point source borehole for main water	82.2
% use pipe-borne system for main water	11.9
% of borehole users access the pipe-borne system	10.8
Total liters consumed per household per day	89
Average number of jerrycans consumed per household per day	3.7
Main source of water for 36 surveyed institutions:	
% using pipe-borne system	43.6
% using own motorized pumps or own boreholes	14
% using public point source boreholes	35.9
Lowest number of jerrycans consumed by a day care/nursery school per day	10
Highest number of jerrycans consumed by a day care/nursery school per day	30
Lowest number of jerrycans consumed by a primary school per day	50
Highest number of jerrycans consumed by a primary school per day	120
Lowest number of jerrycans consumed by a secondary school per day	20
Highest number of jerrycans consumed by a secondary school per day 200	
% households paying for water	71.1
% paying for point boreholes and also buy from vendors and kiosks	12.7
% buying from vendors	2.8
% buying from pipe system (kiosks and yard taps)	11.7
% paying for house connections	0.2

Source: BEC Engineers

Overall, the sample households consume about 85 m^3 of water per day from all available sources (or about 89 liters per household per day).[9]

[9] Each jerry can carries 24 liters of water.

In general, households have a very favorable impression of the quality of their existing water source, judged in terms of taste, color, smell, safety and reliability. The results clearly suggest that the water supply is viewed as a quality issue at best and not just a quantity issue for the majority of the population.

TABLE 9.3. COMPARISON OF THE PIPE NETWORK WITH THE POINT SOURCE BOREHOLES

Pipe water	Point Source Boreholes
Normally the few functional kiosks are closed in the morning yet this is when most people fetch water.	Available at any time of the day: • People wake up as early as 5.30 am to line up at the boreholes and the last person leaves late in the evening, normally after 10.00 pm; at Boma grounds usually there are a few persons fetching water even after 11.00 pm.
The water supply system covers core urban areas of the town but 23% are disconnected or have inactive accounts, and kiosks are closed most of the time because of the unreliable supply. Only 37% of kiosks are functional.	There is a borehole within 300 or 500 meters of most households and about 94% are functional.
Price of water is usually UGX 100 for four jerrycans	Household users pay a monthly charge of UGX 1000; while large volume users pay UGX 5000. For the past one and a half years, water has been free.

Source: BEC Engineers

9.4 SANITATION

In terms of sanitation services, about 92.03% of the sampled households use either a latrine or toilet for defecation purposes (Table 9.4). While about 4.8% use the flush toilets, a majority of the households use cemented pit latrines. About 44.5% of the households share latrines.

TABLE 9.4. SANITATION

Sanitation	Overall (n=950)
% use mud pit latrine	28.7
% use cement pit latrine	66.2
% use flush toilet	4.8
% without access to a latrine	7.97
% share latrine	44.5

Source: BEC Engineers

9.5 HYGIENE AND HEALTH BEHAVIORS

Table 9.5 shows that over 70% of households treat their water before drinking by adding chemicals and other methods. The households were observed to have protected containers for water used in drinking, handling and transferring water without dipping into the storage container. Inspections and observations of household practices, however, revealed some undesirable practices such as using very poor latrine and bathroom structures, and the habit of not washing hands after using the latrine. The poor latrine and bathroom structures are spread throughout the town including the core and fringe areas, growing steadily worse from the center.

TABLE 9.5. HYGIENE AND HEALTH BEHAVIORS

Hygiene and Health Behaviors	Overall (n=950)
% treat water before drinking	70
% discharge grey water into open areas	73.6
% dispose household solid waste into garbage pits	81.2
% affected by malaria, a month prior to the survey	71.8
% had typhoid case	18.2
% had diarrhea case	4.8

Source: BEC Engineers

In evaluating the health status of the survey sample, 71.86% of the households were affected with malaria and 18.21% have experienced a case of typhoid in the month prior to the survey. About 4.83% have experienced a diarrhea case. These are among the primary public health diseases of concern with respect to water and sanitation service interventions. A profile of households that have had diarrhea and typhoid cases in the month prior to the survey showed that they were, on average, poorer and less educated than households that had not suffered from diarrhea. Surprisingly, they entirely depended on none pipe-borne systems for their water needs. It is thus likely that they consume less water or have inadequate water supply.

10.0 WATER DEMAND AND WILLINGNESS TO PAY

10.1 POPULATION AND WATER DEMAND

10.1.1 POPULATION AND HOUSEHOLDS

The current population of Kitgum Town is detailed in Table 10.1.

TABLE 10.1. CURRENT POPULATION OF THE PARISHES IN KITGUM TOWN

Parish	Total Households (at 2002 Census)	Population 2002	Population 2009
Westland 1,394		7545	9,996
Guu 1,260		7265	9,625
Pongdwongo 1,064		6604	8,749
Pager Ward	1,035	6001	7,950
Pandwong 996		5948	7,880
Town Parish	803	5386	7,135
Alango 558		3072	4,070
Total	**7,110**	**41,821**	**55,405**

10.1.2 PROJECTED DOMESTIC POPULATION

The 2002 national population census gives a growth rate of 4.1% for the district population, which is higher than the national average. This growth rate has been used to estimate the projected population of Kitgum Town. The projected domestic populations for the initial, future and ultimate years are shown in tables shown below.

TABLE 10.2. PARISH POPULATION PROJECTIONS

Parish	Populations			
	2009	2010	2017	2025
Westland 9,996		10406	13785	19012
Guu 9,625		10019	13274	18306
Pongdwongo 8,749		9108	12066	16641
Pager Ward	7,950	8276	10964	15121
Pandwong 7,880		8203	10868	14988
Town Parish	7,135	7428	9841	13572
Alango 4,070		4237	5613	7741
Total	**55,405**	**57677**	**76411**	**105381**

Source: BEC Engineers

10.1.3 INSTITUTIONAL AND COMMERCIAL POPULATION PROJECTIONS

Table 10.3 below shows the institutional and commercial population projections for the study area also based on a growth rate of 4.1%.

TABLE 10.3. INSTITUTIONAL PROJECTED POPULATION

	Institution		Population			
			2009	2010	2017	2025
Day Schools						
1.	Kitgum Prison School		1,090	1135 1503	2073	
2.	Kitgum Public School		1,918	1997 2645	3648	
3.	Horizon Primary School		624	650	861	1187
4.	Kitgum Primary School		1,701	1771 2346	3235	
5.	Kitgum Demonstration		600	625 827		1141
6.	Bethel Primary School		95	99 131	181	
7.	Uganda Martyrs Central		271	282 374	515	
8.	Kitgum Boys		1,637	1704 2258	3114	
9.	Ojuma Primary School		703	732	970	1337
10.	Padwong		1,930	2009 2662	3671	
11.	Kitgum Italia Solidarity		314	327 433	597	
12.	NUCBACD Special School		112	117 154	213	
13.	Kitgum Alliance College		246	256 339	468	
14.	Childcare International		3,056	3181 4215	5813	
15.	Kitgum Girls		78	81 108	148	
16.	Green Light College		187	195 258	356	
17.	Kitgum Progressive		357	372 492	679	
18.	Jabulo Issoke College		557	580 768		1059
19.	Kitgum Integrated		715	744 986		1360
20.	Kitgum Vision College		413	430 570	786	
21.	Oxfard College		243	253 335	462	
	Sub Total		**18,856**	**19550**	**25252**	**34068**
Boarding schools						
22.	Antonio Vigato		337	351 465	641	
23.	Okot Memorial College		1,151	1198 1587	2189	
24.	St. Bakhita Girls		109	113 150	207	
25.	Kitgum Girls St. Thereza		1,226	1276 1691	2332	
26.	Kitgum Town College		745	776 1027	1417	
27.	Kitgum Comprehensive College		1,863	1939 2569	3543	
28.	Kitgum High School		1,200	1249 1655	2282	
	Sub Total		**6,631**	**6902**	**9144**	**12611**
Health Facilities						
29.	Kitgum Government Hospital	Inpatients	200	208 276	380	
		Outpatients	400	416 552	760	
30.	St. Joseph Hospital	Inpatients	300	312 414	571	
		Outpatients	600	625	827	1141
31.	Town Parish Health Center (outpatients)		60	62	83	114
32.	Pandwong Health Center* (outpatients)		60	62	83	114
	Sub Total		**3629**	**3695**	**4252**	**5105**
NGO Offices						
33.	Child Care International		10	10 14	19	
34.	War Child Holland		10	10 14	19	
35.	International Medical Corps		47	49 65	89	
36.	Norwegian Refugee Council		62	65 86		118
37.	International Committee of Red Cross		56	58	77	107
38.	Kitgum Concerned Women Organization		30	31 41	57	
39.	AVSI		76	79 105	145	

	Institution	Population			
		2009	2010	2017	2025
40.	CARITAS	20 21	28 38		
41.	OXFAM	12 12	17 23		
42.	Meeting Point	15 16	21 29		
43.	International Rescue Committee	140 146	193 266		
44.	Concerned Parent's Association	8	8	11	15
45.	KICWA	5 5 7			10
46.	World Vision	18 19	25 34		
47.	ACORD	7	7 10	13	
48.	UNICEF	8	8 11	15	
49.	Catholic Relief Services	34 35	47 65		
50.	Lutheran World Federation	55	57	76	105
51.	Acholi Private Sector	7	7	10	13
52.	National Farmers Association	5 5 7			10
53.	ARALPI	5 5 7			10
54.	AMREF	8	8 11	15	
55.	Food for the Hungry	35	36	48	67
56.	Uganda Red Cross	10 10	14 19		
57.	ANPPCAN	7	7 10	13	
58.	Kitgum NGO Forum	6 6 8			11
59.	Jesuit Refugee Service	15 16	21 29		
	Sub Total	**711**	**736**	**984**	**1354**
Local Government Offices					
60.	District Administration Block	68	71	94	129
61.	District Health Services Block	45 47	62 86		
62.	Education Ofifce Block	33 34	46 63		
63.	Production, Probation & other offices	49 51	68 93		
64.	RDC's Office Block	12 12	17 23		
65.	District Engineer	13 14	18 25		
66.	District Water Office	8	8 11	15	
67.	Town Council	50 52	69 95		
	Sub Total	**2287**	**2299**	**2402**	**2554**
Central Government Agencies					
68.	Uganda National Roads Agency	20 21	28 38		
69.	Uganda Peoples Defence Forces 4 Division	1,000 104	1 1379 1902		
	Sub Total	**1,020**	**1062**	**1407**	**1940**
Public Institutions					
70.	St. Joseph Cathedral	470	489 648	894	
71.	Christ the King Church	320	333	441	609
72.	Kitgum Town Mosque	200	208 276	380	
73.	Solar and Light Christian Church	250	260	345	476
74.	District Police Headquarters	100	104 138	190	
	Sub Total	**1340**	**1394**	**1848**	**2549**
Markets (people/day)					
75.	Kitgum Central Market	200	208	276	380
76.	Corner Mission	100	104 138	190	
77.	Mondongo (Ayul)	100	104 138	190	
78.	East Ward	100	104 138	190	
79.	Gangdyang (Tee Atoya)	100	104	138	190
80.	Corner Alango (Monbunyu)	100	104	138	190
81.	Lulojo	100	104 138	190	
82.	Ginnery	100	104 138	190	

	Institution	Population			
		2009	2010	2017	2025
	Sub Total	**900**	**936**	**1242**	**1710**
Hotels					
83.	Bomah Hotel	100	104	138	190
	Sub Total	**100**	**104**	**138**	**190**
Bar/ Restaurant/Guest house					
84.	Timbo Hotel	50	52	69	95
85.	Acholi Pride Guesthouse	35	36	48	67
86.	Los Angeles Restaurant Bar & Lodge	20	21	28	38
87.	Los Angeles Executive Wing	15	16	21	29
88.	P Star Guesthouse	20	21	28	38
89.	Northern Rock Guesthouse	14	15	19	27
90.	O.J Diplomat Guesthouse	20	21	28	38
91.	Smart Guesthouse	20	21	28	38
92.	Travellers Lodge	20	21	28	38
93.	Palalwak Guesthouse	20	21	28	38
94.	Wanglengo Bar and Lodging	20	21	28	38
	Sub Total	**254**	**266**	**353**	**484**
Petrol Stations					
95.	Total Kitgum Service Station	10	10	14	19
	Sub Total	**10**	**10**	**14**	**19**

Source: BEC Engineers

10.2 WATER DEMAND

Water demand estimates have been categorized into domestic, institutional and commercial/industrial, un-accounted for water as well as non-revenue water.

10.2.1 DESIGN CRITERIA

The unit water demands used in the design were adopted after a thorough review of the different water demands. NWSC unit water rates, DWD unit rates for rural growth centers and unit water rates used on other peri-urban areas were reviewed.

Table 10.4 below shows the adopted unit water demand rates.

TABLE 10.4. UNIT WATER DEMANDS

Type of use or user	Average Demand (l/c/d)		
	DWD Design Manual	NWSC	Adopted Rate
Domestic			
Stand pipes	20	20	20
Yard tap	40	40	30
House connection	100	115	50
Institutional			
School – Day	5	-	5
Boarders	50	-	25
Teachers	50	-	40
Mosques	15	-	10
Hospitals/Health Center			
Out patients	10	-	5
Non resident staff	10	-	10
In patients	100	-	80
Hotels 100		-	60

Type of use or user	Average Demand (l/c/d)		
	DWD Design Manual	NWSC	Adopted Rate
Lodges	50	-	40
Petrol stations	200	-	200

NWSC does not give some consumption demands as indicated in the table above. It is also noted that the unit water demand given for house connection (115 l/c/d) is high and would only perhaps compare with areas in municipalities or the city center and not urban centers at the level of a town council. Therefore, the adopted rates were considered appropriate for design.

10.2.2 PEAK FACTORS

Peak factors of 1.2 and 2.0 for maximum day and peak hours are to be adopted in sizing the transmission main and distribution network respectively.

10.2.3 UNACCOUNTED FOR WATER

This has been taken as 15% of the average water demand. Since Kitgum will be a rehabilitated and revamped system, the risk of leakages within the system is perceived to be minimal in the short term, so the adopted figure is considered reasonable.

10.3 DESIGN SERVICE LEVELS

The methodology used categorizes the households into house connections, yard taps and stand posts. An initial tariff of UGX 1000 per m^3 or UGX 20 per 20-liter jerrycan was adopted for this study as this is viewed to be an affordable amount. Thus, an average cost of 1 UGX per liter was adopted for this study (subject to tariff analysis). It was felt that any price lower than this would render the service non-viable, yet for the utility to be sustainable there has to be returns on the enormous investment. The average household size of 5.4 as established by the survey has also been adopted for the demand design.

The design methodology is based on three different analyses, that is:

- Current expenditure on water in the study area,
- Willingness to pay, and
- Ability to pay.

10.3.1 CURRENT EXPENDITURE ON WATER

The survey findings indicated that 71.1% of households pay for their water. Of these, 85.3% pay UGX 1,000 per month for O&M of the point source boreholes. About 12.7% of those paying for O&M of point source boreholes also buy supplementary water from vendors or water kiosks.

Approximately 2.8% of all households paying for water buy from water vendors, 10.7% buy from private outside connections or yard taps and 1% buy from water kiosks. Households who buy from vendors, yard taps and water kiosks pay more for water than those whose main water source is the point source borehole.

Using the spending patterns above, the actual average monthly amounts that households pay for water can be computed based on 3.7 jerrycans as the total average water consumption per household per day. The above statistics are descriptive of the survey sample of 950 households, representative of the total population of Kitgum Town.

HOUSEHOLDS PAYING FOR WATER FROM WATER VENDORS

These constitute 2.8% of all surveyed households. Of these, about 9.52% (or 0.3% of the total sample) pay less than UGX 100 per jerrycan, 26.19% (or 0.7% of the total sample) pay UGX 100-200 and 64.29% (or 1.8% of the total sample) pay UGX 200-300.

Thus: 0.3% of the total sample pay per month =UGX 50 x 3.7 x 30 = UGX 5,550;

0.7% of the total sample pay per month =UGX 150 x 3.7 x 30 = UGX 16,650; and

1.8% of the total sample pay per month =UGX 250 x 3.7 x 30 = UGX 27,750.

HOUSEHOLDS PAYING FOR WATER FROM WATER KIOSKS

These constitute 1% of all surveyed households. Of these approximately 54.1% (0.5% of the total sample) pay UGX 20 per jerrycan, 37.8% (0.4% of the total sample) pay UGX 25 and 8.1% (0.1% of the total sample) pay 33.33 shillings.

Thus: 0.5% of the total sample pay per month = UGX 20 x 3.7 x 30 = UGX 2,220;

0.4% of the total sample pay per month = UGX 25 x 3.7 x 30 = UGX 2,775; and

0.1% of the total sample pay per month = UGX 33.33 x 3.7 x 30 = UGX 3,700.

HOUSEHOLDS PAYING FOR WATER FROM YARD TAPS

These constitute 10.7% of all surveyed households.

Thus: 10.7% of all households pay per month = UGX 25 x 3.7 x 30 = UGX 2,775.

HOUSEHOLDS WHO PAY FOR O&M OF POINT SOURCE BOREHOLES AND ALSO BUY FROM VENDORS AND KIOSKS

These constitute 9% of all surveyed households (Table 10.5). For computation purposes it is assumed these spend UGX 100 daily to supplement water from the point source boreholes.

Thus: 9% of the total sample pay monthly UGX 3,000 (at the kiosks) + UGX 1,000 for O&M of borehole = UGX 4,000 per month

HOUSEHOLDS WHO PAY ONLY FOR O&M OF POINT SOURCE BOREHOLES

These constitute 47.6% of all surveyed households (Table 10.5).

Thus: 47.6% of the total sample pays UGX 1,000 per month.

The amount currently spent on water based on the households' ability to pay is as relayed in Table 10.5.

TABLE 10.5. AMOUNT SPENT ON WATER BASED ON HOUSEHOLDS' ABILITY TO PAY

Monthly Amount Spent on Water (U Shillings)	%	Cumulative%
27,750 1.8		1.8
16,650 0.7		2.5
5,550 0.3		2.8
4,000 9		11.8
3,700 0.1		11.9
2,775 11.1		23
2,220 0.5		23.5
1,000 47.6		71.1

Source: BEC Engineers

Approximately 23% of the households have the ability to spend more on water per month than the UGX 1,000 currently being expended by the majority of households.

10.3.2 WILLINGNESS TO PAY

According to the WTP survey, 20% of the households are willing to pay UGX 6,000 per household per month. About 27.1% say they are willing to pay UGX 3,000 monthly for water. This data (ability to pay and willingness to pay) is plotted on the graph below and a comparison of the projected amounts to be spent on each water supply category is done for Current Expenditure on Water, Ability to Pay and WTP.

FIGURE 10.1. ABILITY TO PAY AND WILLINGNESS TO PAY CURVE

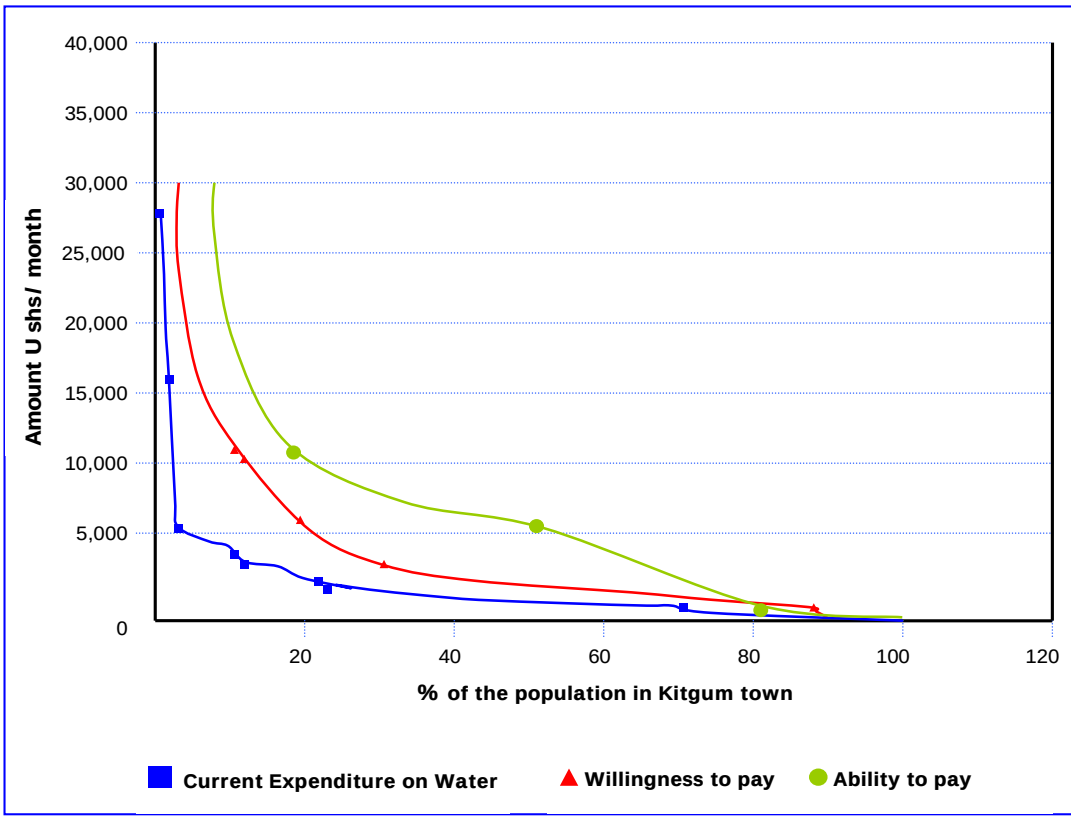


Figure 10.1 can assist in determining the appropriate service levels in the study area. The blue curve represents the households' current expenditure levels on water, while the red curve presents their stated WTP for the improved service. Overall, the curve suggests that households that buy water from the vendors pay more and have a relatively high WTP. It is, however, important to point out that many households that may have been willing to pay for improved services were doubtful of the proposed improvements, and thus never took the survey seriously enough to offer substantive price bids. Therefore, it is advisable that lower service levels be adopted for the base year and have these adjusted as the service stabilizes and people regain confidence in the reliability of the system.

From the current expenditure on water curve:

- About 2% of households in Kitgum Town currently spend not less than UGX 8,000 on water monthly. These could afford house connections.
- About 10% of households currently spend UGX 4,000 or less on water monthly. These could afford yard connections.

- About 20% currently spend UGX 3,000 or less on water monthly. These could afford stand posts.
- The WTP curve would push the service levels slightly higher:
  - About 15% households for house connections,
  - About 25% households for yard connections, and
  - About 40% of the population for stand pipes.

10.3.3 ABILITY TO PAY

However, according to widely accepted international standards, a typical family spends between 5–7% of its income on water. Thus, based on the average income levels in the study area (see Table 5.1):

- Over 30% of the population would spend between UGX 1,000 – 4,950, monthly. These would afford stand pipes.
- Almost a third (31.56%) of the population would spend between UGX 5,000 – 10,000, monthly. These would afford yard connections.
- Almost one-fifth (18.79%) of the population would spend above UGX 10,000, monthly. Some of these would afford house connections while others would settle for yard taps. However, house connection requires internal plumbing, which is missing in most houses.

Thus basing on the above analyses, the service levels for the initial year are set as below:

- House connection: 2%,
- Yard connection: 15%,
- Stand pipes: 50%, and
- Other sources: 33%.

10.3.4 ADOPTED SERVICE LEVELS FOR DESIGN

It is important to note that that service levels are governed by a number of factors, such as ability to pay, sensitization, and WTP among others. In view of this, the new operator of the pipe service in Kitgum is to embark on extensive improvements and rehabilitation of the system along with improved customer care practices guided by a number of performance targets. It is hoped that the proposed interventions will cause a major turnaround in the system in a short period. On the other hand, with several development programs targeting northern Uganda, it is hoped that the region and Kitgum Town in particular will achieve faster growth with each passing year and one of the expected outcomes of this growth would be an improved standard of living which comes with higher demand for water.

In light of the above argument, for the future year (2017), a service level of 5% would be considered for house connections, but expected to rise to 20% by 2025. The yard taps; 40% by 2017 and 40% by 2025. Stand posts; 40% by 2017 and 36% by 2025. Table 10.6 shows the adopted service levels for design.

TABLE 10.6. ADOPTED SERVICE LEVELS

Water category	Initial year 2009 (%)	Future year 2017 (%)	Ultimate year 2025 (%)
House connection	2	5	20
Yard taps	15	40	40
Stand posts	50	40	36
Other sources	33	15	4

Use of existing facilities shall still be maintained by a significant percentage of the population which shall be reduced gradually from 33% during the initial year to 4% by the ultimate year as in the table above.

10.4 WATER DEMAND PROJECTIONS

10.4.1 DOMESTIC WATER DEMAND

Average day demand is derived by applying the per capita consumption for the respective levels of service to the projected town populations[10] whereas the maximum day demands are calculated using a peak factor of 1.2 for the initial, future and ultimate years. The results of the domestic demand projections are shown in Tables 10.7 for the initial, 10.8 for the future and 10.9 for the ultimate years. Tables 10.10 to 10.12 show the mean daily demand for other sources.

The institutional demand projections are shown in Table 10.13, while Table 10.14 shows a summary of the total demands.

[10] Projected populations are less by 10.5% of the population that reported preference for other sources and not pipe water.

TABLE 10.7. DOMESTIC DEMAND FOR THE INITIAL YEAR (2009)

Parish	Population	Initial Year 2009					
		Water Supply Category	l/c/d	Service Level%	Av. Day Demand	Max. Day Demand	Max. Day Demand
					m^3 /d	m^3 /d	m^3 /d + Losses
Westland 999	6	Stand pipes 20		50	100.0	120.0	137.9
		Yard taps	30	15	45.0	54.0	62.1
		House connection	50	2	10.0	12.0	13.8
		Other sources		33			
		Total			**154.9**	**185.9**	**213.8**
Guu 962	5	Stand pipes	20	50	50	50	50
		Yard taps	30	15	15	15	15
		House connection	50	2	2	2	2
		Other sources		33	33	33	33
		Total					
Pongdwongo 874	9	Stand pipes	20	50	50	50	50
		Yard taps	30	15	15	15	15
		House connection	50	2	2	2	2
		Other sources		33	33	33	33
		Total					
Pager Ward	7950	Stand pipes	20	50	50	50	50
		Yard taps	30	15	15	15	15
		House connection	50	2	2	2	2
		Other sources		33	33	33	33
		Total					
Pandwong 7880		Stand pipes	20 50		50	50	50
		Yard taps	30	15	15	15	15
		House connection	50	2	2	2	2
		Other sources		33	33	33	33
		Total					
Town Parish	7135	Stand pipes	20	50	50	50	50
		Yard taps	30	15	15	15	15
		House connection	50	2	2	2	2
		Other sources		33	33	33	33
		Total					
Alango 407	0	Stand pipes	20	50	50	50	50
		Yard taps	30	15	15	15	15
		House connection	50	2	2	2	2
		Other sources		33	33	33	33
		Total					
Total Initial Year Domestic Demand					**858.8**	**1030.5**	**1185.1**

Source: Consultant's own elaboration

TABLE 10.8. DOMESTIC DEMAND FOR THE FUTURE YEAR (2017)

Parish	Population	Future Year 2017					
		Water Supply Category	l/c/d	Service Level%	Av. Day Demand	Max. Day Demand	Max. Day Demand
					m^3 /d	m^3 /d	m^3 /d + Losses
Westland 137	85	Stand pipes	20	40	110.3	132.3	152.2
		Yard taps	30	40	165.4	198.5	228.3
		House connection	50	5	34.5	41.4	47.6
		Other sources		15			
		Total			**310.2**	**372.2**	**428.0**
Guu 132	74	Stand pipes	20	40	106.2	127.4	146.5
		Yard taps	30	40	159.3	191.1	219.8
		House connection	50	5	33.2	39.8	45.8
		Other sources		15			
		Total			**298.7**	**358.4**	**412.2**
Pongdwongo 120	66	Stand pipes	20	40	96.5	115.8	133.2
		Yard taps	30	40	144.8	173.8	199.8
		House connection	50	5	30.2	36.2	41.6
		Other sources		15			
		Total			**271.5**	**325.8**	374.6
Pager Ward	10964	Stand pipes	20	40	87.7	105.3	121.0
		Yard taps	30	40	131.6	157.9	181.6
		House connection	50	5	27.4	32.9	37.8
		Other sources		15			
		Total			**246.7**	**296.0**	**340.4**
Pandwong 10868		Stand pipes 20		40	86.9	104.3	120.0
		Yard taps	30	40	130.4	156.5	180.0
		House connection	50	5	27.2	32.6	37.5
		Other sources		15			
		Total			**244.5**	**293.4**	**337.5**
Town Parish	9841	Stand pipes	20	40	78.7	94.5	108.6
		Yard taps	30	40	118.1	141.7	163.0
		House connection	50	5	24.6	29.5	34.0
		Other sources		15			
		Total			**221.4**	**265.7**	**305.6**
Alango 561	3	Stand pipes	20	40	44.9	53.9	62.0
		Yard taps	30	40	67.4	80.8	93.0
		House connection	50	5	14.0	16.8	19.4
		Other sources		15			
		Total			**126.3**	**151.6**	**174.3**
Total Future Year Domestic Demand					**1719.2**	**2063.1**	**2372.6**

Source: Consultant's own elaboration

TABLE 10.9. DOMESTIC DEMAND FOR THE ULTIMATE YEAR (2025)

Parish	Population	Ultimate Year 2025					
		Water Supply Category	l/c/d	Service Level%	Av. Day Demand	Max. Day Demand	Max. Day Demand
					m³ /d	m³ /d	m³ /d + Losses
Westland	19012 Stand	pipes	20	36 114.		136.9	157.4
		Yard taps	30	40	285.2	342.2	393.5
		House connection	50	20	142.6	171.1	196.8
		Other sources	20	4			
		Total			**541.8**	**650.2**	**747.7**
Guu	18306 Stand	pipes	20	36 109.8		131.8	151.6
		Yard taps	30	40	274.6	329.5	378.9
		House connection	50	20	137.3	164.8	189.5
		Other sources		4			
		Total			**521.7**	**626.1**	**720.0**
Pongdwongo 166	41	Stand pipes	20	36	99.8	119.8	137.8
		Yard taps	30	40	249.6	299.5	344.5
		House connection	50	20	124.8	149.8	172.2
		Other sources		4			
		Total			**474.3**	**569.1**	**654.5**
Pager Ward	15121	Stand pipes	20	36	90.7	108.9	125.2
		Yard taps	30	40	226.8	272.2	313.0
		House connection	50	20	113.4	136.1	156.5
		Other sources		4			
		Total			**430.9**	**517.1**	**594.7**
Pandwong 14988		Stand pipes 20		36	89.9	107.9	124.1
		Yard taps	30	40	224.8	269.8	310.3
		House connection	50	20	112.4	134.9	155.1
		Other sources		4			
		Total			**427.2**	**512.6**	**589.5**
Town Parish	13572	Stand pipes	20	36	81.4	97.7	112.4
		Yard taps	30	40	203.6	244.3	280.9
		House connection	50	20	101.8	122.1	140.5
		Other sources		4			
		Total			**386.8**	**464.2**	**533.8**
Alango 774	1	Stand pipes	20	36	46.4	55.7	64.1
		Yard taps	30	40	116.1	139.3	160.2
		House connection	50	20	58.1	69.7	80.1
		Other sources		4			
		Total			**220.6**	**264.7**	**304.5**
Total Ultimate Year Domestic Demand					**3003.4**	**3604.0**	**4144.6**

Source: Consultant's own elaboration

TABLE 10.10. MEAN DAILY DEMAND FOR OTHER SOURCES IN THE INITIAL YEAR (2009)

Parish	Population	Initial Year 2009			
		Water Supply Category	l/c/d	Service Level%	Mean Daily Demand m³ /d
Westland 9996		Other sources	20	33	66.0
Guu 9625		Other sources	20	33	63.5
Pongdwongo 8749		Other sources	20	33	57.7
Pager Ward	7950	Other sources	20	33	52.5
Pandwong 7880		Other sources	20	33	52.0
Town Parish	7135	Other sources	20	33	47.1
Alango 4070		Other sources	20	33	26.9
Total Initial Year Demand for Other Sources					**365.7**

Source: Consultant's own elaboration

TABLE 10.11. DOMESTIC DEMAND FOR OTHER SOURCES IN THE FUTURE YEAR (2017)

Parish	Population	Future Year 2017			
		Water Supply Category	l/c/d	Service Level%	Mean Daily Demand m³ /d
Westland 1378	5	Other sources	20	15	41.4
Guu 1327	4	Other sources	20	15	39.8
Pongdwongo 1206	6	Other sources	20	15	36.2
Pager Ward	10964	Other sources	20	15	32.9
Pandwong 1086	8	Other sources	20	15	32.6
Town Parish	9841	Other sources	20	15	29.5
Alango 5613		Other sources	20	15	16.8
Total Future Year Demand for Other Sources					**229.2**

Source: Consultant's own elaboration

TABLE 10.12. DOMESTIC DEMAND FOR OTHER SOURCES IN THE ULTIMATE YEAR (2025)

Parish	Population	Ultimate Year 2025			
		Water Supply Category	l/c/d	Service Level%	Mean Daily Demand m³ /d
Westland 1901	2	Other sources	20	04	15.2
Guu 1830	6	Other sources	20	04	14.6
Pongdwongo 1664	1	Other sources	20	04	13.3
Pager Ward	15121	Other sources	20	04	12.1
Pandwong 1498	8	Other sources	20	04	12.0
Town Parish	13572	Other sources	20	04	10.9
Alango 7741		Other sources	20	04	6.2
Total Ultimate Year Domestic Demand					**84.3**

Source: Consultant's own elaboration

TABLE 10.13. INSTITUTIONAL DEMAND PROJECTION

Institution	Population					
	2009		2017		2025	
	MDD	MDD + Losses	MDD	MDD + Losses	MDD	MDD + Losses
Day Schools						
Kitgum Prison School	6.5	7.5	9.0	10.4	12.4	14.3
Kitgum Public School	11.5	13.2	15.9	18.3	21.9	25.2
Horizon Primary School	3.7	4.3	5.2	5.9	7.1	8.2
Kitgum Primary School	10.2	11.7	14.1	16.2	19.4	22.3
Kitgum Demonstration	3.6	4.1	5.0	5.7	6.8	7.9
Bethel Primary School	0.6	0.7	0.8	0.9	1.1	1.2
Uganda Martyrs Central	1.6	1.9	2.2	2.6	3.1	3.6
Kitgum Boys	9.8	11.3	13.5	15.6	18.7	21.5
Ojuma Primary School	4.2	4.9	5.8	6.7	8.0	9.2
Padwong	11.6	13.3	16.0	18.4	22.0	25.3
Kitgum Italia Solidarity	1.9	2.2	2.6	3.0	3.6	4.1
NUCBACD Special School	0.7	0.8	0.9	1.1	1.3	1.5
Childcare International	18.3	21.1	25.3	29.1	34.9	40.1
Kitgum Alliance College	1.5	1.7	2.0	2.3	2.8	3.2
Kitgum Vision College	2.5	2.8	3.4	3.9	4.7	5.4
Green Light College	1.1	1.3	1.5	1.8	2.1	2.5
Kitgum Girls	0.5	0.5	0.6	0.7	0.9	1.0
Kitgum Progressive	2.1	2.5	3.0	3.4	4.1	4.7
Jabulo Issoke College	3.3	3.8	4.6	5.3	6.4	7.3
Kitgum Integrated	4.3	4.9	5.9	6.8	8.2	9.4
Oxfard College	1.5	1.7	2.0	2.3	2.8	3.2
Sub Total	**101**	**116.2**	**139.3**	**160.4**	**192.3**	**221.1**
Boarding School						
Kitgum Comprehensive College	55.9	64.3	77.1	88.6	106.3	122.2
Antonio Vigato	10.1	11.6	14.0	16.0	19.2	22.1
St. Bakhita Girls	3.3	3.8	4.5	5.2	6.2	7.1
Okot Memorial College	34.5	39.7	47.6	54.8	65.7	75.5
Kitgum Girls St. Thereza	36.8	42.3	50.7	58.3	70.0	80.5
Kitgum High School	36.0	41.4	49.6	57.1	68.5	78.7
Kitgum Town College	22.4	25.7	30.8	35.4	42.5	48.9
Sub Total	**199**	**228.8**	**274.3**	**315.4**	**378.4**	**435**
Hospital/Health Centers						
Kitgum Government Hospital (Out patients)	2.4	2.8	3.3	3.8	4.6	5.2
St. Joseph Hospital (In patients)	28.8	33.1	39.7	45.7	54.8	63.0
St. Joseph Hospital (Out patients)	3.6	4.1	5.0	5.7	6.8	7.9
Town Parish Health Center (Out patients)	0.4	0.4	0.5	0.6	0.7	0.8
Pandwong Health Center* (Out patients)	0.4	0.4	0.5	0.6	0.7	0.8
Sub Total	**35.6**	**40.8**	**49**	**56.4**	**67.6**	**77.7**
NGO Offices						
Child Care International	0.1	0.1	0.1	0.1	0.1	0.1
War Child Holland	0.1	0.1	0.1	0.1	0.1	0.1
International Medical Corps	0.3	0.3	0.4	0.4	0.5	0.6

Institution	Population					
	2009		2017		2025	
	MDD	MDD + Losses	MDD	MDD + Losses	MDD	MDD + Losses
Norwegian Refugee Council	0.4	0.4	0.5	0.6	0.7	0.8
International Committee of Red Cross	0.3	0.4	0.5	0.5	0.6	0.7
Kitgum Concerned Women Organisation	0.2	0.2	0.2	0.3	0.3	0.4
AVSI	0.5	0.5	0.6	0.7	0.9	1.0
CARITAS	0.1	0.1	0.2	0.2	0.2	0.3
OXFAM	0.1	0.1	0.1	0.1	0.1	0.2
Meeting Point	0.1	0.1	0.1	0.1	0.2	0.2
International Rescue Committee	0.8	1.0	1.2	1.3	1.6	1.8
Concerned Parent's Association	0.05	0.1	0.1	0.1	0.1	0.1
KICWA	0.03	0.03	0.04	0.0	0.1	0.1
World Vision	0.01	0.1	0.2	0.2	0.2	0.2
ACORD	0.01	0.1	0.1	0.1	0.1	0.1
UNICEF	0.01	0.1	0.1	0.1	0.1	0.1
Catholic Relief Services	0.2	0.2	0.3	0.3	0.4	0.4
Lutheran World Federation	0.3	0.4	0.5	0.5	0.6	0.7
Acholi Private Sector	0.04	0.04	0.1	0.1	0.1	0.1
National Farmers Association	0.03	0.03	0.04	0.04	0.1	0.1
ARALPI	0.03	0.03	0.04	0.04	0.1	0.1
AMREF	0.05	0.1	0.1	0.1	0.1	0.1
Food for the Hungry	0.2	0.2	0.3	0.3	0.4	0.5
Uganda Red Cross	0.01	0.1	0.1	0.1	0.1	0.1
ANPPCAN	0.04	0.04	0.1	0.1	0.1	0.1
Kitgum NGO Forum	0.04	0.04	0.05	0.1	0.1	0.1
Jesuit Refugee Service	0.1	0.1	0.1	0.1	0.2	0.2
Sub Total	**4.15**	**5.01**	**6.27**	**6.68**	**8.2**	**9.3**
Local Government Offices						
District Administration Block	0.4	0.5	0.6	0.6	0.8	0.9
District Health Services Block	0.3	0.3	0.4	0.4	0.5	0.6
Education Office Block	0.2	0.2	0.3	0.3	0.4	0.4
Production, Probation & other offices	0.3	0.3	0.4	0.5	0.6	0.6
RDC's Office Block	0.1	0.1	0.1	0.1	0.1	0.2
District Engineer	0.1	0.1	0.1	0.1	0.2	0.2
District Water Office	0.1	0.1	0.1	0.1	0.1	0.1
Town Council	0.3	0.3	0.4	0.5	0.6	0.7
Sub Total	**1.8**	**1.9**	**2.4**	**2.6**	**3.3**	**3.7**
Central Government Agencies						
Uganda National Roads Agency	0.1	0.1	0.2	0.2	0.2	0.3
Uganda Peoples Defence Forces 4th Division	48.0	55.2	66.2	76.1	91.3	105.0
Sub Total	**48.1**	**55.3**	**66.4**	**76.3**	**91.5**	**105.3**
Public Institutions						
St. Joseph Cathedral	2.8	3.2	3.9	4.5	5.4	6.2
Christ the King Church	1.9	2.2	2.6	3.0	3.7	4.2
Kitgum Town Mosque	2.4	2.8	3.3	3.8	2.3	2.6
Solar and Light Christian Church	1.5	1.7	2.1	2.4	2.9	3.3
District Police Headquarters/Barracks	4.8	5.5	6.6	7.6	9.1	10.5

Institution	Population					
	2009		2017		2025	
	MDD	MDD + Losses	MDD	MDD + Losses	MDD	MDD + Losses
Sub Total	**13.4**	**15.4**	**18.5**	**21.3**	**23.4**	**26.8**
Markets (people/day)				0.0		0.0
Kitgum Central Market	1.2	1.4	1.7	1.9	2.3	2.6
Corner Mission	0.6	0.7	0.8	1.0	1.1	1.3
Mondongo (Ayul)	0.6	0.7	0.8	1.0	1.1	1.3
East Ward	0.6	0.7	0.8	1.0	1.1	1.3
Gangdyang (Tee Atoya)	0.6	0.7	0.8	1.0	1.1	1.3
Corner Alango (Monbunyu)	0.6	0.7	0.8	1.0	1.1	1.3
Lulojo	0.6	0.7	0.8	1.0	1.1	1.3
Ginnery	0.6	0.7	0.8	1.0	1.1	1.3
Sub Total	**5.4**	**6.3**	**7.3**	**8.9**	**10**	**11.7**
Bar/Restaurant/Guest house						
Bomah Hotel	7.2	8.3	9.9	11.4	13.7	15.7
Timbo Hotel	2.4	2.8	3.3	3.8	4.6	5.2
Acholi Pride Guesthouse	1.7	1.9	2.3	2.6	3.2	3.7
Los Angeles Restaurant Bar & Lodge	1.0	1.1	1.3	1.5	1.8	2.1
Los Angeles Executive Wing	0.7	0.8	1.0	1.2	1.4	1.6
P Star Guesthouse	1.0	1.1	1.3	1.5	1.8	2.1
Northern Rock Guesthouse	0.7	0.8	0.9	1.0	1.3	1.5
O.J Diplomat Guesthouse	1.0	1.1	1.3	1.5	1.8	2.1
Smart Guesthouse	1.0	1.1	1.3	1.5	1.8	2.1
Travelers Lodge	1.0	1.1	1.3	1.5	1.8	2.1
Palalwak Guesthouse	1.0	1.1	1.3	1.5	1.8	2.1
Wanglengo Bar and Lodging	1.0	1.1	1.3	1.5	1.8	2.1
Sub Total	**19.7**	**22.3**	**26.5**	**30.5**	**36.8**	**42.4**
Petrol Stations						
Total Kitgum Service Station	2.4	2.8	3.4	3.9	4.6	5.2
Sub total	**2.4**	**2.8**	**3.4**	**3.9**	**4.6**	**5.2**
Grand Total	**430.6**	**494.8**	**593.4**	**682.4**	**816.1**	**938.2**

Source: Consultant's own elaboration

TABLE 10.14. SUMMARY OF DEMANDS

No.	Item	Initial year 2009	Future year 2017	Ultimate year 2025
1.	Domestic Demand (m^3/d) 858.8		1719.2	3003.4
2.	Institutional and Commercial Demands (m^3/d)	430.6	593.4	816.1
3.	Total Maximum Day Demand	1030.5	2063.1	3604
4.	**Total Maximum Day Demand including 15% Operational Losses (m^3/d)**	**1185.1**	**2372.6**	**4144.6**
5.	Mean Daily Demand for Other Sources	365.7	229.2	84.3

Source: Consultant's own elaboration

There are five motorized pumps in the system with a total estimated capacity of 32 m^3 per hour, which adds up to 320 m^3 per day assuming the pumps operate for 8 to 10 hours. In addition, it takes about 3 minutes to fill a jerrycan at a borehole with a hand pump which implies that in 10 hours one borehole would fill about 200 jerrycans. Thus the 80 boreholes in the town would give about 1600, 20 liter

jerrycans per day, giving a total daily water availability from the 80 boreholes as 320 m³ per day. Thus the pipe system (at 320 m³ per day) and the point source boreholes (at 320 m³ per day) could give a total of 640 m³ per day.

Thus, the table below provides the **Water Shortfall** for the initial, future and ultimate years:

Table 10.15. Water Shortfall

Item	**Initial year 2009** (m³ per day)	**Future year 2017** (m³ per day)	**Ultimate year 2025** (m³ per day)
Total Demand	1185.1	2372.6	4144.6
Available water	640	640	640
Shortfall	**545.1**	**1732.6**	**3504.6**

11.0 TECHNICAL DESCRIPTION OF THE WATER SUPPLY SYSTEM

11.1 INTRODUCTION

Kitgum Water Supply System currently offers only pipe water supply services. It does not operate sanitation or sewerage and wastewater treatment services. Water supply services imply the abstraction of water from a natural source, such as surface water (e.g., rivers and lakes) or groundwater, its treatment to make it fit for human consumption and, finally, its distribution to households and commercial users via a pipeline network. Sewerage implies the collection of sewage from households and commercial and industrial users and its transportation through a sewerage pipeline network to a wastewater treatment plant, where sewage is treated to reduce its capacity to pollute before being released into a water body.

This chapter presents the technical characteristics of the water supply service in Kitgum Town as observed during the baseline survey.

11.2 OPERATION OF THE SYSTEM

Kitgum Water Supply System is managed by Kitgum Town Council on behalf of the Ministry of Water and Environment (MWE) through a performance contract. The performance contract designates Kitgum Town Council as the Water authority and the MWE as the Regulatory Authority. The performance contract requires the Town Council to appoint a five-member Water Supply and Sewerage Board (WSSB) comprising of the Town clerk as Secretary, Chair of Social Services Committee, Representative of domestic consumers, Representative of institutional consumers, and Representative of other consumers. The WSSB role is to perform management oversight. The performance contract, in addition, requires Kitgum Town Council as the Water Authority to appoint a private operator to manage the day-to-day operations and maintenance of the water supply system and all related operations.

On 11 August 2009 Kitgum Town Council in its capacity as the Water Authority appointed WASH Consults Limited as the new private operator. WASH Consults Limited was tasked to manage day-to-day operations, investments and maintenance of the water supply system. To this effect a Management Contract was signed between Kitgum Town Council and WASH Consults Limited upon which the private operator is to be paid a monthly management fee and an investment output-based fee (using connection and metering unit rates per new water connection).

11.3 THE WATER AUTHORITY

Kitgum Town Council as the Water Authority is charged with the responsibility of provision and management of water services, in liaison with the Ministry of Water and Environment. For this purpose

the council is required to undertake planning, budgeting and resource allocation, community mobilization and ensure their effective participation and involvement, and monitor implementation by the private operator.

The Water Supply and Sewerage Board is the organ responsible for executing the above functions on behalf of the town council. The urban water office serves as the secretariat of the Board. The WSSB is constituted by political appointees who ideally sit quarterly or more times to discuss and consider reports from the Urban Water Officer or the Private Operator. However it was not possible to establish whether this Board met regularly before the appointment of the current operator. The last minutes of the previous Board seen by the survey team were dated 8 June 2005 (see Annex G); more so this was an emergency meeting.

11.4 PROCUREMENT OF THE CURRENT OPERATOR

Regarding the recent appointment of a private operator, the National Water and Sewerage Corporation (NWSC) standard appraisal procedures for managing area systems were used to evaluate bidders for the operation of the water system. According to the Acting Urban Water Officer, the procurement process was a rigorous process that involved evaluating the applicants at four stages that included:

- Assessing the completeness of legal documents,
- Establishing their back stopping capability,
- Assessing technical capability (at this stage experience and qualifications took precedence over other issues), and
- Scrutinizing finances.

Each of the above criteria had standards the bidders had to comply with. The Directors of WASH Consults Limited (the company that eventually won the management tender) participated in all previous rehabilitation and improvement works on the Kitgum water system funded by the Austrian Development Cooperation and very recently WASH Consults carried out the civil works for revitalization of two pumping stations (K-New and KTI)[11] funded by the Northern Uganda Transition Initiative (NUTI).

11.5 THE OPERATOR'S OFFICE

The private operator's office is located in an improvised 20 feet container near the district headquarters, outside the central business area of Kitgum Town. It has no sign post and from the outside it can be mistaken for an abandoned workshop. Its view is unaesthetic and not appropriate for an institution that handles critical customer care matters such as a water office. There is only one room for all the staff (including the Managing Director, Administrative and Finance Manager, Technical Manager, and the Accounts Assistant/ Secretary) and all administrative and customer care matters are handled there. There is one working old computer in the office but without an antivirus. The majority of the people (except a few landlords) met disclosed that they did not know where the water office is located, while a few thought it was within the town council offices.

11.6 ASSETS, INFRASTRUCTURE AND HUMAN RESOURCES

The next chapter presents at length all the main physical assets and infrastructure of the system.

[11] For complete information on the pumping system, see Section 12.1 of this report.

The system which has over the years undergone a number of improvements extends to almost all the parishes of the town. In Alango parish the pipe line extends up the water kiosk, in Guu parish up to the water kiosk in Ginnery, in Westland up to Kitgum Comprehensive School, and in Pandwong up to Auch village. The pipeline crosses through Pager parish beyond the town council into Akwang Sub-county and beyond Corner Mission into Layamo Sub-county. For instance YY Okot pump has two lines; one line supplies the reservoir at Hilltop while the second line extends up to Kitgum High School in Akwang Sub-county and serves all institutions along its way such as the Diocese of Kitgum, the Mothers Union as well as a number of stand pipes.

The new operator has some staff in place and reported that was soon embarking on recruitment of more personnel to fill up all vacant positions. WASH Consults Ltd, the operator, has a Managing Director responsible for overall management and reporting, a technical department under the oversight of a Technical Director, and an administrative department currently preoccupied with revenue collection. The private operator reported having adequate expertise in water and sewerage services. In addition to managing the pipe system it operates two cesspool trucks that are hired privately to empty septic tanks in the town.

It is however important to note that WASH Consults Ltd has never operated such a big network before. It is thus important that due guidance, mentoring, capacity enhancement and supervision are carried out by the Contract Manager. This does not imply WASH Consults Ltd is not qualified, besides its appointment is a good practice in as far as it builds local private sector capacity in the region.

During the recent project for the revitalisation of Kitgum Town Water Supply funded by USAID's Northern Uganda Transition Initiative, three of the new operator's staff were trained in maintenance of the equipment and systems installed. The three staff include one Electrician (Oroma Milton) and two Operators (Makmot Micheal and Atube Morris). They were trained in: electrical wiring and reading of wiring diagrams, the technology used during installation, normal operation of the system, measurements of DC circuits and AC circuits, Maintenance of electrical parts and control units, how to program the Grundfos control board, how to use the R100 Grundfos remote control and, how to read the technical documentation.

In addition, the NUTI project handed over to the operator a set of electrical tools and small machinery for maintenance of the system. The tools include: a full Leather tool box, Electrical phase testers, Pliers and Cutters, Crimping tools, Electricians Knife, Spanners set, Electrical meter, Hammers, Try square, Spirit level, Cold chisel, Center punch, Wood screwer, Drilling bit set and Tape measure. Further, some spares including fuses for Umeme, fuses for LED indications, and fuses for DC battery protection were also handed to the operator.

11.7 LAND AVAILABILITY

Availability of land for laying infrastructure such as distribution pipes is critical to implementation of planned investments and increased coverage by the network. Tenure arrangements on open urban spaces in Uganda vary. Most of these lands are owned by the Central Government, Urban Authorities, or individuals. According to the staff at the Kitgum Town Council Water Department, the Water Authority only lays pipes along the road reserves and open public spaces while it is the responsibility of the individual customers to identify where the lines to their sites (or premises) should pass. Kitgum Town has road reserves along all the roads across all the 11 parishes in the town. It was learnt that Kitgum Town Council is in charge of all developments along the road reserves, and can thus demolish any temporary structures along the reserves in case these open spaces are abused.

11.8 ELECTRICITY BILL

Currently the system is debt ridden with a huge outstanding electricity bill for its pumping stations, which affects the amount of water the system supplies as a result of UMEME disconnections. At any single time there is one or two pumps disconnected for non payment of accumulated UMEME bills. The unpaid UMEME arrears accumulated over an extended period of time before the appointment of the current operator. By November 2009 the total outstanding electricity bill was about UGX 30,000,000. Nonetheless, there are ongoing efforts by the Water Authority (Kitgum Town Council), the Contract Manager (NUWATER) and the Operator (WASH Consult) to settle these arrears. The table below shows recent payments to UMEME and the outstanding arrears for each of the 5 pumping stations.

TABLE 11.1. OUTSTANDING UMEME BILLS (AS AT NOVEMBER 2009)

No.	Pumping Station	Paid by NUWATER	Paid by Operator	Outstanding Bill
1	K-Flag	142,802	1,744,682	0
2	Lang alanga	145,042		282,561
3	YY Okot			10,643,036
4	KTI			(147,857)
5	K-Ne w			17,000,000
	TOTAL			**28,073,454**

KTI bill is in credit
K-New bill is estimated

12. VERIFYING DATA PRESENTED IN THE PERFORMANCE INDICATOR SHEETS OF THE PMP

This chapter reviews the data on the indicators of the Performance Monitoring Plan (PMP) for the Northern Uganda Water Supply Services.

In order to investigate data relating to the performance indicators of the PMP it was pertinent to review previous records and reports as well as up-to-date information on the system. However all the previous records and reports reviewed consisted of only actual data while all projections were missing. The staff in the Urban Water Department attributed missing data to the previous operators who they said disappeared with most of the records upon termination of their contracts. Therefore the information in this chapter is largely based on previous actual or operational records as well as current up-to-date information and not on projected data because this was not obtained by the study team.

12.1 NUMBER OF CONNECTIONS AND/OR WATER POINTS

This indicator measures the number of physical structures owned by the water authority, whether they are functional or not, rehabilitated, old or new. According to the PMP it includes the number of new connections, new and repaired pipes, new and repaired pumps, new and repaired storage tanks, installation of generators or solar systems, etc. The survey sought to validate the PMP data on inventory of current physical structures and the tables below present the updated information.

TABLE 12.1. TOTAL NUMBER OF CONNECTIONS AND KEY ASSETS (SEPTEMBER 2009)

Connection	Number	Remarks
Total connections	721	Includes active and non active connections accounts and kiosks
Non active connections	169	
Institutional connections 95		Offices, Schools, NGO installations
Yard connections	478	Includes 5 new connections in August
House and commercial connections	121	The operator's database does not categorically separate the two types of connections
Kiosks 27		
Active Kiosks	10	These have been open for the last one month
Inactive Kiosks	17	
Reservoir tanks	3	With a total capacity of 249 m³

Connection	Number	Remarks
Motorized pumps	5	
Inactive pump	0	
Generator	1	The operator noted that it is a heavy duty equipment not cost effective to operate

Regarding the new operator's performance during the month of August (first month of operation), there were five new connections and 3 disconnections which were reconnected in the same month following the customers' settlement of their overdue bills.

TABLE 12.2. INVENTORY OF PHYSICAL ASSETS (SEPTEMBER 2009)

No.	Borehole Identification	Location	Make	Condition
1	**K-Flag**			
Submers	ible pump with electrical accessories	Senior Quarters	• Installe d capacity is 5 m³/ hr	• Operatio nal • F ence was vandalized • Children play at the meter chamber and pour in rubbish • Currently uses only electricity; the existing 27 KVA generator is not used (operator noted it is not cost effective for 1 pump)
	UMEME meter box	K-Flag		• Wo rking
	3" bulk meter	K-Flag		• W orking
	DN 75 mm raising main from K-Flag			• In use
2	**K-New**			
Submers	ible pump with electrical accessories	Senior Quarters	• Grundfos pump type SP 5A -33 • Installe d capacity is 6 m³/ hr	• Currently operates only on solar panels that were recently installed with USAID's NUTI funding • Pumps a maximum of 6 m³/ hr on full sunshine giving about 48 m³ a day (with 7 to 8 hrs of sunshine) • Electricit y was disconnected due to accumulated utility bills but generator line from K-Flag is already connected • Well fenced with gate
	Solar array: 65 solar panels in 2 strings, one with 33 new panels and the other with 32 old panels giving a maximum power of 6810Wp to the Solar Inverter	Senior Quarters	• 32 old panels were made in China • 33 new panels were made in Germany	• 33 new solar panels procured with funding from USAID's NUTI project
	Solar Inverter System	K-New	• Würth Solar Gmbh inverter 15kVA 3x230VAC (German make)	• Inverter procured from Germany and installed with funding from USAID's NUTI
	Solar Tracking System	K-New	• German make	• Solar panels installed on 4 solar trackers complete with a GI earthing system
	Distribution Board	K-New	• Imported from the Euro pean Union	• Main distributor is composed of the : - pump inverter system - manual change over & On/Off switch for grid power

No.	Borehole Identification	Location	Make	Condition
				selection - surge protective elements - motor protective unit from Grundfos - connection terminals - fuses for incoming lines - stabiliser protection
	UMEME meter box	K-New		• New meter box installed with funding from NUTI, but not working because electricity supply is still disconnected due to non-payment of accumulated utility bills
	Stabiliser for UMEME power supply	K-New	• Imported from the USA • 3 phase 3x400 V 50 Hz 30 kVA Type VRp-30000-0339	• Funding provided by NUTI
Surge	Protection	K-New		• Surge protection consists of: - DC power protection - AC grid power protection - Grounding system
	3" bulk meter			• Working
	DN 75 mm raising main			• In use
3	**KTI**			
Submersible pump with electrical accessories		Kitgum Technical Institute (KTI)	• Grundfos pump type SP 8A -30 • Installed capacity is 8 m³/hr	• Operational • Fully works on UMEME and solar • Currently pumps 48 m³ with about 6 hrs of sunshine • Well fenced with gate
	3" bulk meter			• Working
	Solar array: 72 solar panels arranged in 3 rows of 24 panels each giving about 8640Wp to the Solar Inverter	KTI	• YINGLI SOLAR (Made in China)	• Solar panels working after installation of a new inverter system
Solar	Inverter System	KTI	• Würth Solar Gmbh inverter 15kVA 3x230VAC (German make)	• Inverter procured from Germany and installed with funding from USAID's NUTI
Distribution Board		KTI	• Imported from the European Union	• Main distributor is composed of the : - pump inverter system - connection terminals - manual change over & On/Off switch for grid power selection - surge protective elements - motor protective unit from Grundfos - fuses for incoming lines - stabilizer protection
	UMEME meter box	KTI		• Meter box working
	Stabiliser for UMEME power supply	KTI	• Imported from the USA • 3 phase 3x400 V	• Funding provided by NUTI • Stabilizer is faulty and NUTI has already made contacts with the

No.	Borehole Identification	Location	Make	Condition
			50 Hz 45 kVA Type VRp-45000-0339	supplier for repairs
Surge	Protection	KTI		• Surge protection consists of: - DC power protection - AC grid power protection - Ground ing system
	DN 75 mm raising main from KTI			• In use
4	**YY-Okot**			
Submers	ible pump with electrical accessories connected to 3'' transmission main	Lamit	• Grundfos pump • Installe d capacity is 6 m³/ hr	• Operatio nal • Uses both electricity and solar • Pumps to two pipelines- one to Kitgum High School and the other to the reservoir
	3'' bulk meter			• F aulty
	UMEME meter box	YY Okot		• Wo rking
	72 No. Solar panels arranged in two rows of 36 each		• YINGLI SOLAR (made in China)	• Operatio nal • 4 solar panels damaged by stone throwing children • Solar is serviced by technician on call from Gulu
	DN 75 mm raising main			• In use
5	**Langalanga**			
Submers	ible pump with electrical accessories connected to 3'' raising main	Langalanga	• 5 m³/ hr	• Pump installed but not sure of yield/ currently operating at 5 m³/ hr • F enced
	3'' bulk meter			• Faulty in need of service or replacement • There are frogs inside the meter pit
	UMEME meter box	Langalanga		• Wo rking
	DN 75 mm raising main			• In use
6	**27 KVA generator**			
		K-Flag	• Perkins 38 A generator	• Supplies K-New and K-Flag pumps • In good working condition but not operated because of high operational costs
7	**RESERVIORS**		•	•
	3 elevated steel tanks	Hill top	• 3 reservoirs with 249m³ capacity	• Operatio nal • Nee d painting
	6'' bulk meter	Hill top		• Wo rking

The survey observed a number of issues for consideration by the operator and authority:

- There is a discrepancy between installed capacity and the pumps' current production (see table below).

TABLE 12.3. CURRENT CAPACITY OF PUMPS (AS AT NOVEMBER 2009)

Pump	Original Pumping Rates	Current Pumping Rates
K-Flag	10 m³/ hr	5 m³/ hr
K-New	10 m³/ hr	8 m³/ hr
YY Okot	15 m³/ hr	6 m³/ hr
KTI	17 m³/ hr	8 m³/ hr
Langalanga	Not confirmed	5 m³/ hr
Total for all pumps		32 m³/ hr

After carrying out fresh borehole yield tests, boreholes are now equipped with pumps of pumping rates given in Table 12.3 above, giving a total of 32 m³/hr.

The operator expressed the urgency to carry out pump testing to confirm the yields.

- There are no signposts or billboards at all the facilities (pump houses and water tanks) to indicate the type of facility and who owns or operates it.
- The bulk meters at all the pump houses are not securely covered. In case of heavy rains such as the El Nino that are due starting October 2009 the equipment may get waterlogged.
- Most of the functional kiosks have one or two non-functional taps that need replacement.
- Langalanga pump was installed and the metre is working.
- YY Okot meter was installed and it is working on both electricity and solar.
- The pumping systems at KTI and K-New were recently rehabilitated under a USAID-NUTI funded Revitalisation of Kitgum Urban Water Supply Project. The two pumps are currently fully functional. KTI works on both solar and Umeme, while K-New works on solar only.
- K-New pump is currently operational on solar only following supply and installation of solar equipment by NUTI. However, electricity was disconnected for non payment of bills currently estimated at about UGX 17,000,000.

BOX 12.1. BASELINE INFORMATION: NUMBER OF CONNECTIONS AND /OR WATER POINTS

There are 721 connections. These include:

- 126 house and commercial connections
- 478 yard connections (5 were connected in August 2009)
- 10 functional and 17 non functional water kiosks

There are 169 inactive accounts

Most of the Kiosks have 1 or 2 non functioning taps

The infrastructure for the system includes:

- 3 reservoirs or water tanks, with a total capacity of 249 m³
- 5 functional motorized pumps
- The 5 pumps have a total pumping rate of 32 m³ per hour
- 4 pumps and water tanks are securely fenced; the fence at 1 pump was vandalized
- 68 solar panels at YY Okot working; 4 panels are damaged
- 65 solar panels at K-New working
- 72 solar panels at KTI working
- 2 solar inverter systems imported from Germany; one installed at KTI and the other at K-New
- Solar tracking system (with 4 solar trackers) installed at K-New.
- 2 Distribution Boards installed and working; one at KTI and the other at K-New
- 5 UMEME meter boxes, one at each of the 5 pumps; the K-New meter box is newly installed complete with new wiring from the UMEME pole
- 2 stabilizers for UMEME power supply installed; one at KTI (but currently faulty) and the other at K-New, working
- 3" bulk meters at 3 pumps and one 6" bulk meter at the water tanks are working; two 3" bulk meter (at Langalanga and YY Okot) are faulty
- DN 75 mm raising mains in use for all 5 pumps
- 1 number 27 KVA generator to supply power to K-Flag and K-New pumps; but not used currently due to high running costs

Date of update: November 2009; Consultant's own elaboration

12.2 WATER AVAILABILITY

Water availability refers to the number of hours per day that water can be accessed from the system, either through compound standpipes, community taps or house connections.

Interactions with the town council staff and customers revealed that the system was only partially functional for six to eight months covering the period from 2008 to around July 2009. During this period water was not available to the majority of customers especially those on high ground and supply to the kiosks (community taps) was completely unavailable. The survey observed that the situation is not much different now. Water supply is just picking up again and currently the service is very unstable due to inconsistent supply of electricity. Most of the 10 functional kiosks are always closed or open for only a few hours (on average 6 hours or less per day) because their operators feel the people are yet to get used to pipe water, again, and partly because of the people's preference for cheaper alternative sources such as point source boreholes.

Due to the long periods without water in the distribution system, most of the customers resorted to other sources. As water starts to flow again these customers cannot access it. It could be that some of the pipelines have been closed off due to persistent leaks. The new operator is yet to confirm why water does not reach those areas. This explains why the new operator constantly informed the survey team that "there is water in the pipes" yet most of the people met said there was no pipe water yet.

BOX 12.2. BASELINE INFORMATION: WATER AVAILABILITY

- Out of the 27 water kiosks, only 10 are working and most of these open for an average of 9 hours every day. During the mornings most of them are not open yet this is the time of the day when most people fetch their water.
- People who reside on high grounds such as Alango and parts of Ayul do not get pipe water at all because the small diameter pipes used by the network cannot convey water to those areas.
- The majority of institutions (such as NGOs, Schools and Local Government offices) connected to the network, do not have flowing water in the pipes, while a few institutions have reported inadequate, intermittent supply.
- In all the majority of people using the system access water for a period averaging 9 hours a day.

Date of update: November 2009; Consultant's own elaboration

Current production for the entire system was put at 32 m^3/ hr. The operator explained that each pump operates an average of 18 hours per day. However, observations during the survey period and project reports showed this was unattainable (at least during the duration of the baseline survey). Three pumps (K-Flag, YY Okot and Langalanga) supply water for about 8 hours after which supply is turned off until the next day. In addition, pumping at these three pumps is often interrupted due to rampant load shedding in the region. The two other pumps (KTI and K-New) that were recently re-equipped with new pumping systems under USAID-NUTI's Revitalisation of Kitgum Urban Water Supply Project use alternative power supplied from solar panels. However, the Project's final report notes that KTI currently gives about 60 m^3 a day with about 6 hours of sunshine, while K-New gives about 50 m^3 a day with about 7 to 8 hours.

Once the pumps are switched off supply to most areas is affected because even a slight reduction in the reservoir levels reduces water flowing to areas on higher grounds such as Alango. This is so because of the small diameter pipes that were laid to convey water to those areas. It is thus critical that relatively larger diameter pipes should replace the existing small pipes and more so in order to pump as much water as possible from the system three power sources should be considered, that is: solar panels, UMEME power, and Independent generator.

The institutions in the town also reported facing pipe water supply problems similar to the ones mentioned above. Some of the institutions currently connected but without flowing water in the pipes include:

- World Vision Uganda: There is no water flowing in the pipes
- AVSI: Have not received pipe water for one year
- International Medical Corps: The line is faulty
- Pandwong Primary School: Since it the time the school was connected the pipe system has never been reliable
- Kitgum Comprehensive College: Water does not flow in the pipes
- Child Care Nursery School: Inadequate supply
- Kitgum Integrated College: Water used to be on and off
- Kitgum NGO Forum: Water is on and off

Lutheran World Federation's Kitgum Field Office had gone without water for long periods but started flowing again in the month of August (2009).

12.3 SUBSIDIES AND PRICING

The survey set out to examine the subsidy and pricing practices in the system. Some relevant records to facilitate a thorough review of the subsidies were missing. Missing records included previous projections or target amount planned for collection and operation of the system. However, actual amount collected and actual operation costs incurred over the years were obtained and examined.

12.3.1 SUBSIDIES

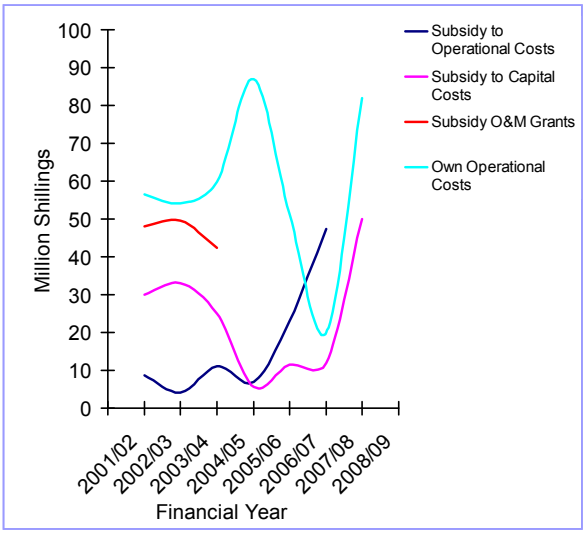
Records show that the system received subsidies in the form of co-financing for the operations and maintenance as well as investment funds from 2001 to 2008. In more specific terms, on average, the service received O&M grants totaling over UGX 46,000,000 per year for three consecutive years (from 2001 to 2004), operational subsidies of UGX 17,077,585 for six years and capital costs of UGX 24,024,137 for seven years (Table 12.4).

TABLE 12.4. PREVIOUS SUBSIDIES

Financial Year	Subsidies			Own Operational Costs (Million UGX)
	Operational Subsidies (Million UGX)	Capital Costs (Million UGX)	O&M Grants (Million UGX)	
2001/02	8,791,75 2	30,143,928	48,000,000	56,569,457
2002/03	4,290,80 2	33,055,916	49,566,713	54,285,342
2003/04	11,136,5 90	25,385,379	42,463,134	59,742,649
2004/05	7,290,00 0	5,658,740		86,922,946
2005/06	23,383,4 71	11,560,000		51,394,151
2006/07	47,572,9 00	12,137,000		20,093,560
2007/08		50,228,000	24,873,000	82,265,569

The O&M grants were occasioned by the requirement to maintain the improved infrastructure after the initial rehabilitation works funded by the Austrian Development Cooperation in 2001. The capital costs were primarily for extending the distribution mains to outlying parishes. The operational subsidies included in the Town Council Annual Budgets were for paying staff salaries, purchasing fuel and spare parts, including payments for costs of repairs on the system.

FIGURE 12.1. PATTERN OF SUBSIDIES



All the subsidies (operational subsidies, capital costs and O&M grants) received were indicative of an erratic trend of transfers or expenditures that did not appear to have been founded on a systematic planning process with clear outcomes. The subsidy-to-operational costs curve in Figure 12.1 exhibits an erratic pattern suggestive of some kind of interventions without adequate thought processing.

Many questions arise with the kind of scenario presented in the table above and more so the absence of collated and analyzed projections in a systematic way as the basis for subsidies. For instance what was the objective of extending the subsidies? Was the objective to achieve financial sustainability by the utility in the long-term, was it to cover the utility's operations and

maintenance costs in the near term, or to have more pipe water affordable to more people through a subsidized tariff structure.

It is clear that the subsidies did not result into technical and financial sustainability of the system. Since 2004 to date the system has been hit with various problems but most outstanding is the failure to supply water to its customers. For the past 5 years the system has only worked well for only a few months on two separate occasions, following the completion of the Austrian funded rehabilitation works and recently after emergency repairs by NUTI. Besides, the total population that use pipe water has not increased substantially since 2002. About 2.6 percent (184) of households were connected in 2002 while by August 2009 about 6.2 percent (596) of households were connected.

The failure of the previous subsidies is not surprising because the urban water staff also concur that the past operators lacked minimum expertise to operate a water utility. The success of a subsidy scheme however is dependent on a number of factors, many of which in this case were lacking. For instance baseline findings reveal that both the authority and the operator lacked the staff skills and expertise to operate a medium scale water utility like the Kitgum system. Few of the staff in the Urban Water Department then and the operator had adequate technical expertise to effectively structure the subsidies to achieve desired technical and/or economic outcomes. Other skills that would be critical to reinforcing operations of a subsidized system such as demand management or detecting and repairing leaks were also lacking. Thus without financial and technical expertise the subsidies received for seven years up to 2008 were mismanaged, lacked accountability or did not serve the purpose. Further, in view of the inadequate technical expertise and lack of collated data it is also possible that the subsidies were not sufficient to cover necessary operation and maintenance works.

Coupled with the above, the subsidies focused only on infrastructural improvements of the system, but neglected the performance improvement and the institutional environment within which the system operates, more importantly, capacity building of the decision makers (Water Authority) and the incentives for the operator to perform well. Building this capacity and designing performance improvement programs was squarely the responsibility of the Ministry of Water and Environment through the Urban Water Department of the Directorate of Water Development.

The ministry has the role of planning, policy making and guidance, support to Local Governments, allocating funds, general mobilization of funding and co-ordination of donor inputs. According to survey findings the ministry's staff carried out monitoring visits but did not carry out critical assessments of the system and capacity building needs. Usually they had little time to spend in the districts.

BOX 12.3. BASELINE INFORMATION: SUBSIDIES AND PRICING

- Between 2001 and 2008 (a period of 7 years) Kitgum water supply system received subsidies to the tune of UGX 411,273,674.
- On average UGX 58,753,382 was received per year.
- Subsidies were erratic; not based on systematic planning processes with clear outcomes.
- Subsidies were not based on systematically collated or analyzed projections.
- Subsidies did not result into technical and financial sustainability of the system.
- Subsidies were not sufficient to cover necessary operation and maintenance works.

Date of update: September 2009; Consultant's own elaboration

12.3.2 PRICING

For eight years the authority has not adjusted the water tariffs. The current price of UGX 1000 per m^3 of water was set by a ministerial directive before the inception of the performance contracts which currently allow the WSSB to set tariffs and only seek ministerial approval. However, the WSSB has never adjusted the prices, in part because of the inefficiencies in the water service over the years. This is understandable because in ideal situations any increase in water tariffs should come with improvements in service delivery.

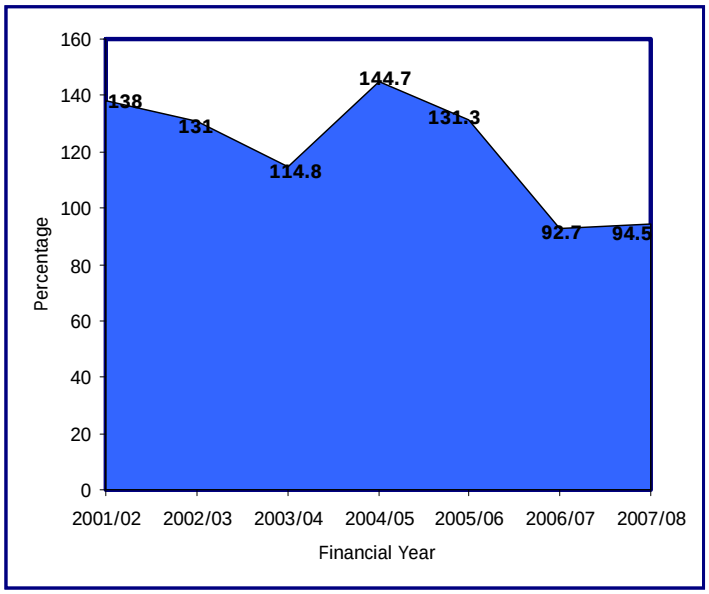
Currently the system uses a two-part tariff policy to convey a subsidy to certain customers. The price subsidy targets mainly the low income earning or poor households in the town and it comes in two forms. At the community taps known as Water Kiosks consumers buy four 20 liter jerrycans of water at UGX 100. In addition customers with standpipes who sell water to the public are charged lower tariffs than those who do not sell to their neighbors. This price may seem to be so low and affordable to the majority population. However, currently most of the households resort to getting their water from other sources especially point source boreholes because they pay less or no cost. For instance individual households pay UGX 1000 monthly for water at the borehole, while high volume institutional users such as schools and guesthouses contribute a lump sum of UGX 5000 monthly for all the water they consume. Thus all boreholes have long lines of jerrycans, every day, from dawn through sunset while at most of the functional water kiosks there is literally no activity. Structuring the tariff levels to enable more people access or afford pipe water is still a challenge especially as long as other cheaper alternative sources are available.

12.4 COLLECTION RATE AND RATIO

The PMP identifies the collection rate as a measure of utility sustainability (being able to meet O&M and administrative costs from sales of water)[12]. It is the percentage of revenue collected versus the projected revenue. Though revenue collections were available for the past 7 years projected revenues were not on hand. The focus of previous operators was not on the long-term financial sustainability (which would be based on projected billings, revenues, costs, etc) but on immediate collections. This made it practically impossible for the survey to calculate the collection rates. However, one thing was evident, that the sales of water have never fully met the O&M and administrative costs of the system (see Table 12-4 above, on previous subsidies received by the system).

The collection ratio is the percentage of revenue collected versus the total billed. The survey reviewed amounts billed and collected for the past 7 financial years and noted a distinct falling trend in annual collection ratios. There is a characteristic trend of high collection ratios immediately after every rehabilitation and improvements on the system (of 2001, 2004 and 2008) followed by a steady decline in the ratios (Figure 12-2). The figure shows the highest annual collection ratio of 144.7 percent and the lowest at 92.7 percent.

FIGURE 6.2. COMPARISON OF 7 YEARS COLLECTION RATIOS



The only monthly billings and collections that were obtained (for financial year 2007/2008) were reviewed to have a further understanding of collection efficiency, monthly (Table 12-5). The highest amount collected monthly was UGX 11,113,982 in August 2007 representing a collection ratio of 125 percent, but the highest collection

[12] NUWATER's Project Monitoring Plan (PMP) describes the collection rate as the proportion of actual revenues collected versus the projected revenues. According to the PMP it measures the necessary cash flow to pay on-going administrative and O&M costs.

ratio attained was 155.7 percent in September 2007[13]. According to the Urban Water Officer the first operator (ND Brothers) once collected UGX 18,000,000 in one month but it was not possible to verify this data because the records were not available.

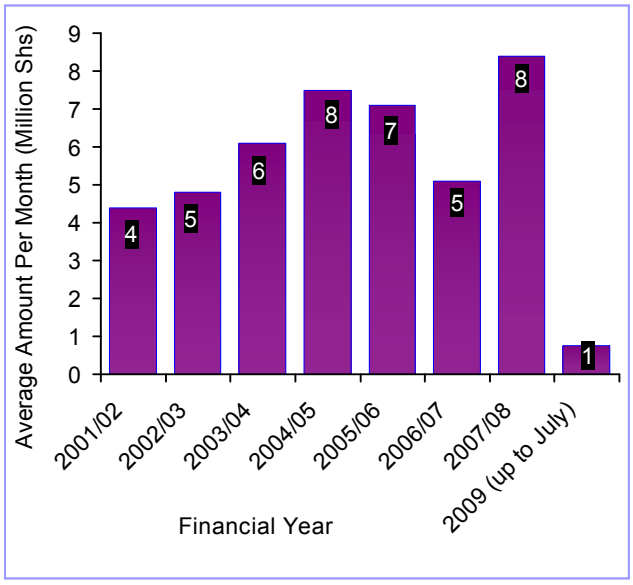
TABLE 12.5. AMOUNT BILLED AND COLLECTED MONTHLY FROM JULY 2007 TO JUNE 2008

Month	Amount billed (UGX)	Amount collected (UGX)	Outstanding collections (UGX)	Collection ratio (%)
Year: 2007				
July	10,395,800	10,739,596	-343,796	103
August	8,862,390	11,113,982	-2,595,388	125
September	6,530,454	10,170,231	-3,639,777	155.7
October	10,470,477	5,246,649	5,223,828	50
November	10,981,080	8,529,000	2,452,080	77.6
December	11,991,070	6,561,170	5,429,900	55
Year: 2008				
January	11,534,500	12,535,619	-1,001,119	109
February	9,732,830	12,921,985	-3,189,155	133
March				
April	6,218,890	7,778,440	-1,559,550	125
May	3,821,430	2,354,350	1,467,080	61
June	7,769,260	6,191,930	1,577,330	80

The seven months preceding the baseline survey (January to July 2009) registered substantial decline in collections as well as lower monthly collection ratios. During this time monthly collections exceeded UGX 1,000,000 only once during the month of February. Average monthly collections for 2009 (up to July) were UGX 751,152 the lowest since 2001, which contrasts with UGX 8,430,525 average monthly collections for 2007/2008 (Figure 12.3).

Though previous high collection ratios may seem to paint a rosy picture of the system operation then, these statistics should be viewed with caution. The data suggests that after every rehabilitation of the system (2001, 2004 and 2008) a great deal of effort was set on maximizing collections and recovering outstanding bills with little consideration for routine operation and maintenance of the system -ultimately running down the improved infrastructure to near close down. This is well illustrated by Figure 12.3 which shows that following a year of high

FIGURE 12.3. COMPARISON OF AVERAGE MONTHLY COLLECTIONS FROM 2001 TO JULY 2009



[13] All the monthly and annual collections quoted in this report are VAT exclusive.

collections (in 2007/2008) the system deteriorated in 2009 with customers going without water for seven months.

CAUSES OF LOW COLLECTION RATES

A number of factors have come to light as drivers of low collection rates in Kitgum:

According to the PMP, all payments require the issuance of receipts. All movements of cash between the customer and operator must be recorded. It was however noted that the staff under previous operators in addition to the certified Water Authority receipt books, maintained own receipt books from which they receipted payments of bills by some customers. This practice is known to have misappropriated revenues that rightfully belonged to the town council and the system.

The staff of previous operators that were interviewed attributed low collection rates to defaulting customers. It was learnt that councilors and key institutions such as the town council offices normally do not pay for water supplied and are difficult to handle because of their political influence. A number of customers with political influence or wealthy businessmen when they are disconnected for accumulated bills, get private plumbers to reconnect their premises without the operator's approval.

BOX 12.4. BASELINE INFORMATION: COLLECTION RATE AND RATIO

- The system registered the highest annual collection ratio of 144.7% (in 2004/05), but with a significant percentage of collections being accumulated arrears.
- The highest monthly collection ratio was in September 2007 at 155.7%, also with a high percentage collections being accumulated arrears.
- Collections have never covered O&M and administrative costs of the system.
- Collection ratios were high after all major rehabilitation works to the system, thereafter took a downward trend.
- Following all the 3 previous rehabilitation works to the system the operators put much effort in recovering outstanding bills; BUT the customers also paid up hoping for improved service which never materialized.
- Not all the money paid by the customers was receipted in official receipt books.
- Individual customers and institutions with political clout accumulate unpaid bills and are very difficult to handle.

Date of update: September 2009; Consultant's own elaboration

12.5 RESPONSE TIME

The survey also examined the response time, which is the time in days that it takes for a reported complaint or problem to be resolved. This indicator is intended to measure customer service. Efforts to examine complaints or problem log books of the previous operators were unsuccessful because these were not available. According to the Urban Water staff previous operators initially responded promptly to complaints and problems with a response time of one day. However, over time the response time increased to over seven days due to mismanagement of the system blamed on subsequent operators. Financial mismanagement affected the integrity of the system because there were little or no funds for operation and maintenance. For instance, the distribution network started having leaks and breakages but there were no funds for repairs. The monthly collections were affected and the water consumers in Kitgum Town constantly complained about the poor service without response.

The new operator (WASH Consults Ltd.) maintains a complaints/problems log book which was seen and reviewed during the survey. In the operator's complaints/problem log, for every complaint or problem reported a number of entries are recorded and these include: name of person reporting a complaint/problem, contact address and telephone, nature of complaint, technician assigned, and evaluation of technician's response (by operator's senior staff). Between 18 August and 2 September 2009 (17 days) a total of 25 problems were recorded. The survey also found that not all problems reported by the customers are entered in the log book. According to the operator's staff about ten or more complaints had not been recorded because these were reported in the presence of the plumbers who were immediately assigned to handle the complaints or problems. The problems recorded in the logbook

BOX 12.5. BASELINE INFORMATION: RESPONSE TIME

- During the first 15 days of management under a new operator 25 complaints/ problems were recorded and 10 complaints/ problems were logged but not recorded. The 25 recorded problems included water leaks, broken pipes, and water not flowing in the pipes. The complaints included one customer who demanded for a tax invoice and two others who reported not getting water for over one year.
- The new operator reported an average of 2 days as the response time after one month of operating the system.
- The household survey results showed that:
  - A typical household with a pipe connection has its problem or complaint resolved in a period of not less than 6 months.
  - 3.3% of households have their problems resolved in 7 days.
  - 1.1% have their problems resolved in 2 weeks.
  - 4.4% have their problems resolved in 4 weeks.
  - 5.5% have their problems resolved in 3 months.
  - 2.2% have their problems resolved in 6 months.

Date of update: November 2009; Consultant's own elaboration

included water leaks, broken pipes and water not flowing in the pipes. Complaints included one institutional customer who demanded for tax invoices and receipts, and two others who reported not getting water for over a year.

However, for all the 25 complaints/problems recorded the last two entries were not filled, an indication that these were yet to be resolved. The survey team checked the complaints/problem logbook twice on two different occasions (in two weeks) and still the critical entries (of technician assigned and evaluation of technician's response) were not filled. Nonetheless, on completion of a full month of operating the system, the new operator reported a response time of 2 days. According to the operator the average response time to technical problems is 2 days, average response time to leaks and bursts is also 2 days while average response time to billing complaints is 1 day. Further, it was reported that regarding complaints about water unavailability for customers on higher ground it would require more time to address them because the small diameter pipes that were initially installed are incapable of transferring water over long distances of raised ground.

The findings of the household survey show that a total of 91 households had logged complaints or problems with the operator. At the time of the baseline survey, over three-quarters (83.5%) of these had their complaint or problem not resolved after a period of over 6 months since reporting (the complaint or problem). About 3.3% reported having their complaints or problems resolved in 7 days, 1.1% in 2 weeks, 4.4% in 4 weeks, 5.5% in 3 months and 2.2% in 6 months.

12.6 RECORD KEEPING AND ACCOUNTABILITY STANDARDS

NUWATER's Performance Monitoring Plan (PMP) and the Management Contract for operating Kitgum water supply system stipulate the records that an operator must keep and the reports to the authority[14]. According to the PMP this indicator measures the incidence of the operator's ability to generate accurate quarterly reports using up-to-date records.

It was not possible for this survey to review record keeping and reporting practices of previous operators because all their technical, administrative and financial records were not obtained. According to the urban water staff the previous operators deliberately misplaced or disappeared with key records and reports following termination of their contracts.

[14] The Management Contract requires the operator to maintain certain technical, administrative and financial records. It further mentions a number of required reports which include technical, commercial, financial, security, miscellaneous and stand alone event driven reports.

During the survey the new operator was in the process of setting up a records and reporting system. The NUWATER project is to provide monthly and quarterly reporting formats for the various reports spelt out in the management contract.

Of the records stipulated in the management contract, at the time of the survey very few were in place. A complaints/problem log book and receipt book were the only operator documents seen by the survey team. However, the operator's staff said they are ready with the following documents:

- Connection form,
- Stock card,
- Store requisition form,
- Cash requisition,
- Payment vouchers
- Invoices
- Receipts provided by the town council
- Pump production form, and
- Log book

The operator also maintains an excel database with all the names of customers, type of connection, their addresses, water meter numbers, as well as current billing and collection statistics.

BOX 12.6. BASELINE INFORMATION: RECORD KEEPING AND ACCOUNTABILITY STANDARDS

- Following termination of management contracts, the previous operators deliberately misplaced or disappeared with key records and reports.
- There are still inadequate practices regarding data recording, statistical processing, and retrieval. For instance during data collection for the baseline survey the consultant requested for the total bill of the month of August 2009, and the operator had to subtract the total accumulated unpaid bill from the total bill. The August bill was somehow lumped together with the outstanding bill.
- The new operator maintains a complaint/problem and resolution log book (less than one month of implementing the new contract).
- The new operator was given formats for monthly reports by NUWATER. Operator is yet to receive formats for quarterly reports. These formats and their application will determine the realization of record keeping requirements and reporting standards as spelled out in the management contract.

Date of update: September 2009; Consultant's own

Currently some of the records that were observed such as the complaints/problems log book were not filled fully while it is still difficult to accurately discern up-to-date data for many indicators. For instance when the survey team requested for up dated statistics on number of connections, O&M activities, revenues and expenditures, these were not easily identifiable. The operator is currently assessing the technical integrity of the system, such as identifying functional and non-functional meters and pipe leaks, but there was no systematic daily record of the field findings. There is lack of reliable statistics on status of connections (including new connections and disconnections) because though the data may be known to some staff, it is not well captured by the records.

The operator mentioned maintaining a pump production form at the office, but there were no field records at any of the five pump houses. The survey team noted pump attendants take meter readings on pieces of paper before the data is entered in the production form at the operator's office. Besides, such information is not fully captured because only the meter readings are noted while the hours of operation are not accurately recorded. Whereas the starting time at every pump is recorded, the end time, pumping rate, and stoppages in service (or power breakdowns) are not recorded.

The above findings point to lack of good practice record keeping and reporting systems by the operator. It is not enough to maintain standard forms or books but being able to capture all the relevant data accurately is by far more important.

12.7 WATER QUALITY STANDARDS

The Performance Monitoring Plan states that Uganda subscribes to the WHO water quality standards for chemicals and biologicals, in which (for example) no incidence of E.coli is found in any 100 ml samples, arsenic and lead are less than 0.01 mg/l and copper is less than 2 mg/l.

This indicator is based on the NUWATER project hypothesis that successful commercialization of water requires customer assurance that the water they pay for is safe to drink.

Previously, water quality tests were carried out on the system's motorized pumps and point sources on three different occasions, that is, in July 2004, June 2006 and January 2007. In July 2004 the International Rescue Committee (IRC) carried out tests on 26 point sources within Kitgum Town and 21 sources passed while 5 failed. The results of the five sources that failed are presented below.

TABLE 12.6. SELECTED RESULTS FROM JULY 2004 WATER QUALITY TESTS

Sample No.	Location of borehole	Coli count/100ml
1	Apollo Ground	09
2 Senior	Quarter	02
3	East Ward B	100
4 Owali	nga well A	05
5 Owali	nga well B	02

In June 2006 the International Committee of Red Cross carried out quality tests on 41 point sources and only 2 failed the tests. The results of the boreholes that failed the tests were as relayed in the table below.

TABLE 12.7. SELECTED RESULTS FROM JUNE 2006 WATER QUALITY TESTS

Sample No.	Location of borehole	Coli count/100ml
1	Awuch Village (BH-HP ICRC/DWD21484)	5-10
2	Child Care Westland (BH-HP DWD1988)	50-100

In January 2007 the Urban Water Officer carried out water quality tests on 10 points and the results were as shown in the table below.

TABLE 12.8. RESULTS OF JANUARY 2007 WATER QUALITY TESTS

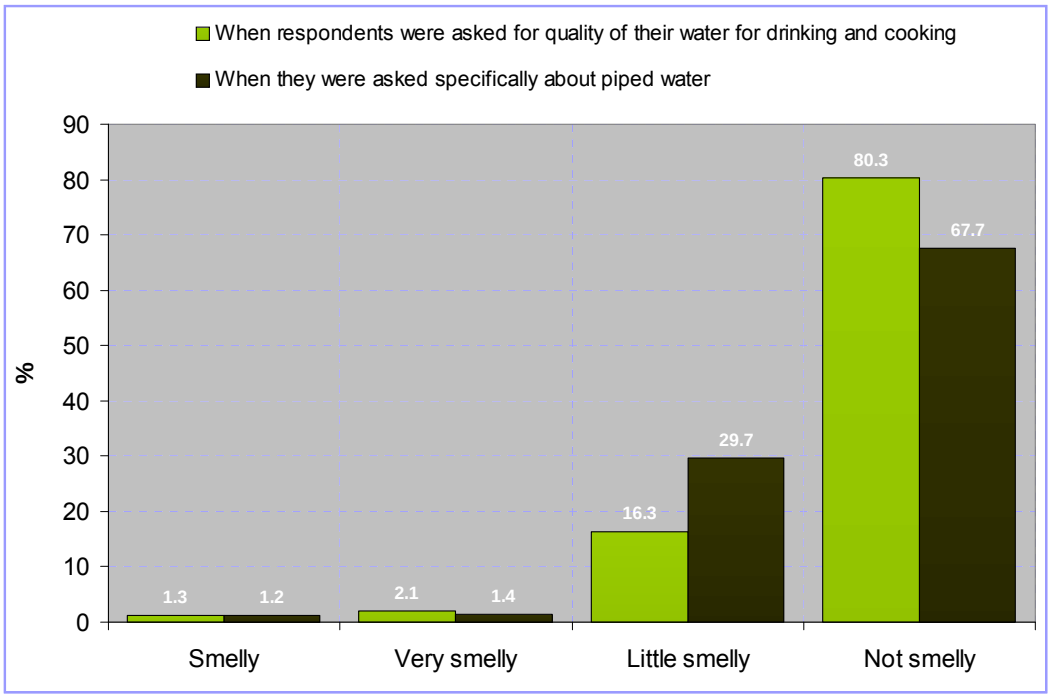
Sample	Location	PH	TDS ppt	Coli count/100ml
KI	KTI Pump Station	6.8	0.30	0
K2	YY Pump Station	6.8	0.24	0
K3 K-Flag	Pump Station	6.7	0.21	0
K4	K-New Pump Station	7.1	0.46	0
K5 Wate	r Tank	6.6	0.35	02
K6 Lolo	o Kiosk	6.8	0.25	04
K7	Boma Ground borehole	6.7	0.33	0
K8	Childcare field borehole	6.6	0.19	60
K9	Childcare kitchen borehole	6.9 0.56		0
K10	Kitgum Town Council tap	6.8	0.22	0

During the baseline survey 10 water samples were collected and analyzed for a number of parameters at the National Water and Sewerage Corporation Central Laboratory. These included four samples from Kitgum System's 4 motorized pumps[15], three samples from the distribution network and three others from the point source boreholes. The analysis showed good bacteriological and satisfactory physical-chemical characteristics of all the 10 samples. However, color was slightly higher than the National Standards for portable water quality for all three point source boreholes and at KTI and K-New motorized pumps (see Annex H).

In addition, people's perceptions of their main water were captured to provide insights into what they felt about the water quality.

Overall, about 80.3% of the households felt their main water for drinking and cooking was not smelly (Figure 12.3). However, when the respondents were specifically asked about pipe water the percentage reduced. About 67.7% felt pipe water was not smelly. At the bottom of the scale though, while 2.1% felt their main water was very smelly, only 1.4% felt so for pipe water. The household survey investigated a number of other consumer perceptions to inform the quality of water used in Kitgum (specifically about water purity and taste) and the results are presented in Section 7.2 (quality of water) of this report.

FIGURE 12.4. SMELL OF WATER



[15] No sample was collected from K-Flag because the electricity supply had been disconnected for non-payment of energy bills.

BOX 12.7.: BASELINE INFORMATION: WATER QUALITY STANDARDS

Water Quality Tests:

- Water quality tests were n ot carried out on routine basis; for in stance tests on the pipe supply system were last carried out in January 2007.
- In January 2007, of the 6 points tested in the system, 4 points passed while 2 failed. The 4 water pumps pa ssed the tests while the 2 points tested on the distributi on system fa iled. While th e motorised pumps were free of any incidence of E.coli the Water Tank and Kiosk that were tested had incidences of E.Coli.
- In November 2009, all the 10 samples (collected from 4 pu mping stations, 3 di stribution points and 3 point source boreholes) passed.
- All the 10 samples had 0 incidences of Faecal Coli forms.

People's Perceptions:

- About 67.7% perceive pipe water not smelly.
- About 80.3% perceive their main water for drinking and cooking not smelly.
- 1.4% perceives pipe water not very smelly, 29.7% a little smelly and 1.2% smelly.
- 10% perceive pipe water poor for drinking and cooking.
- 59% consider pipe water good for drinking and cooking.
- Point source boreholes were scored higher than pipe water because of perceived quality issues.
- People expressed reservations about the level of hygiene in the water tanks and the pipeline.

Date of update: November 2009; Consultant's own elaboration

12.8 NUMBER OF LOCAL GOVERNMENT OFFICIALS TRAINED ON CONTRACT MANAGEMENT

This indicator relates to the number of town council members (including the Town Clerk) who have been selected to serve as the Water Authority that have been trained by NUWATER project on how to oversee and manage Water Utility Management Contracts, as well as other related topics such as customer service, dispute resolution, etc. It defines whether the capacity of local governments to manage local resources has been strengthened or not.

BOX 12.8. BASELINE INFORMATION: NUMBER OF LOCAL GOVERNMENT OFFICIALS TRAINED ON CONTRACT MANAGEMENT

- The current Water and Sewerage Services Board (WSSB) memb ers have not had training in management or op erations of pipe water services.
- The last training was a workshop attended by some members of the previous WSSB in 2006 in Soroti (Eastern Uganda).

Date of update: September 2009.

The survey noted that the last training of local government officials was in 2006. WSSB members were trained in Soroti and these have long been replaced. Training records and reports were not obtained. However, interactions with the town council staff indicated that the current board and councilors have not had any training relating specifically to their roles or O&M issues of the water supply system. The staff in the urban water department, though, have attended training programs in their areas of specialty.

12.9 NUMBER OF AUDITS PERFORMED ON OPERATOR

This indicator measures the number of times the Authority or Contract Manager performs an audit of the operator. The operator is audited for performance, progress in meeting standards and plans, billing and collection, and finances.

According to the former Urban Water Officer, previous operators were audited by the town council's internal auditors only upon request by the Water Authority. The audits were not routine but initiated by the authority purposely to corroborate specific aspects of the urban water services such as irregular supply of water to the town residents. One such special audit report of 18 July 2006 was seen and reviewed by the survey team (see Annex F). According to the report the operator was audited for performance (water production, unaccounted for water or losses), billing, collection and finances. The auditors performed a trend analysis from December 2005 to June 2006 from which they made a number of observations aimed at improving operator performance; for example:

BOX 12.9. BASELINE INFORMATION: NUMBER OF AUDITS PERFORMED ON OPERATOR

- Private operator was last audited in July 2006.
- The audits were not routine but special audits carried out only by the Town Council's Internal Auditors upon request by the Water Authority
- There were no independent auditors or auditors from a central government agency called in to appraise the operators' performance on the basis of best practices or certified standards.

Date of update: November 2009

- It is possible to increase water supply and ensure reliable supply from the existing network;
- Water loses should be reduced and investigations initiated as to why loses are high;
- Better sales records of water supplied should be maintained in accordance with generally accepted accounting principles;
- All collections should be promptly banked; and
- Immediate mitigating measures should be taken to avert the risk of the water supply system collapsing.

The survey team also learnt that the operators were never audited by any external auditors or the Auditor General of Government.

12.10 NUMBER OF RURAL HOUSEHOLDS DIRECTLY BENEFITING FROM THE SYSTEM

The Performance Monitoring Plan describes this indicator as the number of households served by the water systems.

According to the household survey 1221 of Kitgum households (11.9%) currently use tap water for drinking and cooking; and 544 (5.3%) use it for bathing and laundry (Table 12.6). About 500 (4.8%) households currently have pipe water connections though a significant number are without flowing water.

TABLE 12.6. USE OF THE PIPE WATER SYSTEM

Type of Pipe Water	Drinking and Cooking%	Bathing and Laundry%
Neighbor's tap 0.3 0.3		
Inside tap	0.2	0.2
Private outside connection	10.4	3.4
Water kiosk	1	1.4
Total	**11.9**	**5.3**

The system does not supply free water to any category of persons. The distribution of the households by parish reveals that Town parish has the highest number of households (12%) served by the system, Westland 7.1%, Pager 6.5%, Pandwong 4.4%, Alango 3.3%, Guu 3.2%, and Pondwongo 1.2% (also see

Figures 6.1 and 6.2). Over 82% of households use point source boreholes, 2.8% water vendors and 2.9% springs.

12.11 NUMBER OF PEOPLE IN TARGETED AREAS WITH ACCESS TO IMPROVED DRINKING WATER

According to the Performance Monitoring Plan, this indicator accurately measures delivery of a basic human service, using definitions that are completely consistent with internationally endorsed WHO/UNICEF indicators. It demonstrates that as a result of system improvements, expansion and commercialization, the people in the town council have a reliable and clean source of water.

The current customer base of the system includes:

- 95 institutional connections,
- 473 yard taps/ private outside connections,
- 121 house and commercial connections,
- 27 kiosks,
- 5 new connections in August 2009, totaling
- 721 total connections.

However, it was difficult for the survey to use the above statistics to calculate the total number of people with access to the system because these include many disconnections which are not highlighted in the operator's customer database.

Thus the estimation for the population currently accessing the system is based on the number of households using tap water for any activity such as drinking, cooking, bathing or laundry.

Currently about 1221 households access the system for drinking and cooking.

The average size of households in Kitgum Town is 5.4.

BOX 12.10. BASELINE INFORMATION: NUMBER OF RURAL HOUSEHOLDS DIRECTLY BENEFITING FROM THE SYSTEM

- Overall, 11.9 % of all household s in Kitgum town access pipe water.
- The coverage of households using pipe water by parish is:
  - Town parish, 12%
  - Westland, 7.1%
  - Pager, 6.5%
  - Pandwong 4.4%
  - Alango 3.3%
  - Guu, 3.2%
  - Pondwong o, 1.2%
- About 4.7 percent of households in Kitgum town are connected to the water supply system.

BOX 12.11. BASELINE INFORMATION: NUMBER OF PEOPLE IN TARGETED AREAS WITH ACCESS TO IMPROVED DRINKING WATER

- The system is meeting the demand for 6593 people, approximately 11.9% of the population.
- The coverage of population using pipe water by parish is:
  - Town parish, 12%
  - Westland, 7.1%
  - Pager, 6.5%
  - Pandwong 4.4%
  - Alango 3.3%
  - Guu, 3.2%
  - Pondwong o, 1.2%

Date of update: September 2009; Consultant's own elaboration.

Therefore, the current system is serving: 1221 x 5.4 = 6593 people. This represents approximately 11.9% of the population.

13.0 CONCLUSION

This study has characterized the water supply situation in Kitgum Town through a household survey of 950 households and institutional assessment of the pipe water system. This baseline characterization of water supply conditions in the study area can be used to monitor and evaluate USAID's Northern Uganda Water Supply Services Project. This would not be possible without a thorough knowledge of the current water supply situation and the concerns and constraints of the inhabitants of the town. Furthermore, the information reported in the previous chapters can be used to refine or re-design project indicators, activities and targets in a manner that is more responsive to and targeted at the inhabitants of Kitgum Town.

From the survey findings a number of key conclusions can be deduced:

THE WATER SUPPLY SITUATION IS PATHETIC

The water situation in Kitgum Town is pathetic. The inconveniences involved in provision of domestic water preoccupy constantly, everyday, the minds of household decision makers and those who fetch water, whether in poor or non-poor families. What is embarrassingly prevailing is the fact that a significant percentage of the population with the ability to fully rely on the pipe service for their main water needs have been inconvenienced for a long time by having to depend on overcrowded point source boreholes, because the system is unable to supply them with water. Yet the network has undergone major rehabilitation and improvements, three times in the past 8 years.

The system in its current state cannot satisfy current demand. This conclusion is based on two factors. First, the national electric grid forms the bulk of power for running the pumps yet there is rampant load shedding in the region. Three pumps (KTI, YY Okot and K-New) have functioning alternative power sources (solar panels) which currently operate for 6 to 8 hours. A KVA generator that was meant to supply two pumps (K-New and K-Flag) is not operated because it is heavy duty equipment, not cost effective to run. Thus none of the 5 pumps can be said to be operating optimally. Secondly, there is much suppressed demand in the town. The findings reveal that current consumption of water is just 52% of actual demand, of which the pipe water system meets only 25% (of actual demand). The inhabitants of the town have over the years got accustomed to living distressed livelihoods characterised with many problems and one of them is water shortages.

Improving the network service in Kitgum is long overdue. However, this time round as another series of improvement and rehabilitation works are scheduled to start (with funding from USAID's NUWATER project), ample efforts should be undertaken to ensure there is no repeat of system mismanagement as has been the case in the past. Along with a series of planned activities spelt out in the current management contract, it is apparent that the operator should in addition undertake a public information and education campaign packaged as a corporate social responsibility program as one of the ways to improve the system and water utility's image among the community and customers. For instance one of the operator's entry point would be sensitizing communities and schools on the role of water in improved sanitation and hygiene practices. Such an exercise would also present the operator with an opportunity to educate the masses on the products or services available from the water office such as yard and house connections, since the findings show that a majority of the people are ignorant of the water utility's activities. The public education campaign should also include an Information-Education-Communication component to redress community misconceptions about the quality of pipe water.

In addition NUWATER should clarify UMEME arrears for K-New and YY Okot and consider settling these arrears by spreading payments over time. Once all the pumps have access to UMEME power then at least 3 pumping stations (K-New, YY Okot and KTI) would be able to use solar during the day and UMEME during the night, thus cutting on the energy costs. Above all these pumps would be able to operate at maximum capacity.

CURRENT WATER DEMAND WILL DOUBLE IN JUST 7 YEARS

The baseline findings have shown demand for water in Kitgum will leap steadfast; by 2017 for instance the current demand is expected to have doubled. With sustained peace in the region observations already reveal a high potential for growth especially since this is the only big town around this northern tip of the country with increasingly growing commercial contacts in Southern Sudan. In order for the NUWATER project to be relevant to the planning and development of the town there is need to consider the implications of a fast growing population and commercial center on the water network. Thus the project should focus more on adequate investment in infrastructure and the capacity of the operator and authority to manage and grow the improved system.

The project should pay much attention to skills strengthening of the operator and authority. The technical and financial expertise of the operator in particular will be critical to the effective management of the improved service and thus transforming the current inadequate system into a customer sensitive service, with the capacity to supply projected volume of water, on a sustainable basis. NUWATER should ensure that the operator staff are professional (in all aspects, including their academic qualifications and experience) and motivated to contribute to the sustainable growth of the service. It is important to reiterate once again the major factor underlying the failures of past projects –focusing so much on infrastructural investments and giving diminutive consideration to capacity building.

IT IS NOT A BOREHOLE EFFECT BUT INHERENT FACTORS WITHIN THE SYSTEM THAT CAUSE THE NETWORK'S DISMAL PERFORMANCE

From the findings two major issues pertaining to the pipe system come to light: perceived quality and regularity. Pipe water is perceived to be of lower quality in all aspects (color, taste, smell, and odor) to point source boreholes. However irregular supply is by far the biggest liability to the system. A combination of these two factors (perceived lower quality and irregular supply) has in effect facilitated the steady (and complete) loss of confidence in the system by the Kitgum community including connected customers, users of water kiosks and those who do not use the system. On a good note, the survey results suggest that the system can effectively operate regardless of the functioning of the point source boreholes. In other words these point sources should not give project managers sleepless nights. Currently, there is need to decongest the point boreholes. Many people are stuck to other sources because the pipe service is highly unreliable –the few functional water kiosks are closed most of the time, the neighbor's yard tap is not functional and some areas have very little flow of water and for short periods. Besides households that buy from water vendors (3.8% of the population) pay very high prices. There are also other inconveniences related to vendor water such as storage especially for high volume users, yet they could comfortably use water from the roof tank connected to the pipe network. Households currently connected to the pipe water system specifically asked for replacement of the small diameter pipes with bigger pipes that can hold high water volume. It is thus critical that the improved service seeks to satisfy customers by ensuring water supply 24 hours a day in all parts of the town, regular and fair billing based on metered use, and prompt and efficient repairing and customer service. These will be the keys to a successful operation.

POINT SOURCE BOREHOLES HAVE BEEN SUCCESSFUL: "COPY AND PASTE" THEIR SUCCESS STORY

Point sources in Kitgum Town have had a successful story. Since the outbreak of Hepatitis E in 2007, borehole water has been free. NGOs have been supporting repairs and maintenance through the District Water Office. However, even before the NGO involvement the Water Source Committees who were in

charge of operations and maintenance of these boreholes were trained in management and revenue mobilization and were successful in doing so. Each household used to pay monthly, a minimum of UGX 500 but high volume users like bricklayers paid higher monthly lump sums. According to the town council water staff the current arrangement (of using free water) cannot be sustained any more. The District Water Office has already communicated to stakeholders that free spare parts will not be available anymore. The users (town residents) will have to raise money and buy the spares like they used to do before the water became free.

This scenario presents an opportunity for the operator of pipe water to rise to the occasion. In the first place point sources became popular in part because of the unreliability of pipe water in the town. About 3 to 4 years ago there were serious water shortages in the town and some households resorted to using river water which resulted in a cholera outbreak. But, there is no justification for having many point boreholes in the central business area of the town, if at any time of the day one could open a tap and water flows or the nearby kiosk is open whenever one needs to fill up a jerrycan of water. Point source boreholes should cater for the families that cannot afford the cost of pipe water. According to discussions held with the town inhabitants and their leaders there are currently many people using point source borehole water because the alternative (pipe water) is not reliable. Many households disclosed that they have the pipe connections or are close to a neighbor's tap but have had no water in pipes for a long time.

As Kitgum water system prepares for major rehabilitation and investment it is important to concurrently strive to build confidence and trust among the consumers. At present the water system's rating among the town residents is extremely low. Below are some suggestions for consideration by the NUWATER project (Contract Manager), the Water Authority and the Operator:

In a public-private partnership like the arrangement between Kitgum Town Council and the private operator, the private sector normally brings in creativity, expertise in customer service, and efficiency in resource and time management. However to get the best out of the private operator, Kitgum Town Council should exercise some form of "arm's length regulation" –the operator receives some form of operational freedom while the authority carries out regulatory oversight to ensure improved service delivery and system sustainability. Thus, it is recommended that the Water Office relocates to the central business area, a relatively more accessible place for potential and current customers. Staying within the district bounds does not only cement further the people's perception of the water service as another "inefficient public service" but will also undermine the operator's independence and creativity.

The survey notes that the performance contract details far reaching targets. Some people the survey team has interacted with have called the targets overly ambitious. This survey found that previous underperformance of the system even after costly improvements was due to poor management. In addition all interventions dwelt so much on expansion and increasing service levels and paid lip service to problems in management. The current management contract however, has detailed a project implementation plan that includes Kitgum Operator Training (Activity 28, page 58). For purposes of emphasis, the realization of targets in the management contract is greatly dependant on the quality of capacity building activities or training for the operator in a number of areas relevant to utility management, such as customer care, financial management, record keeping and reporting. Such training should also involve sharing with other operators and experts, what has worked elsewhere and what has not worked, etc.

Coupled with the above it is necessary to equip the water office to enable efficient operations. This would entail acquiring computers, printers, photocopier, visitor's chairs and shelves among others. The operator's staff (especially the meter readers and plumbers) should be easily identifiable with up-to-date identity cards, tools and corporate wear.

The medium to long term goal of the system should include extending the pipeline and distribution to all parishes and villages without discriminating remote areas (such as Nyikinyiki and Ginnery) because

property developments are on the increase throughout the entire town area. With sustained peace in the region, in about 5 years from now remote or fringe areas may be transformed, with permanent residential houses alongside the mud walled huts, and these would need pipe water supply. However, given the limited resources short to medium term priority should be to ensure adequate supply or satisfy demand of existing as well as new customers and extend supply to areas currently without pipe water but with several permanent residential houses such as the quarters (lining both sides of the road to Ginnery). In other words the priority for the system should be improving and expanding the service but with a focus on satisfying demand of existing customers. Satisfied customers are normally the best salespeople for any product or service.

FINANCING SCHEME

In order to offer more households the opportunity to connect to the pipe network, the Authority/Contract Manager/Operator should consider introducing flexible schemes for low income segments. One of these schemes could be a financing scheme for unconnected households, which would allow the consumers to pay off the one-time connection cost through a stream of monthly payments collected along with their monthly consumption charge (especially when the rates are increased as per the new management contract).[16] Before such a scheme is introduced there is need for a mini survey possibly carried out by the operator or contract manager to identify the number of potential households that would change their minds and connect to the network if a financing scheme was available.

[16] The eighth schedule of the management contract states that after the first 1,200 connections, the customers will have to pay for the full cost of connection.

ANNEXES

ANNEX A. SPSS DATA

SECTION ONE: LOCATION OF INTERVIEW

TABLE A.1.1. GENDER OF RESPONDENTS BY PARISH AND VILLAGE, AUGUST 2009

Parish	Village	Sex of respondent	Frequency	Valid percentage
Pondwongo	Nyanya	Male	20	33.3
		Female	40	66.7
		Total	60	100.0
	Nyiki Nyiki	Male	32	52.5
		Female	29	47.5
		Total	61	100.0
	Lemo South	Male	14	31.1
		Female	31	68.9
		Total	45	100.0
	Lemo East	Male	11	57.9
		Female	8	42.1
		Total	19	100.0
Pager	Lamit North	Male	11	68.8
		Female	5	31.2
		Total	16	100.0
	Lamit South	Male	9	56.2
		Female	7	43.8
		Total	16	100.0
	Ayul A	Male	10	31.2
		Female	22	68.8
		Total	32	100.0
	Ayul B	Male	11	34.4
		Female	21	65.6
		Total	32	100.0
Guu	Eastward A	Male	27	42.2
		Female	37	57.8
		Total	64	100.0
	Eastward B	Male	35	56.5
		Female	27	43.5
		Total	62	100.0
	Ginnery	Male	24	38.1
		Female	39	61.9
		Total	63	100.0
Town Parish	Central ward	Male	18	56.2
		Female	14	43.8
		Total	32	100.0
	Apolo Ground	Male	9	29.0
		Female	22	71.0
		Total	31	100.0
	Langalanga	Male	16	51.6
		Female	15	48.4

Parish	Village	Sex of respondent	Frequency	Valid percentage
		Total	31	100.0
Alango	Tangi-Agoro	Male	12	37.5
		Female	20	62.5
		Total	32	100.0
	Alango West	Male	14	46.7
		Female	16	53.3
		Total	30	100.0
	Alango East	Male	13	38.2
		Female	21	61.8
		Total	34	100.0
Westland	Westland West	Male	18	28.1
		Female	46	71.9
		Total	64	100.0
	Lulojo	Male	19	30.2
		Female	44	69.8
		Total	63	100.0
	Second Jenge	Male	36	57.1
		Female	27	42.9
		Total	63	100.0
Pandwong	Gangdyang	Male	18	52.9
		Female	16	47.1
		Total	34	100.0
	Bardege	Male	6	18.8
		Female	26	81.2
		Total	32	100.0
	Auch	Male	12	37.5
		Female	20	62.5
		Total	32	100.0

SECTION TWO: BACKGROUND CHARACTERISTICS

TABLE A.2.1. GENDER OF RESPONDENTS, AUGUST 2009

Male	395	41.7
Female	553	58.3
Total	**948**	**100.0**

TABLE A.2.2. HEAD OF HOUSEHOLD, AUGUST 2009

	Respondents	Respondents%
Head of household	802	87.9
Not head of household	110	12.1
Total	**912**	**100.0**

TABLE A.2.3. AGE OF RESPONDENTS, AUGUST 2009

	Respondents	Respondents%
15 - 30 years	320	34.9
31 - 50 years	384	41.9
51 - 70 years	182	19.9
70+ years	30	3.3
Total	**916**	**100.0**

TABLE A.2.4. MARITAL STATUSES OF RESPONDENTS, AUGUST 2009

	Respondents	Respondents%
Married	572	63.7
Single	96	10.7
Widow	107	11.9
Divorced	55	6.1
Separated	52	5.8
Others	16	1.8
Total	**898**	**100.0**

TABLE A.2.5. ETHNICITY OR TRIBE OF RESPONDENTS, AUGUST 2009

Tribe	Respondents	Respondents%
Acholi	917	97.3
Itesot	4	0.4
Langi	8	0.9
Madi	3	0.3
Baganda	2	0.2
Bagishu	2	0.2
Others (Sudanese, Lugbara, Alur, Basoga, Banyoro, Banyankole)	7	0.7
Total	**939**	**100.0**

TABLE A.2.6. RELIGION OF RESPONDENTS, AUGUST 2009

Religion	Respondents	Respondents%
Catholic	447	48.6
Protestant	376	40.9
Moslem	52	5.7
Others	44	4.8
Total	**919**	**100.0**

TABLE A.2.7. PLACE OF BIRTH OF RESPONDENTS, AUGUST 2009

Area	Respondents	Respondents%
Kitgum	716	61.0
Outside Kitgum	214	18.2
Total	**930**	**79.2**

TABLE A.2.8. MAIN REASON FOR COMING TO KITGUM, FOR THOSE BORN OUTSIDE KITGUM, AUGUST 2009

Main reason	Respondents	Respondents%
Security	25	11.7
Employment	106	49.5
Education	3	1.4
Marriage	42	19.6
Relative	16	7.5
Facilities/ Trading	22	10.3
Total	**214**	**100.0**

TABLE A.2.9 AGE DISTRIBUTION OF THE REDISTRIBUTION OF HOUSEHOLD MEMBERS, AUGUST 2009

	Mean	Median	Mode	Minimum	Maximum	Sum
Number of persons in the household	5.40	4.00	5	1	25	5111
Number of males within age range (0 - 19)	1.42	1.00	1	0	9	1,316
Number of males within age range (19 - 38)	.50	.00	0	0	4	664
Number of males within age range (38 - 57)	.12	.00	0	0	4	278
Number of males within age range (57 - 76)	.07	.00	0	0	2	84
Number of males within age range (76+ years)	.03	.00	0	0	3	42
Number of females within age range (0 - 19)	1.44	1.00	1	0	8	1,448
Number of female within age range (19 - 38)	.53	.00	0	0	5	733
Number of female within age range (38 - 57)	.15	.00	0	0	2	411
Number of female within age range (57 - 76)	.08	.00	0	0	4	102
Number of female within age range (76+)	.03	.00	0	0	2	33

SECTION THREE: SOCIOECONOMIC SITUATION

TABLE A.3.1A. HIGHEST LEVEL OF EDUCATION ATTAINED, AUGUST 2009

Level of education attained	Respondents	Respondents%
None	169	20.6
Primary	239	29.7
Secondary	256	23.9
College training	190	17
University	69	7.1
Others	15	1.7
Total	938	100

TABLE A.3.1B. HIGHEST LEVEL OF EDUCATION ATTAINED (FEMALE RESPONDENTS), AUGUST 2009

Level of education attained	Respondents	Respondents%
None	143	26.2
Primary	188	34.4
Secondary	95	17.3
College training	77	14
University	35	6.4
Others	9	1.7
Total	547	100

TABLE A.3.1C. HIGHEST LEVEL OF EDUCATION ATTAINED (MALE RESPONDENTS), AUGUST 2009

Level of education attained	Respondents	Respondents%
None	51	13
Primary	90	23
Secondary	129	33
College training	83	21.2
University	31	8
Others	7	1.8
Total	391	100

TABLE A.3.2. RESPONDENTS WHO CAN READ AND WRITE, AUGUST 2009

Writing and Reading status: Village - Parish cross tabulation						
				Can read and write Luo:		
Parish				Yes	No	Total
Pondwongo	Village	Nyanya	Count	44	16	60
			% within Village	73.3%	26.7%	100.0%
		Nyiki Nyiki	Count	49	11	60
			% within Village	81.7%	18.3%	100.0%
		Lemo South	Count	21	24	45
			% within Village	46.7%	53.3%	100.0%
		Lemo East	Count	18	1	19
			% within Village	94.7%	5.3%	100.0%
	Total		Count	132	52	184
			% within Parish	71.7%	28.3%	100.0%
Pager	Village	Lamit North	Count	15	1	16
			% within Village	93.8%	6.2%	100.0%
		Lamit South	Count	13	3	16
			% within Village	81.2%	18.8%	100.0%
		Ayul A	Count	23	9	32
			% within Village	71.9%	28.1%	100.0%
		Ayul B	Count	30	2	32
			% within Village	93.8%	6.2%	100.0%

	Total		Count	81	15	96
			% within Parish	84.4%	15.6%	100.0%
Guu	Village	Eastward A	Count	49	14	63
			% within Village	77.8%	22.2%	100.0%
		Eastward B	Count	49	11	60
			% within Village	81.7%	18.3%	100.0%
		Ginnery	% within Village	61.9%	38.1%	100.0%
	Total		Count	137	49	186
			% within Parish	73.7%	26.3%	100.0%
Town Parish	Village	Central ward	Count	25	7	32
			% within Village	78.1%	21.9%	100.0%
		Apolo Ground	Count	26	5	31
			% within Village	83.9%	16.1%	100.0%
		Langalanga Cou	nt	24	6	30
			% within Village	80.0%	20.0%	100.0%
	Total Cou		nt	75	18	93
			% within Parish	80.6%	19.4%	100.0%
Alango Villa	ge	Tangi-Agoro	Count	29	3	32
			% within Village	90.6%	9.4%	100.0%
		Alango West	Count	17	13	30
			% within Village	56.7%	43.3%	100.0%
		Alango East	Count	20	14	34
			% within Village	58.8%	41.2%	100.0%
	Total Cou		nt	66	30	96
			% within Parish	68.8%	31.2%	100.0%
Westland Villa	ge	Westland West	Count	56	7	63
			% within Village	88.9%	11.1%	100.0%
		Lulojo Cou	nt	31	32	63
			% within Village	49.2%	50.8%	100.0%
		Second Jenge	Count	48	14	62
			% within Village	77.4%	22.6%	100.0%
	Total Cou		nt	135	53	188
			% within Parish	71.8%	28.2%	100.0%
Pandwong Village		Gangdyang	Count	26	6	32
			% within Village	81.2%	18.8%	100.0%
		Bardege C	ount	29	2	31
			% within Village	93.5%	6.5%	100.0%
		Auch Cou	nt	25	6	31
			% within Village	80.6%	19.4%	100.0%
	Total Cou		nt	80	14	94
			% within Parish	85.1%	14.9%	100.0%

TABLE A.3.3. RESPONDENTS WHO CAN READ AND WRITE ENGLISH, AUGUST 2009

Parish				Can read and write English: Yes	Can read and write English: No	Total
Pondwongo	Village	Nyanya	Count	41	18	59
			% within Village	69.5%	30.5%	100.0%
		Nyiki Nyiki	Count	40	19	59
			% within Village	67.8%	32.2%	100.0%
		Lemo South	Count	19	26	45
			% within Village	42.2%	57.8%	100.0%
		Lemo East	Count	15	4	19
			% within Village	78.9%	21.1%	100.0%
	Total		Count	115	67	182
			% within Parish	63.2%	36.8%	100.0%
Pager	Village	Lamit North	Count	10	6	16
			% within Village	62.5%	37.5%	100.0%
		Lamit South	Count	12	4	16
			% within Village	75.0%	25.0%	100.0%
		Ayul A	Count	17	15	32
			% within Village	53.1%	46.9%	100.0%
		Ayul B	Count	24	2	26
			% within Village	92.3%	7.7%	100.0%
	Total		Count	63	27	90
			% within Parish	70.0%	30.0%	100.0%
Guu	Village	Eastward A	Count	45	16	61
			% within Village	73.8%	26.2%	100.0%
		Eastward B	Count	47	13	60
			% within Village	78.3%	21.7%	100.0%
		Ginnery	Count	25	38	63
			% within Village	39.7%	60.3%	100.0%
	Total		Count	117	67	184
			% within Parish	63.6%	36.4%	100.0%
Town Parish	Village	Central ward	Count	24	8	32
			% within Village	75.0%	25.0%	100.0%
		Apollo Ground	Count	27	4	31
			% within Village	87.1%	12.9%	100.0%
		Langalanga	Count	23	8	31
			% within Village	74.2%	25.8%	100.0%
	Total		Count	74	20	94
			% within Parish	78.7%	21.3%	100.0%
Alango	Village	Tangi-Agoro	Count	21	11	32
			% within Village	65.6%	34.4%	100.0%
		Alango West	Count	16	14	30
			% within Village	53.3%	46.7%	100.0%
		Alango East	Count	18	16	34
			% within Village	52.9%	47.1%	100.0%

	Total		Count	55	41	96
			% within Parish	57.3%	42.7%	100.0%
Westland	Village	Westland West	Count	46	14	60
			% within Village	76.7%	23.3%	100.0%
		Lulojo	Count	20	43	63
			% within Village	31.7%	68.3%	100.0%
		Second Jenge	Count	42	20	62
			% within Village	67.7%	32.3%	100.0%
	Total		Count	108	77	185
			% within Parish	58.4%	41.6%	100.0%
Pandwong	Village	Gangdyang	Count	24	7	31
			% within Village	77.4%	22.6%	100.0%
		Bardege	Count	25	3	28
			% within Village	89.3%	10.7%	100.0%
		Auch	Count	23	8	31
			% within Village	74.2%	25.8%	100.0%
	Total		Count	72	18	90

TABLE A.3.4. HOUSEHOLD MAIN SOURCE OF INCOME WITH THEIR CORRESPONDING MONTHLY INCOME BY MAIN OCCUPATION, AUGUST 2009

Household main source of income * Amount of monthly income from main source * Main occupation of the head of the household Cross tabulation

Main occupation of the head of the household			Amount of monthly income from main source			Total
			Less than 100,000/=	Over 200,000/=	100,000/= - 200,000/=	
Peasant Cultivation	Household main source of income	Sales of agricultural products	62.4%	17.8%	19.8%	100.0%
		Wages and Salaries	75.0%		25.0%	100.0%
		Trading	18.2%	54.5%	27.3%	100.0%
		Support from family members	100.0%			100.0%
		Others	66.7%	13.3%	20.0%	100.0%
	Total		60.4%	19.4%	20.1%	100.0%
Casual Laborer	Household main source of income	Sales of agricultural products	100.0%			100.0%
		Wages and Salaries	67.3%	6.1%	26.5%	100.0%
		Trading	50.0%		50.0%	100.0%
		Allowances	23.5%	5.9%	70.6%	100.0%
		Support from family members	75.0%	25.0%		100.0%
		Others	80.8%	11.5%	7.7%	100.0%
	Total		65.0%	7.8%	27.2%	100.0%
Petty retail trader	Household main source of income	Sales of agricultural products	100.0%			100.0%
		Wages and Salaries	33.3%	33.3%	33.3%	100.0%
		Trading	56.7%	14.9%	28.4%	100.0%
		Support from family members	100.0%			100.0%

		Others	75.0%	12.5%	12.5%	100.0%
	Total		62.9%	14.3%	22.9%	100.0%
NGO staff	Household main source of income	Wages and Salaries	14.3%	32.1%	53.6%	100.0%
		Trading	25.0%	25.0%	50.0%	100.0%
		Allowances		30.8%	69.2%	100.0%
	Total		12.3%	31.5%	56.2%	100.0%
Trader	Household main source of income	Sales of agricultural products	40.0%	50.0%	10.0%	100.0%
		Trading	20.0%	31.8%	48.2%	100.0%
	Total		22.1%	33.7%	44.2%	100.0%
Public Servant (Teacher, Health worker)	Household main source of income	Sales of agricultural products	66.7%		33.3%	100.0%
		Wages and Salaries	39.8%	19.5%	40.6%	100.0%
		Allowances			100.0%	100.0%
		Support from family members			100.0%	100.0%
		Others	40.0%	40.0%	20.0%	100.0%
	Total		39.0%	19.2%	41.8%	100.0%
Housewife	Household main source of income	Sales of agricultural products	70.0%	10.0%	20.0%	100.0%
		Wages and Salaries	100.0%			100.0%
		Trading	50.0%	25.0%	25.0%	100.0%
		Allowances	100.0%			100.0%
		Support from family members	81.8%	18.2%		100.0%
		Others	76.3%	2.6%	21.1%	100.0%
	Total		77.2%	8.9%	13.9%	100.0%
Others	Household main source of income	Sales of agricultural products	33.3%	33.3%	33.3%	100.0%
		Wages and Salaries	75.0%	25.0%		100.0%
		Trading	50.0%	50.0%		100.0%
		Allowances		100.0%		100.0%
		Support from family members	87.5%	12.5%		100.0%
		Others	53.8%	12.1%	34.1%	100.0%
	Total		58.2%	15.6%	26.2%	100.0%

TABLE A.3.5A. AMOUNT OF MONTHLY INCOME FROM SECOND MAIN SOURCE, AUGUST 2009

Income interval	Respondents	Respondents%
Less than 10,000/=	193	49.5
10,000/=	73	18.7
Greater than 10,000/=	124	31.8
Total	390	100.0

TABLE A.3.5B. AVERAGE INCOME LEVELS OF SURVEYED VILLAGES (AS A PROPORTION OF TOTAL INCOMES OF SAMPLED HOUSEHOLDS)

Surveyed villages		Valid Percent (less than UGX 100,000)	Valid Percent (UGX 100,000-200,000)	Valid Percent Greater than (over UGX 200,000)
Valid	Apollo Ground	.9	7.4	5.0
	Bardege	1.4	0	8.2
	Tangi-Agoro	1.6	1.2	7.1
	Lemo East	1.8	4.9	1.1
	Lamit South	2.5	1.9	.4
	Eastward A	2.7	1.9	16.1
	Central ward	2.9	3.7	4.6
	Langalanga	2.9	6.2	1.4
	Lamit North	3.2	0	.7
	Gangdyang	3.8	8.0	1.1
	Ayul B	4.1	5.6	1.8
	Alango West	4.1	4.3	1.4
	Auch	4.1	5.6	.7
	Nyanya	4.3	1.9	12.5
	Ayul A	4.7	1.9	1.4
	Alango East	4.7	3.7	2.1
	Westland West	5.0	3.1	12.9
	Lemo South	5.9	5.6	2.9
	Eastward B	5.9	8.0	6.4
	Lulojo	7.2	11.7	1.8
	Second Jenge	7.4	4.3	4.3
	Nyiki Nyiki	9.0	4.9	3.9
	Ginnery	10.1	4.3	2.1
	Total	100.0	100.0	100.0

TABLE A.3.6. SOURCE OF MAIN FOOD ITEMS FOR HOUSEHOLD, AUGUST 2009

Main source of food item	Respondents	Respondents%
Own produce	130	15.0
Purchase from market	695	80.1
Relief	11	1.3
Gift from relative/parents in the village	14	1.6
Others	18	2.1
Total	868	100.0

TABLE A.3.7A. HOUSEHOLD EXPENDITURE OF UG SHS 100,000 OR LESS PER MONTH

	Responses	Percent of Cases
Item spent on	**N**	**%**
Health expenses	607	66.9%
School expenses	382	42.1%
Buying food for the household	791	87.2%
Water	564	62.2%
Contribution to cultural family obligations (funerals, marriage etc)	285	31.4%
Travel	169	18.6%
Drinking and smoking	166	18.3%
Housing (e.g rent, repairs)	230	25.4%
Fuel (firewood, charcoal, parafin, electricity etc)	771	85.0%

TABLE A.3.7B. HOUSEHOLD EXPENDITURE OF OVER UG SHS 100, 000 -200,000 PER MONTH

Item spent on	Responses (N)	Percent of Cases
Health expenses	23	26.4%
School expenses	11	12.6%
Buying food for the household	40	46.0%
Water	3	3.4%
Contribution to cultural family obligations (funerals, marriage etc)	8	9.2%
Travel	3	3.4%
Drinking and smoking	3	3.4%
Housing (e.g. rent, repairs)	4	4.6%
Fuel (firewood, charcoal, paraffin, electricity etc)	6	6.9%

TABLE A.3.7.C. HOUSEHOLD EXPENDITURE GREATER THAN UG SHS 200, 000 PER MONTH

Item spent on	Responses	Percent of Cases
Health expenses	6	14.3%
School expenses	11	26.2%
Buying food for the household	17	40.5%
Travel	1	2.4%
Drinking and smoking	2	4.8%
Housing (e.g., Rent, repairs)	9	21.4%
Fuel (firewood, charcoal, paraffin, electricity, etc.)	6	14.3%

TABLE A.3.8. FUNCTIONING METER FOR HOUSEHOLDS WITH ELECTRICITY (29.1%)

	Respondents	Respondents %
Yes	93	89.4
No	11	10.6
Total	104	100.0

TABLE A.3.9. HOUSEHOLD OWNING A COLOR TV

	Respondents	Respondents %
Yes	97	11.2
No	771	88.8
Total	868	100.0

TABLE A.3.10. HOUSEHOLD OWNING A BLACK AND WHITE TV

	Respondents	Respondents %
Yes	36	4.3
No	810	95.7
Total	846	100.0

TABLE A.3.11. HOUSEHOLD OWNING A RADIO

	Frequency	Valid Percent
Yes	747	83.7
No	146	16.3
Total	893	100.0

TABLE A.3.12. HOUSEHOLD OWNING A BICYCLE

	Frequency	Valid Percent
Yes Own	213	24.7
Yes Government	9	1.0
Yes NGO	3	0.3
No	639	74
Total	864	100.0

TABLE A.3.13. HOUSEHOLD OWNING A MOTORCYCLE

	Frequency	Valid Percent
Yes Own	41	4.7
Yes Government	2	0.2
Yes NGO	4	0.5
No	829	94.6
Total	876	100.0

TABLE A.3.14. HOUSEHOLD OWNING A MOTOR VEHICLE

	Frequency	Valid Percent
Yes Own	12	1.4
Yes Government	5	0.6
Yes NGO	7	0.8
No	843	97.2
Total	867	100.0

SECTION FOUR: TRENDS IN HEALTH STATUS

TABLE A.4.1. WATER RELATED DISEASES (30 DAYS PRIOR TO SURVEY DAY) AND AGE GROUP OF MEMBERS OF HOUSEHOLD AFFECTED MOST

		Age group of members of household affected most					Total
		0-1 year	1-9 years	10-17 years	18-60 years	60+ years	
Water related diseases attack in the last 30 days	Diarrhoea	2.9%	45.7%	28.6%	20.0%	2.9%	100.0%
	Malaria	3.5%	53.9%	28.5%	13.0%	1.2%	100.0%
	Typhoid		9.8%	43.9%	43.2%	3.0%	100.0%
	Dysentery		25.0%	50.0%	25.0%		100.0%
	Cholera				100.0%		100.0%
	Bilharzia			66.7%	33.3%		100.0%
	Intestinal worms		45.5%	36.4%	18.2%		100.0%
Total		2.6%	44.4%	31.9%	19.5%	1.5%	100.0%

TABLE A.4.2. RELATIONSHIP BETWEEN HOUSEHOLD WHICH LOST A MEMBER AS A RESULT OF DEATH AND FREQUENCIES OF FALLING SICK IN THE LAST 12 MONTHS BY THE LIKELY CAUSE

Likely cause of death (If yes to above)			Frequencies of falling sick in the last 12 months					Total
			2	3	4	5	6+	
Heart Disease (cardiovascular)	Did your household loss a member as a result of death in the last 12 months	Yes	100.0%					100.0%
	Total		100.0%					100.0%
Upper respiratory (Asthma, Bronchitis)	Did your household loss a member as a result of death in the last 12 months	Yes		100.0%				100.0%
	Total			100.0%				100.0%
Tuberculosis	Did your household loss a member as a result of death in the last 12 months	Yes		100.0%				100.0%
	Total			100.0%				100.0%
AIDS related	Did your household loss a member as a result of death in the last 12 months	Yes	66.7%	33.3%				100.0%
	Total		66.7%	33.3%				100.0%

Malaria	Did your household loss a member as a result of death in the last 12 months	Yes	18.2%	72.7%		9.1%		100.0%
	Total		18.2%	72.7%		9.1%		100.0%
Others	Did your household loss a member as a result of death in the last 12 months	Yes	20.0%	20.0%	40.0%		20.0%	100.0%
	Total		20.0%	20.0%	40.0%		20.0%	100.0%

SECTION FIVE: CURRENT SOURCE OF WATER & WATER UTILIZATION

TABLE A.4.3A. RELATIONSHIP BETWEEN MOST FREQUENTLY USED SOURCE OF WATER FOR DRINKING AND COOKING DURING WET AND DRY SEASON

		Most frequently used source of water for drinking and cooking during dry season									
		Protected well/ Spring	Open well/ Spring	Water kiosks	Private outside connection	Private inside tape	Water vendor	Bore-hole	Neighor-ing house-hold	River /lake/ Pond	Total
Most frequently used source of water for drinking and cooking during wet season	Protected well/Spring	100%									100.0%
	Open well/Spring		100%								100.0%
	Water kiosk			100%							100.0%
	Private Outside connection				100%						100.0%
	Private inside tape					100%					100.0%
	Water vendor						100%				100.0%
	Borehole		.1%					99.9%			100.0%
	Neighboring household							25.0%	75.0%		100.0%
	River/Pond/lake									100%	100.0%
	Rain harvesting				33.3%			66.7%			100.0%
Total		.7%	1.9%	1.8%	10.1%	.2%	2.9%	81.8%	.3%	.2%	100.0%

TABLE A.4.3B. RELATIONSHIP BETWEEN MOST FREQUENTLY USED SOURCE OF WATER FOR BATHING AND LAUNDRY DURING WET AND DRY SEASON

Parish			Most frequently used source of water for bathing, laundry during the wet season										
			Protected well/ spring	Open well/ spring	Water kiosk	Outside connecti on	Private inside tap	Water vendor	Bore hole	Neigh boring household	River/ lake/ pond	Rain water harvesting	Total
Pondwongo	Most frequently used source of water for bathing, laundry during the	Open well/Spring		50.0%					50.0%				100.0%
		Water kiosk			100%								100.0%
		Private outside connection				100%							100.0%
		Water vendor						100%					100.0%
		Borehole							98.8%			1.2%	100.0%

	dry season	River/lake/pond							100%				100.0%
	Total			.6%	.6%	.6%		1.1%	96.1%			1.1%	100.0%
Pager	Most frequently used source of water for bathing, laundry during the dry season	Protected well/Spring		100%									100.0%
		Water kiosk			100%								100.0%
		Water vendor						100%					100.0%
		Borehole							100%				100.0%
	Total			1.1%	6.5%			2.2%	90.3%				100.0%
Guu	Most frequently used source of water for bathing, laundry during the dry season	Protected well/Spring	100.0%										100.0%
		Open well/Spring		100.0%									100.0%
		Water kiosk			100.0%								100.0%
		Water vendor						100%					100.0%
		Borehole							99.2%			.8%	100.0%
		River/lake/pond									100.0%		100.0%
		Rain harvesting										100.0%	100.0%
	Total		**3.8%**	**11.5%**	**2.2%**			**7.7%**	**67.0%**	**.5%**	**6.0%**	**1.1%**	**100%**
Town Parish	Most frequently used source of water for bathing, laundry during the dry season	Private outside connection				100.0%							100.0%
		Water vendor						100%					100.0%
		Borehole							100.0%				100.0%
		Rain harvesting										100.0%	100.0%
	Total					10.9%		5.4%	80.4%	1.1%		2.2%	100.0%
Alango	Most frequently used source of water for bathing,laundry during the dry season	Water kiosk			100.0%								100.0%
		Borehole							100.0%				100.0%
	Total				3.3%				96.7%				100.0%
Westland	Most frequently used source of water for bathing, laundry during the dry season	Protected well/Spring		100.0%									100.0%
		Water kiosk			100.0%								100.0%
		Private outside connection				50.0%						50.0%	100.0%
		Private inside tap					100%						100.0%

		Water vendor					20.0%	80.0%					100.0%
		Borehole							100.0 %				100.0%
		River/lake/pond									100%		100.0%
	Total			.5%	3.8%	.5%	1.6%	2.2%	85.8%	.5%	4.4%	.5%	100%
Pandwong	Most frequently used source of water for bathing, laundry during the dry season	Private outside connection				100.0%							100.0%
		Borehole						1.2%	98.8%				100.0%
		River/lake/pond									100.0 %		100.0%
		Rain harvesting										100.0%	100.0%
	Total					4.4%		1.1%	91.2%		2.2%	1.1%	100%

TABLE A.4.3C. THE LAST TIME COMPLAINT OR PROBLEM WAS LOGGED

Time duration	Frequency	Valid Percent
7 days	3	3.3
2 Weeks	1	1.1
1 Month	4	4.4
3 Months	5	5.5
6 Months	2	2.2
Over 6 months	76	83.5
Total	91	100.0

TABLE A.4.4. RELATIONSHIP BETWEEN NATURE OF THE PROBLEM AND DURATION TAKEN TO SOLVE THE PROBLEM

Nature of the problem * Duration taken to solve the problem * Village Cross tabulation

Village			Duration taken to solve the problem					Total
			7 days	Two Weeks	One Month	Three Months	Others	
Nyiki Nyiki	Nature of the problem	Others					100.0%	100.0%
	Total						100.0%	100.0%
Lemo South	Nature of the problem	Others					100.0%	100.0%
	Total						100.0%	100.0%
Westland West	Nature of the problem	Others					100.0%	100.0%
	Total						100.0%	100.0%
Eastward B	Nature of the problem	Incorrect billing					100.0%	100.0%
		Breakage	100.0%					100.0%
		Low Pressure					100.0%	100.0%
		Others	42.9%				57.1%	100.0%
	Total		36.4%				63.6%	100.0%
Lulojo	Nature of the problem	Water quality issues				100.0%		100.0%

		Others					100.0%	100.0%
	Total					20.0%	80.0%	100.0%
Ginnery	Nature of the problem	Others					100.0%	100.0%
	Total						100.0%	100.0%
Tangi-Agoro	Nature of the problem	Others					100.0%	100.0%
	Total						100.0%	100.0%
Alango West	Nature of the problem	Others	10.0%	10.0%			80.0%	100.0%
	Total		10.0%	10.0%			80.0%	100.0%
Alango East	Nature of the problem	Others					100.0%	100.0%
	Total						100.0%	100.0%
Apolo Ground	Nature of the problem	Low Pressure		50.0%	50.0%			100.0%
	Total			50.0%	50.0%			100.0%
Langalanga	Nature of the problem	Low Pressure			50.0%	50.0%		100.0%
		Others					100.0%	100.0%
	Total				7.1%	7.1%	85.7%	100.0%
Auch	Nature of the problem	Low Pressure					100.0%	100.0%
		Others					100.0%	100.0%
	Total						100.0%	100.0%
Second Jenge	Nature of the problem	Incorrect billing					100.0%	100.0%
		Others					100.0%	100.0%
	Total						100.0%	100.0%
Gangdyang	Nature of the problem	Others					100.0%	100.0%
	Total						100.0%	100.0%
Central ward	Nature of the problem	Incorrect billing					100.0%	100.0%
		Leak					100.0%	100.0%
		Others					100.0%	100.0%

TABLE A.5.1A. MOST FREQUENTLY USED SOURCE OF WATER FOR DRINKING AND COOKING

	Dry season		Wet season	
Water source	**Frequency**	**Valid Percent**	**Frequency**	**Valid Percent**
Protected well/spring	7	.7	7	.7
Open well/spring	18	1.9	17	1.8
Water kiosks	17	1.8	17	1.8
Private outside connection	94	10.1	93	10.0
Private inside tape	2	.2	2	.2
Water vendor	27	2.9	27	2.9
Borehole	764	81.8	762	81.6
Neighboring household	3	.3	4	.4
River/lake/pond	2	.2	2	.2
Rain harvesting	0	0	3	.3
Total	934	100.0	934	100.0

TABLE A.5.1B. MOST FREQUENTLY USED SOURCE OF WATER FOR BATHING, LAUNDRY DURING

	Dry season		*Wet season*	
Water source	*Frequency*	*Valid Percent*	*Frequency*	*Valid Percent*
Protected well/Spring	9	1.0	7	.8
Open well/Spring	23	2.5	24	2.6
Water kiosk	21	2.3	21	2.3
Private outside connection	18	2.0	16	1.8
Private inside tap	3	.3	3	.3
Water vendor	28	3.1	28	3.1
Borehole	781	85.5	780	85.5
Neighboring household	3	.3	3	.3
River/lake/pond	23	2.5	22	2.4
Rain harvesting	4	.4	8	.9
Total	913	100.0	912	100.0

TABLE A.5.2. REASON FOR PREFERENCES FOR WATER SOURCES FOR DRINKING AND COOKING (DRY SEASON)

	Dry season		**Wet season**	
Reason	**Frequency**	**Valid Percent**	**Frequency**	**Valid Percent**
Distance	333	35.8	270	29.0
Convenience	379	40.8	387	41.6
Quality water	110	11.8	144	15.5
Price	64	6.9	83	8.9
Others	44	4.7	46	4.9
Total	930	100.0	930	100.0

TABLE A.5.3. DISTANCE TO THE MOST FREQUENTLY USED WATER SOURCES FOR DRINKING AND COOKING

	Dry season		**Wet season**	
Distance to water	**Frequency**	**Valid Percent**	**Frequency**	**Valid Percent**
Less than 250km	395	42.4	414	44.7
250-500 meters	344	36.9	326	35.2
501-1000 meters	115	12.4	90	9.7
1-3 km	52	5.6	72	7.8
3.1-5 km	25	2.7	24	2.6
Total	931	100.0	926	100.0

TABLE A.5.4A. MOST FREQUENTLY USED SOURCE OF WATER FOR DRINKING AND COOKING DURING DRY SEASON * DISTANCE TO THE MOST FREQUENTLY USED SOURCE OF WATER FOR DRINKING AND COOKING (DRY SEASON) * PARISH CROSS TABULATION

Parish				Distance to the most frequently used source of water for drinking and cooking (dry season)					Total
				Less than 250km	250-500 meters	501-1000 meters	1-3 km	3.1 - 5 km	
Pondwongo	Most frequently used source of water for drinking and cooking during dry season	Open well/Spring	Count	0	1	0	0	0	1
			% within most frequently used source of water for drinking and cooking during dry season	**.0%**	**100.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Private outside connection	Count	1	2	3	2	0	8
			% within most frequently used source of water for drinking and cooking during dry season	**12.5%**	**25.0%**	**37.5%**	**25.0%**	**.0%**	**100.0%**
		Water vendor	Count	1	1	0	0	0	2
			% within most frequently used source of water for drinking and cooking during dry season	**50.0%**	**50.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Borehole	Count	66	57	30	10	7	170
			% within most frequently used source of water for drinking and cooking during dry season	**38.8%**	**33.5%**	**17.6%**	**5.9%**	**4.1%**	**100.0%**
	Total		Count	68	61	33	12	7	181
			% within most frequently used source of water for drinking and cooking during dry season	**37.6%**	**33.7%**	**18.2%**	**6.6%**	**3.9%**	**100.0%**
Pager	Most frequently used source of water for drinking and cooking during dry season	Water kiosks	Count	6	0	0	0	0	6
			% within most frequently used source of water for drinking and cooking during dry season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Private outside connection	Count	1	0	0	0	0	1
			% within most frequently used source of water for drinking and cooking during dry season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**

		Water vendor	Count	2	0	0	0	0	2
			% within most frequently used source of water for drinking and cooking during dry season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Borehole	Count	38	33	6	5	1	83
			% within most frequently used source of water for drinking and cooking during dry season	**45.8%**	**39.8%**	**7.2%**	**6.0%**	**1.2%**	**100.0%**
	Total		Count	47	33	6	5	1	92
			% within most frequently used source of water for drinking and cooking during dry season	**51.1%**	**35.9%**	**6.5%**	**5.4%**	**1.1%**	**100.0%**
Guu	Most frequently used source of water for drinking and cooking during dry season	Protected well/Spring	Count	4	3	0	0	0	7
			% within most frequently used source of water for drinking and cooking during dry season	**57.1%**	**42.9%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Open well/ Spring	Count	7	5	2	1	0	15
			% within most frequently used source of water for drinking and cooking during dry season	**46.7%**	**33.3%**	**13.3%**	**6.7%**	**.0%**	**100.0%**
		Water kiosks	Count	2	0	0	0	0	2
			% within most frequently used source of water for drinking and cooking during dry season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Private outside connection	Count	15	10	7	3	0	35
			% within most frequently used source of water for drinking and cooking during dry season	**42.9%**	**28.6%**	**20.0%**	**8.6%**	**.0%**	**100.0%**
		Water vendor	Count	1	12	0	0	0	13
			% within most frequently used source of water for drinking and cooking during dry season	**7.7%**	**92.3%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Borehole	Count	50	47	14	2	1	114
			% within most frequently used source of water for drinking and cooking during dry season	**43.9%**	**41.2%**	**12.3%**	**1.8%**	**.9%**	**100.0%**

		River/Lake/Pond	Count	0	1	0	0	0	1
			% within most frequently used source of water for drinking and cooking during dry season	**.0%**	**100.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
	Total		Count	79	78	23	6	1	187
			% within most frequently used source of water for drinking and cooking during dry season	**42.2%**	**41.7%**	**12.3%**	**3.2%**	**.5%**	**100.0%**
Town Parish	Most frequently used source of water for drinking and cooking during dry season	Open well/ Spring	Count	0	1	0	0	0	1
			% within most frequently used source of water for drinking and cooking during dry season	**.0%**	**100.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Private outside connection	Count	8	7	4	2	0	21
			% within most frequently used source of water for drinking and cooking during dry season	**38.1%**	**33.3%**	**19.0%**	**9.5%**	**.0%**	**100.0%**
		Water vendor	Count	2	3	0	2	0	7
			% within most frequently used source of water for drinking and cooking during dry season	**28.6%**	**42.9%**	**.0%**	**28.6%**	**.0%**	**100.0%**
		Borehole	Count	26	22	7	4	2	61
			% within most frequently used source of water for drinking and cooking during dry season	**42.6%**	**36.1%**	**11.5%**	**6.6%**	**3.3%**	**100.0%**
		Neighboring household	Count	1	0	0	0	0	1
			% within most frequently used source of water for drinking and cooking during dry season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
	Total		Count	37	33	11	8	2	91
			% within most frequently used source of water for drinking and cooking during dry season	**40.7%**	**36.3%**	**12.1%**	**8.8%**	**2.2%**	**100.0%**
Alango	Most freq. source water for drinking & cooking during dry season	Open well/Spring	Count	0	1	0	0	0	1
			% within most frequently used source of water for drinking and cooking during dry season	**.0%**	**100.0%**	**.0%**	**.0%**	**.0%**	**100.0%**

		Water kiosks	Count	0	1	0	0	1	2
			% within most frequently used source of water for drinking and cooking during dry season	**.0%**	**50.0%**	**.0%**	**.0%**	**50.0%**	**100.0%**
		Private outside connection	Count	9	2	1	0	0	12
			% within most frequently used source of water for drinking and cooking during dry season	**75.0%**	**16.7%**	**8.3%**	**.0%**	**.0%**	**100.0%**
		Borehole	Count	25	38	11	3	1	78
			% within most frequently used source of water for drinking and cooking during dry season	**32.1%**	**48.7%**	**14.1%**	**3.8%**	**1.3%**	**100.0%**
	Total		Count	34	42	12	3	2	93
			% within most frequently used source of water for drinking and cooking during dry season	**36.6%**	**45.2%**	**12.9%**	**3.2%**	**2.2%**	**100.0%**
Westland	Most frequently used source of water for drinking and cooking during dry season	Water kiosks	Count	4	2	0	0	1	7
			% within most frequently used source of water for drinking and cooking during dry season	**57.1%**	**28.6%**	**.0%**	**.0%**	**14.3%**	**100.0%**
		Private outside connection	Count	7	1	1	0	0	9
			% within most frequently used source of water for drinking and cooking during dry season	**77.8%**	**11.1%**	**11.1%**	**.0%**	**.0%**	**100.0%**
		Private inside tape	Count	1	1	0	0	0	2
			% within most frequently used source of water for drinking and cooking during dry season	**50.0%**	**50.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Water vendor	Count	1	2	0	0	0	3
			% within most frequently used source of water for drinking and cooking during dry season	**33.3%**	**66.7%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Borehole	Count	63	61	19	10	10	163
			% within most frequently used source of water for drinking and cooking during dry season	**38.7%**	**37.4%**	**11.7%**	**6.1%**	**6.1%**	**100.0%**

		Neighboring household	Count	2	0	0	0	0	2
			% within most frequently used source of water for drinking and cooking during dry season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
	Total		Count	78	67	20	10	11	186
			% within most frequently used source of water for drinking and cooking during dry season	**41.9%**	**36.0%**	**10.8%**	**5.4%**	**5.9%**	**100.0%**
Pandwong	Most frequently used source of water for drinking and cooking during dry season	Private outside connection	Count	1	1	1	4	0	7
			% within most frequently used source of water for drinking and cooking during dry season	**14.3%**	**14.3%**	**14.3%**	**57.1%**	**.0%**	**100.0%**
		Borehole	Count	47	24	8	4	1	84
			% within most frequently used source of water for drinking and cooking during dry season	**56.0%**	**28.6%**	**9.5%**	**4.8%**	**1.2%**	**100.0%**
		River/lake/ Pond	Count	0	1	0	0	0	1
			% within most frequently used source of water for drinking and cooking during dry season	**.0%**	**100.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
	Total		Count	48	26	9	8	1	92
			% within most frequently used source of water for drinking and cooking during dry season	**52.2%**	**28.3%**	**9.8%**	**8.7%**	**1.1%**	**100.0%**

TABLE A.5.4B. MOST FREQUENTLY USED SOURCE OF WATER FOR DRINKING AND COOKING DURING WET SEASON * DISTANCE TO THE MOST FREQUENTLY USED SOURCE OF WATER FOR DRINKING AND COOKING (WET SEASON) * PARISH CROSS TABULATION

Parish				Distance to the most frequently used source of water for drinking and cooking (Wet season)					Total
				less than 250 meters	250-500 meters	501-1000 meters	1-3 Km	3.1-5 Km	
Pondwongo	Most frequently used source of water for drinking and cooking during wet season	Open well/ Spring	Count	0	1	0	0	0	1
			% within most frequently used source of water for drinking and cooking during wet season	**.0%**	**100.0%**	**.0%**	**.0%**	**.0%**	**100.0%**

		Private Outside connection	Count	1	2	3	2	0	8
			% within most frequently used source of water for drinking and cooking during wet season	**12.5%**	**25.0%**	**37.5%**	**25.0%**	**.0%**	**100.0%**
		Water vendor	Count	1	1	0	0	0	2
			% within most frequently used source of water for drinking and cooking during wet season	**50.0%**	**50.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Borehole	Count	68	63	16	13	7	167
			% within most frequently used source of water for drinking and cooking during wet season	**40.7%**	**37.7%**	**9.6%**	**7.8%**	**4.2%**	**100.0%**
		Neighboring household	Count	1	0	0	0	0	1
			% within most frequently used source of water for drinking and cooking during wet season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Rain harvesting	Count	1	0	0	0	0	1
			% within most frequently used source of water for drinking and cooking during wet season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
	Total		Count	72	67	19	15	7	180
			% within most frequently used source of water for drinking and cooking during wet season	**40.0%**	**37.2%**	**10.6%**	**8.3%**	**3.9%**	**100.0%**
Pager	Most frequently used source of water for drinking and cooking during wet season	Water kiosk	Count	6	0	0	0	0	6
			% within most frequently used source of water for drinking and cooking during wet season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Private Outside connection	Count	1	0	0	0	0	1
			% within most frequently used source of water for drinking and cooking during wet season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Water vendor	Count	2	0	0	0	0	2
			% within most frequently used source of water for drinking and cooking during wet season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Borehole	Count	48	20	4	9	2	83

			% within most frequently used source of water for drinking and cooking during wet season	**57.8%**	**24.1%**	**4.8%**	**10.8%**	**2.4%**	**100.0%**
	Total		Count	57	20	4	9	2	92
			% within most frequently used source of water for drinking and cooking during wet season	**62.0%**	**21.7%**	**4.3%**	**9.8%**	**2.2%**	**100.0%**
Guu	Most frequently used source of water for drinking and cooking during wet season	Protected well/Spring	Count	4	3	0	0	0	7
			% within most frequently used source of water for drinking and cooking during wet season	**57.1%**	**42.9%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Open well/Spring	Count	7	5	2	1		15
			% within most frequently used source of water for drinking and cooking during wet season	**46.7%**	**33.3%**	**13.3%**	**6.7%**		**100.0%**
		Water kiosk	Count	2	0	0	0		2
			% within most frequently used source of water for drinking and cooking during wet season	**100.0%**	**.0%**	**.0%**	**.0%**		**100.0%**
		Private Outside connection	Count	15	10	7	2		34
			% within most frequently used source of water for drinking and cooking during wet season	**44.1%**	**29.4%**	**20.6%**	**5.9%**		**100.0%**
		Water vendor	Count	1	6	0	0		7
			% within most frequently used source of water for drinking and cooking during wet season	**14.3%**	**85.7%**	**.0%**	**.0%**		**100.0%**
		Borehole	Count	47	47	14	5		113
			% within most frequently used source of water for drinking and cooking during wet season	**41.6%**	**41.6%**	**12.4%**	**4.4%**		**100.0%**
		River/Pond/lake	Count	0	1	0	0		1
			% within most frequently used source of water for drinking and cooking during wet season	**.0%**	**100.0%**	**.0%**	**.0%**		**100.0%**

		Rain harvesting	Count	2	0	0	0		2
			% within most frequently used source of water for drinking and cooking during wet season	**100.0%**	**.0%**	**.0%**	**.0%**		**100.0%**
	Total		Count	78	72	23	8		181
			% within Most frequently used source of water for drinking and cooking during wet season	**43.1%**	**39.8%**	**12.7%**	**4.4%**		**100.0%**
Town Parish	Most frequently used source of water for drinking and cooking during wet season	Private Outside connection	Count	8	7	4	2	0	21
			% within most frequently used source of water for drinking and cooking during wet season	**38.1%**	**33.3%**	**19.0%**	**9.5%**	**.0%**	**100.0%**
		Water vendor	Count	2	3	0	2	0	7
			% within most frequently used source of water for drinking and cooking during wet season	**28.6%**	**42.9%**	**.0%**	**28.6%**	**.0%**	**100.0%**
		Borehole	Count	27	21	6	5	2	61
			% within most frequently used source of water for drinking and cooking during wet season	**44.3%**	**34.4%**	**9.8%**	**8.2%**	**3.3%**	**100.0%**
		Neighboring household	Count	1	0	0	0	0	1
			% within most frequently used source of water for drinking and cooking during wet season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
	Total		Count	38	31	10	9	2	90
			% within most frequently used source of water for drinking and cooking during wet season	**42.2%**	**34.4%**	**11.1%**	**10.0%**	**2.2%**	**100.0%**
Alango	Most frequently used source of water for drinking and cooking during wet season	Open well/Spring	Count	0	1	0	0	0	1
			% within most frequently used source of water for drinking and cooking during wet season	**.0%**	**100.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Water kiosk	Count	0	1	0	0	1	2
			% within most frequently used source of water for drinking and cooking during wet season	**.0%**	**50.0%**	**.0%**	**.0%**	**50.0%**	**100.0%**

		Private Outside connection	Count	9	2	1	0	0	12
			% within most frequently used source of water for drinking and cooking during wet season	**75.0%**	**16.7%**	**8.3%**	**.0%**	**.0%**	**100.0%**
		Borehole	Count	21	43	10	4	1	79
			% within most frequently used source of water for drinking and cooking during wet season	**26.6%**	**54.4%**	**12.7%**	**5.1%**	**1.3%**	**100.0%**
	Total		Count	30	47	11	4	2	94
			% within most frequently used source of water for drinking and cooking during wet season	**31.9%**	**50.0%**	**11.7%**	**4.3%**	**2.1%**	**100.0%**
Westland	Most frequently used source of water for drinking and cooking during wet season	Water kiosk	Count	5	1	0	0	1	7
			% within most frequently used source of water for drinking and cooking during wet season	**71.4%**	**14.3%**	**.0%**	**.0%**	**14.3%**	**100.0%**
		Private outside connection	Count	6	2	0	1	0	9
			% within most frequently used source of water for drinking and cooking during wet season	**66.7%**	**22.2%**	**.0%**	**11.1%**	**.0%**	**100.0%**
		Private inside tape	Count	2	0	0	0	0	2
			% within most frequently used source of water for drinking and cooking during wet season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Water vendor	Count	1	2	0	0	0	3
			% within most frequently used source of water for drinking and cooking during wet season	**33.3%**	**66.7%**	**.0%**	**.0%**	**.0%**	**100.0%**
		Borehole	Count	71	58	13	15	8	165
			% within most frequently used source of water for drinking and cooking during wet season	**43.0%**	**35.2%**	**7.9%**	**9.1%**	**4.8%**	**100.0%**
		Neighboring household	Count	2	0	0	0	0	2
			% within most frequently used source of water for drinking and cooking during wet season	**100.0%**	**.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
	Total		Count	87	63	13	16	9	188

			% within most frequently used source of water for drinking and cooking during wet season	46.3%	33.5%	6.9%	8.5%	4.8%	100.0%
Pandwong	Most frequently used source of water for drinking and cooking during wet season	Private Outside connection	Count	1	1	1	4	0	7
			% within most frequently used source of water for drinking and cooking during wet season	**14.3%**	**14.3%**	**14.3%**	**57.1%**	**.0%**	**100.0%**
		Borehole	Count	45	22	8	7	2	84
			% within most frequently used source of water for drinking and cooking during wet season	**53.6%**	**26.2%**	**9.5%**	**8.3%**	**2.4%**	**100.0%**
		River/Pond/lake	Count	0	1	0	0	0	1
			% within most frequently used source of water for drinking and cooking during wet season	**.0%**	**100.0%**	**.0%**	**.0%**	**.0%**	**100.0%**
	Total		Count	46	24	9	11	2	92
			% within most frequently used source of water for drinking and cooking during wet season	**50.0%**	**26.1%**	**9.8%**	**12.0%**	**2.2%**	**100.0%**

TABLE A.5.5. PERSON WHO FETCHES WATER MOST IN THE HOUSEHOLD

Category	Frequency	Valid Percent
Adult women	553	62.1
Adult man	43	4.8
Boys	39	4.4
Girls	256	28.7
Total	891	100.0

TABLE A.5.6. TIME SPENT PER TRIP OF FETCHING WATER

Duration	Frequency	Valid Percent
less than 30 minutes	262	30.1
30 minutes	207	23.8
30-60 minutes	280	32.2
60+ minutes	120	13.8
Total	869	100.0

TABLE A.5.7. NUMBER OF PEOPLE WHO GO TOGETHER TO FETCH WATER

Number of parsons	Frequency	Valid Percent
1	415	47.5
2	353	40.4
3 or more	105	12.0
Total	873	100.0

TABLE A.5.8. HOW OFTEN A HOUSEHOLD COLLECTS WATER FROM THEIR MAIN WATER SOURCE

Regularity of water collection	Frequency	Valid Percent
daily	747	86.4
On alternative days	100	11.6
once in three days	8	.9
others	10	1.2
Total	865	100.0

TABLE A.5.9. TIME OF THE DAY WHICH THE HOUSEHOLD COLLECTS WATER

Time of the day	Frequency	Valid Percent
before sunrise	149	16.2
morning	593	64.5
afternoon	126	13.7
after sunset	51	5.5
Total	919	100.0

TABLE A.5.10A. WATER COLLECTION TRIPS PER DAY (DRY SEASON)

Trips	Frequency	Valid Percent
less than 2	135	15.4
2 trips	268	30.5
3 trips	247	28.1
more than 3	228	26.0
Total	878	100.0

TABLE A.5.10B. WATER COLLECTION TRIPS PER DAY (WET SEASON)

Trips	Frequency	Valid Percent
1 trip	238	28.3
2 trips	251	29.8
3 trips	177	21.0
4 or more trips	175	20.8
Total	841	100.0

TABLE A.5.11A. SMALL SCALE IRRIGATION AND LIVESTOCK FEEDING USAGE STATUS (DRY SEASON)

Usage	Frequency	Percent
Small-scale irrigation	6	.5
Livestock feeding	54	4.6

TABLE A.5.11B. SMALL SCALE IRRIGATION AND LIVESTOCK FEEDING USAGE STATUS (WET SEASON)

Usage	Frequency	Valid Percent
	Frequency	Percent
small scale irrigation	3	.3
livestock investment	51	4.3

TABLE A.5.12A. NUMBER OF JERRYCANS USED IN HOUSEHOLD PER DAY DURING DRY SEASON

Number of jerrycans	Frequency	Valid Percent
less than 3 jerrycans	100	11.6
3 jerrycans	203	23.5
more than three jerrycans	560	64.9
Total	863	100.0

TABLE A.5.12B. NUMBER OF JERRYCANS USED IN HOUSEHOLD PER DAY DURING WET SEASON

Number of jerrycans	Frequency	Valid Percent
less than 3 jerrycans	173	20.4
3 jerrycans	247	29.1
more than 3 jerrycans	429	50.5
Total	849	100.0

ASSESSMENT OF QUALITY OF WATER USED FOR DRINKING AND COOKING

TABLE A.5.13A. SMELL/ODOR

Assessment of smell	Frequency	Valid Percent
smelly	12	1.3
very smelly	19	2.1
little smelly	147	16.3
not smelly	724	80.3
Total	902	100.0

TABLE A.5.13B. PURITY

Purity of water	Frequency	Valid Percent
very good	50	5.4
good	602	65.2
average	215	23.3
poor	56	6.1
very poor	1	.1
Total	924	100.0

TABLE A.5.13C. TASTE

Water Taste	Frequency	Valid Percent
very good	45	4.9
good	615	67.3
average	203	22.2
poor	49	5.4
very poor	2	.2
Total	914	100.0

TABLE A.5.13D. OVERALL ASSESSMENT

Assessment	Frequency	Valid Percent
very good	32	3.5
good	633	69.2
average	203	22.2
poor	44	4.8
very poor	3	.3
Total	915	100.0

ASSESSMENT OF QUALITY OF PIPED WATER SUPPLIED

TABLE A.5.14A. SMELL/ODOR

Smell of Water	Frequency	Valid Percent
smelly	9	1.2
very smelly	11	1.4
a little smelly	227	29.7
not smelly	518	67.7
Total	765	100.0

TABLE A.5.14B. PURITY

Water Purity	Frequency	Valid Percent
very good	46	5.7
good	402	49.6
average	264	32.6
poor	96	11.9
very poor	2	.2
Total	810	100.0

TABLE A.5.14C. TASTE

Water Taste	Frequency	Valid Percent
very good	41	5.1
good	401	49.8
average	271	33.7
poor	91	11.3
very poor	1	.1
Total	805	100.0

TABLE A.5.14D. OVERALL ASSESSMENTS

Assessment	Frequency	Valid Percent
very good	28	3.5
good	432	53.6
average	266	33.0
poor	76	9.4
very poor	4	.5
Total	806	100.0

TABLE A.5.15A. TREAT WATER BEFORE DRINKING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	671	57.2	73.3	73.3
	no	100	8.5	10.9	84.3
	sometimes	144	12.3	15.7	100.0
	Total	915	77.9	100.0	
Missing	non response	35	3.0		
	System	224	19.1		
	Total	259	22.1		
Total		1174	100.0		

TABLE A.5.15B. METHODS OF TREATING WATER BEFORE DRINKING

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	boiling	76	6.5	9.1	9.1
	add chemicals such as water guard	651	55.5	77.7	86.8
	filtration with cloth	6	.5	.7	87.5
	others	105	8.9	12.5	100.0
	Total	838	71.4	100.0	
Missing	Not Applicable	102	8.7		
	non response	10	.9		
	System	224	19.1		
	Total	336	28.6		
Total		1174	100.0		

TABLE A.5.16. PAYMENT OF WATER FROM THE MAIN SOURCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	648	55.2	71.1	71.1
	NO	264	22.5	28.9	100.0
	Total	912	77.7	100.0	
Missing	Non response	38	3.2		
	System	224	19.1		
	Total	262	22.3		
Total		1174	100.0		

TABLE A.5.17. AVAILABILITY OF WATER SINCE THE BEGINNING OF 2009

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes all the time	111	9.5	11.9	11.9
	yes most of the time	595	50.7	64.0	76.0
	unavailable occasionally	186	15.8	20.0	96.0
	4	37	3.2	4.0	100.0
	Total	929	79.1	100.0	
Missing	non response	21	1.8		
	System	224	19.1		
	Total	245	20.9		
Total		1174	100.0		

TABLE A.5.18. AVAILABILITY OF WATER IN A WEEK PRIOR THE SURVEY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	780	66.4	84.9	84.9
	no	139	11.8	15.1	100.0
	Total	919	78.3	100.0	
Missing	non response	31	2.6		
	System	224	19.1		
	Total	255	21.7		
Total		1174	100.0		

TABLE A.5.19. ASSESSMENT OF CURRENT RELIABILITY OF PIPED WATER SERVICES IN KITGUM TOWN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	reliable	105	8.9	12.4	12.4
	moderately reliable	321	27.3	38.0	50.4
	not reliable	419	35.7	49.6	100.0
	Total	845	72.0	100.0	
Missing	non response	105	8.9		
	System	224	19.1		
	Total	329	28.0		
Total		1174	100.0		

TABLE A.5.20. WATER PREFERENCES BY SOURCE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Borehole	828	70.5	88.7	88.7
	Protected spring	28	2.4	3.0	91.6
	River/lake/pond	7	.6	.7	92.4
	Rain water	11	.9	1.2	93.6
	Water kiosk	17	1.4	1.8	95.4
	Water vendor	25	2.1	2.7	98.1
	Neighbor's tap	2	.2	.2	98.3
	Others	16	1.4	1.7	100.0
	Total	934	79.6	100.0	
Missing	Non response	16	1.4		
	System	224	19.1		
	Total	240	20.4		
Total		1174	100.0		

TABLE A.5.21. REASON FOR THE PREFERENCES ABOVE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Good taste	257	21.9	27.6	27.6
	Price	115	9.8	12.4	40.0
	Perceived quality	184	15.7	19.8	59.8
	Distance or convenience	339	28.9	36.5	96.2
	Others	35	3.0	3.8	100.0
	Total	930	79.2	100.0	
Missing	Non response	20	1.7		
	System	224	19.1		
	Total	244	20.8		
Total		1174	100.0		

TABLE A.5.22. PERSONS RESPONSIBLE FOR TAKING DECISIONS REGARDING WATER ACQUISITION AND UTILIZATION IN THE HOUSEHOLD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Husband	45	3.8	4.8	4.8
	Wife	612	52.1	65.9	70.8
	Any member of the household	271	23.1	29.2	100.0
	Total	928	79.0	100.0	
Missing	Non response	22	1.9		
	System	224	19.1		
	Total	246	21.0		
Total	1174	100.0			

TABLE A.5.23. TOTAL NUMBER OF JERRYCANS BOUGHT FROM PRIVATE VENDORS DURING DRY SEASON

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 3 jerrycans	23	2.0	26.7	26.7
	3 jerrycans	17	1.4	19.8	46.5
	More than 3 jerrycans	46	3.9	53.5	100.0
	Total	86	7.3	100.0	
Missing	Not applicable	802	68.3		
	Non response	62	5.3		
	System	224	19.1		
	Total	1088	92.7		
Total		1174	100.0		

TABLE A.5.24. PRICE PER JERRYCAN CHARGED BY PRIVATE VENDORS DURING DRY SEASON

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than ugshs100	8	.7	9.5	9.5
	Ugshs100	22	1.9	26.2	35.7
	More than ugshs100	54	4.6	64.3	100.0
	Total	84	7.2	100.0	
Missing	Not applicable	802	68.3		
	Non response	64	5.5		
	System	224	19.1		
	Total	1090	92.8		
Total		1174	100.0		

TABLE A.5.25. TOTAL NUMBER OF JERRYCANS BOUGHT FROM PRIVATE VENDORS DURING WET SEASON

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less 3 jerrycans	14	1.2	26.9	26.9
	3 jerrycans	14	1.2	26.9	53.8
	More than 3 jerrycans	24	2.0	46.2	100.0
	Total	52	4.4	100.0	
Missing	Not applicable	802	68.3		
	Non response	96	8.2		
	System	224	19.1		
	Total	1122	95.6		
Total		1174	100.0		

TABLE A.5.26. PRICE PER JERRYCAN CHARGED BY PRIVATE VENDORS DURING WET SEASON

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than ugshs 100	4	.3	8.9	8.9
	Ugshs 100	18	1.5	40.0	48.9
	More than ugshs 100	23	2.0	51.1	100.0
	Total	45	3.8	100.0	
Missing	Not applicable	802	68.3		
	Non response	103	8.8		
	System	224	19.1		
	Total	1129	96.2		
Total		1174	100.0		

TABLE A.5.27. TOTAL NUMBER OF JERRYCANS BOUGHT FROM WATER KIOSK DURING DRY SEASON

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 3 jerrycans	14	1.2	35.9	35.9
	3 jerrycans	8	.7	20.5	56.4
	More than 3 jerrycans	17	1.4	43.6	100.0
	Total	39	3.3	100.0	
Missing	Not applicable	802	68.3		
	Non response	109	9.3		
	System	224	19.1		
	Total	1135	96.7		
Total		1174	100.0		

TABLE A.5.28. PRICE PER JERRYCAN CHARGED BY WATER KIOSK DURING DRY SEASON

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than ugshs 25	3	.3	8.1	8.1
	Ugshs25	14	1.2	37.8	45.9
	More than ugshs 25	20	1.7	54.1	100.0
	Total	37	3.2	100.0	
Missing	Not applicable	802	68.3		
	Non response	111	9.5		
	System	224	19.1		
	Total	1137	96.8		
Total		1174	100.0		

TABLE A.5.29. TOTAL NUMBER OF JERRYCANS BOUGHT FROM WATER KIOSK DURING WET SEASON

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 3 jerrycans	13	1.1	41.9	41.9
	3 jerrycans	9	.8	29.0	71.0
	More than three jerrycans	9	.8	29.0	100.0
	Total	31	2.6	100.0	
Missing	Not applicable	802	68.3		
	Non response	117	10.0		
	System	224	19.1		
	Total	1143	97.4		
Total		1174	100.0		

TABLE A.5.30. PRICE PER JERRYCAN CHARGED BY WATER KIOSK DURING WET SEASON

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than ugshs 25	4	.3	14.3	14.3
	Ugshs 25	14	1.2	50.0	64.3
	More than Ugshs 25	10	.9	35.7	100.0
	Total	28	2.4	100.0	
Missing	Not applicable	802	68.3		
	Non response	120	10.2		
	System	224	19.1		
	Total	1146	97.6		
Total		1174	100.0		

TABLE A.5.31. PRICE PER JERRYCAN CHARGED BY WATER VENDORS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than Ugshs100	8	.7	9.5	9.5
	Ugshs100	22	1.9	26.2	35.7
	More than Ugshs100	54	4.6	64.3	100.0
	Total	25	3.8	100.0	
Missing	Not applicable	924	28.9		
	Non response	1	5.5		
	System	224	19.1		
	Total	1090	92.8		
Total		1174	100.0		

TABLE A.5.32. PRICE PER JERRYCAN CHARGED AT YARD TAPS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ugshs 20	8	.7	9.5	9.5
	Ugshs 25	22	1.9	26.2	35.7
	Ugshs 33.33	54	4.6	64.3	100.0
	Total	84	7.2	100.0	
Missing	Not applicable	802	68.3		
	Non response	64	5.5		
	System	224	19.1		
	Total	1090	92.8		
Total		1174	100.0		

TABLE A.5.33. PRICE PER JERRYCAN CHARGED BY WATER KIOSK DURING DRY SEASON

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ugshs 20	20	1.7	54.1	54.1
	Ugshs 25	14	1.2	37.8	91.9
	More than Ugshs 25	3	.3	8.1	100.0
	Total	10	1.6	100.0	
Missing	Not applicable	802	68.3		
	Non response	3	9.5		
	System	224	19.1		
	Total	1137	96.8		
Total		1174	100.0		

SECTION SIX: DESIRE FOR CHANGE

HOUSE CONNECTION

TABLE A.6.1. UTMOST AMOUNT THAT THE HOUSEHOLD IS WILLING TO PAY PER JERRYCAN FOR A HOUSE CONNECTION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 20/=	293	25.0	44.9	44.9
	20/=	221	18.8	33.9	78.8
	30/=	99	8.4	15.2	94.0
	40/=	39	3.3	6.0	100.0
	Total	652	55.5	100.0	
Missing	Not applicable	179	15.2		
	Non response	119	10.1		
	System	224	19.1		
	Total	522	44.5		
Total		1174	100.0		

TABLE A.6.2. DESIRE TO CONNECT PIPED WATER GIVEN THE PRICE CHARGED IS 40/=

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	179	15.2	22.9	22.9
	No	601	51.2	77.1	100.0
	Total	780	66.4	100.0	
Missing	Not applicable	107	9.1		
	Non response	63	5.4		
	System	224	19.1		
	Total	394	33.6		
Total		1174	100.0		

TABLE A.6.3. DESIRE TO CONNECT PIPED WATER GIVEN THE PRICE CHARGED IS 30/=

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	285	24.3	36.5	36.5
	No	495	42.2	63.5	100.0
	Total	780	66.4	100.0	
Missing	Not Applicable	107	9.1		
	Non Response	63	5.4		
	System	224	19.1		
	Total	394	33.6		
Total		1174	100.0		

TABLE A.6.4. DESIRE TO CONNECT PIPED WATER GIVEN THE PRICE CHARGED IS 20/=

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	602	51.3	77.3	77.3
	No	177	15.1	22.7	100.0
	Total	779	66.4	100.0	
Missing	Not Applicable	108	9.2		
	Non Response	63	5.4		
	System	224	19.1		
	Total	395	33.6		
Total		1174	100.0		

TABLE A.6.5. THE MOST AMOUNT PEOPLE ARE WILLING TO PAY FOR THE INSTALLATION OF PIPED WATER CONNECTION IN THEIR HOUSEHOLD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 10,000/=	309	26.3	42.3	42.3
	10,000/= - 30,000/=	175	14.9	23.9	66.2
	30,000/= -50,000/=	142	12.1	19.4	85.6
	Greater 50,000/=	105	8.9	14.4	100.0
	Total	731	62.3	100.0	
Missing	Not Applicable	135	11.5		
	Non Response	84	7.2		
	System	224	19.1		
	Total	443	37.7		

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 10,000/=	309	26.3	42.3	42.3
	10,000/= - 30,000/=	175	14.9	23.9	66.2
	30,000/= -50,000/=	142	12.1	19.4	85.6
	Greater 50,000/=	105	8.9	14.4	100.0
	Total	731	62.3	100.0	
Missing	Not Applicable	135	11.5		
	Non Response	84	7.2		
	System	224	19.1		
	Total	443	37.7		
Total		1174	100.0		

TABLE A.6.6. DESIRE TO CONNECT PIPED WATER GIVEN THE INSTALLATION FEE IS UGX 125,000

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	50	4.3	6.4	6.4
	No	729	62.1	93.6	100.0
	Total	779	66.4	100.0	
Missing	Not Applicable	106	9.0		
	Non Response	65	5.5		
	System	224	19.1		
	Total	395	33.6		
Total		1174	100.0		

TABLE A.6.7. DESIRE TO CONNECT PIPED WATER GIVEN THE INSTALLATION FEE IS UGX 50,000

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	426	36.3	54.5	54.5
	No	355	30.2	45.5	100.0
	Total	781	66.5	100.0	
Missing	Not Applicable	105	8.9		
	Non Response	64	5.5		
	System	224	19.1		
	Total	393	33.5		
Total		1174	100.0		

PUBLIC STANDPOST

TABLE A.6.8. THE MOST AMOUNT A HOUSEHOLD IS WILLING TO PAY PER JERRYCAN AT A PUBLIC STAND POST

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 25/=	377	32.1	53.1	53.1
	25/=	239	20.4	33.7	86.8
	More than 25/=	94	8.0	13.2	100.0
	Total	710	60.5	100.0	
Missing	Not Applicable	141	12.0		
	non response	99	8.4		
	System	224	19.1		
	Total	464	39.5		
Total		1174	100.0		

TABLE A.6.9. PREFERENCE FOR PUBLIC STAND POST GIVEN A PRICE OF 100/= PER JERRYCAN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	133	11.3	16.2	16.2
	No	686	58.4	83.8	100.0
	Total	819	69.8	100.0	
Missing	Not Applicable	81	6.9		
	Non Response	50	4.3		
	System	224	19.1		
	Total	355	30.2		
Total		1174	100.0		

TABLE A.6.10. PREFERENCE FOR PUBLIC STAND POST GIVEN A PRICE OF 50/= PER JERRYCAN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	428	36.5	52.3	52.3
	No	391	33.3	47.7	100.0
	Total	819	69.8	100.0	
Missing	Not Applicable	79	6.7		
	Non Response	52	4.4		
	System	224	19.1		
	Total	355	30.2		
Total		1174	100.0		

YARD CONNECTION

TABLE A.6.11. THE MOST A HOUSEHOLD IS WILLING TO PAY PER JERRYCAN FOR A CONNECTION WITHIN ITS YARD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 20/=	305	26.0	44.9	44.9
	20/=	252	21.5	37.1	82.0
	More than 20/=	122	10.4	18.0	100.0
	Total	679	57.8	100.0	
Missing	Not Applicable	159	13.5		
	Non Response	112	9.5		
	System	224	19.1		
	Total	495	42.2		
Total		1174	100.0		

TABLE A.6.12. DESIRE TO CONNECT PIPED WATER SYSTEM WITHIN THE YARD GIVEN PRICE CHARGED IS 40/= PER JERRYCAN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	169	14.4	20.9	20.9
	No	640	54.5	79.1	100.0
	Total	809	68.9	100.0	
Missing	Not Applicable	90	7.7		
	Non Response	51	4.3		
	System	224	19.1		
	Total	365	31.1		
Total		1174	100.0		

TABLE A.6.13. DESIRE TO CONNECT PIPED WATER SYSTEM WITHIN THE YARD GIVEN PRICE CHARGED IS 30/= PER JERRYCAN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	287	24.4	35.6	35.6
	No	519	44.2	64.4	100.0
	Total	806	68.7	100.0	
Missing	Not Applicable	91	7.8		
	Non Response	53	4.5		
	System	224	19.1		
	Total	368	31.3		
Total		1174	100.0		

TABLE A.6.14. DESIRE TO CONNECT PIPED WATER SYSTEM WITHIN THE YARD GIVEN PRICE CHARGED IS 20/= PER JERRYCAN

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	622	53.0	77.2	77.2
	No	184	15.7	22.8	100.0
	Total	806	68.7	100.0	
Missing	Not Applicable	92	7.8		
	Non Response	52	4.4		
	System	224	19.1		
	Total	368	31.3		
Total		1174	100.0		

TABLE A.6.15. THE MOST AMOUNT THE HOUSEHOLD IS WILLING TO PAY FOR INSTALLATION OF PIPED WATER CONNECTION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20,000/=	353	30.1	50.5	50.5
	30,000/=	165	14.1	23.6	74.1
	40,000	83	7.1	11.9	86.0
	50,000/=	98	8.3	14.0	100.0
	Total	699	59.5	100.0	
Missing	Not Applicable	137	11.7		
	Non Response	114	9.7		
	System	224	19.1		
	Total	475	40.5		
Total		1174	100.0		

TABLE A.6.16. DESIRE TO INSTALL A PIPED WATER CONNECTION WITHIN THE YARD IF THE INITIAL INSTALLATION FEE IS 100,000/=

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	142	12.1	18.8	18.8
	No	612	52.1	81.2	100.0
	Total	754	64.2	100.0	
Missing	Not Applicable	113	9.6		
	Non Response	83	7.1		
	System	224	19.1		
	Total	420	35.8		
Total		1174	100.0		

TABLE A.6.17. DESIRE TO INSTALL A PIPED WATER CONNECTION WITHIN THE YARD IF THE INITIAL INSTALLATION FEE IS 50,000/=

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	430	36.6	56.7	56.7
	No	329	28.0	43.3	100.0
	Total	759	64.7	100.0	
Missing	Not Applicable	110	9.4		
	Non Response	81	6.9		
	System	224	19.1		
	Total	415	35.3		
Total		1174	100.0		

TABLE A.6.18. THE MOST PREFERRED CONNECTION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	House connection (20/= per jerrycan(20 ltrs), 50,000/= connection charge and monthly metered bills)	107	11.3	11.3	11.3
	Yard Connection (20/= per jerrycan (20 ltrs), 50,000/= connection charge and monthly metered bills)	215	22.6	22.6	33.9
	Public Stand Post (50/= per jerrycan, no connection charge and no monthly bills)	528	55.6	55.6	89.5
	Water from another source other than the above (no charge and monthly metered bills)	100	10.5	10.5	100
	Total	950	100	100	
Missing	Non Response	0	0		
Total		950	100.0		

TABLE A.6.19. AVERAGE NUMBER OF JERRYCAN USED PER DAY GIVEN THE PREFERRED CONNECTION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 3 jerrycans	84	7.2	12.4	12.4
	3 jerrycans	182	15.5	26.9	39.3
	more than 3 jerrycans	404	34.4	59.8	99.1
	4	6	.5	.9	100.0
	Total	676	57.6	100.0	
Missing	Non Response	274	23.3		
	System	224	19.1		
	Total	498	42.4		
Total		1174	100.0		

TABLE A.6.17. EXPECTED AMOUNT TO BE SPENT ON WATER PER DAY GIVEN THE PREFERRED CONNECTION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 100/=	272	23.2	39.7	39.7
	100/=	186	15.8	27.1	66.8
	more than 100/=	224	19.1	32.7	99.4
	4	4	.3	.6	100.0
	Total	686	58.4	100.0	
Missing	Non Response	264	22.5		
	System	224	19.1		
	Total	488	41.6		
Total		1174	100.0		

SECTION SEVEN: SANITATION FACILITIES AND WASTE DISPOSAL

TABLE A.7.1. CONNECTION TO SEWERAGE SYSTEM STATUS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	1.4	1.8	1.8
	No	909	77.4	98.2	100.0
	Total	926	78.9	100.0	
Missing	Non Response	24	2.0		
	System	224	19.1		
	Total	248	21.1		
Total		1174	100.0		

TABLE A.7.2. PAYMENT FOR SEWERAGE DISPOSAL SERVICES

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	1	.1	12.5	12.5
	No	7	.6	87.5	100.0
	Total	8	.7	100.0	
Missing	Not Applicable	916	78.0		
	Non Response	26	2.2		
	System	224	19.1		
	Total	1166	99.3		
Total		1174	100.0		

TABLE A.7.3. HOUSEHOLDS USING A FLUSH TOILET OR LATRINE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	859	73.2	92.03	92.03
	No	7.4	6.3	7.97	100.0
	Total	933	79.5	100.0	
Missing	Non Response	17	1.4		
	System	224	19.1		
	Total	241	20.5		
Total		1174	100.0		

TABLE A.7.4. TYPE OF TOILET USED BY THE HOUSEHOLD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Flush latrine	44	3.7	4.8	4.8
	Pit latrine (cement)	606	51.6	66.2	71.0
	Pit latrine (mud)	263	22.4	28.7	99.7
	Others	3	.3	.3	100.0
	Total	916	78.0	100.0	
Missing	Not Applicable	10	.9		
	Non Response	24	2.0		
	System	224	19.1		
	Total	258	22.0		
Total		1174	100.0		

TABLE A.7.5. NUMBER OF HOUSEHOLDS THAT SHARE THE TOILETS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	275	23.4	52.6	52.6
	3	147	12.5	28.1	80.7
	more than 3	101	8.6	19.3	100.0
	Total	523	44.5	100.0	
Missing	Non Response	427	36.4		
	System	224	19.1		
	Total	651	55.5		
Total		1174	100.0		

TABLE A.7.6. PERSONS RESPONSIBLE FOR CLEANING THE TOILET

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	This household	612	52.1	76.2	76.2
	Other users	162	13.8	20.2	96.4
	Share cleaning	29	2.5	3.6	100.0
	Total	803	68.4	100.0	
Missing	Non Response	147	12.5		
	System	224	19.1		
	Total	371	31.6		
Total		1174	100.0		

TABLE A.7.7. SATISFACTION WITH LATRINE FACILITY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	834	71.0	92.0	92.0
	No	73	6.2	8.0	100.0
	Total	907	77.3	100.0	
Missing	Non Response	43	3.7		
	System	224	19.1		
	Total	267	22.7		
Total		1174	100.0		

TABLE A.7.8. HANDWASHING AFTER USING THE LATRINE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	892	76.0	96.5	96.5
	No	32	2.7	3.5	100.0
	Total	924	78.7	100.0	
Missing	Non Response	26	2.2		
	System	224	19.1		
	Total	250	21.3		
Total		1174	100.0		

NB: No handwashing facilities seen

TABLE A.7.9. REASONS FOR NOT HAVING A HOUSEHOLD TOILET FACILITY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cannot afford	7	.6	63.6	63.6
	No space	2	.2	18.2	81.8
	Others	2	.2	18.2	100.0
	Total	11	.9	100.0	
Missing	Not applicable	922	78.5		
	Non Response	17	1.4		
	System	224	19.1		
	Total	1163	99.1		
Total		1174	100.0		

TABLE A.7.10. WHERE HOUSEHOLD MEMBERS WITHOUT TOILET FACILITIES DEFECATE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neighbor's toilet/latrine	2	.2	28.6	28.6
	Bush or open space	2	.2	28.6	57.1
	Others	3	.3	42.9	100.0
	Total	7	.6	100.0	
Missing	Not applicable	923	78.6		
	Non Response	20	1.7		
	System	224	19.1		
	Total	1167	99.4		
Total		1174	100.0		

TABLE A.7.11. DISCHARGE OF GREY WATER FROM THE HOUSEHOLD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Open area	661	56.3	73.6	73.6
	Disposal	155	13.2	17.3	90.9
	Drainage system	42	3.6	4.7	95.5
	Others	40	3.4	4.4	100.0
	Total	898	76.5	100.0	
Missing	Non Response	52	4.4		
	System	224	19.1		
	Total	276	23.5		
Total		1174	100.0		

TABLE A.7.12. DISPOSAL OF SOLID WASTE FROM THE HOUSEHOLD

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Garbage pit	734	62.5	81.2	81.2
	Gazetted collection point	123	10.5	13.6	94.8
	Open area or anywhere else	47	4.0	5.2	100.0
	Total	904	77.0	100.0	
Missing	Non Response	46	3.9		
	System	224	19.1		
	Total	270	23.0		
Total		1174	100.0		

SECTION EIGHT: HOUSING

TABLE A.8.1. TYPE OF MATERIAL THE HOUSEHOLD ROOF IS MADE OF

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Grass	382	32.5	41.5	41.5
	Iron Sheets	533	45.4	57.9	99.5
	Asbestos	5	.4	.5	100.0
	Total	920	78.4	100.0	
Missing	Non Response	30	2.6		
	System	224	19.1		
	Total	254	21.6		
Total		1174	100.0		

TABLE A.8.2. TYPE OF MATERIAL THE HOUSEHOLD WALL IS MADE OF

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Unburned bricks	261	22.2	28.4	28.4
	Mud and Wattle	53	4.5	5.8	34.2
	Burnt bricks	431	36.7	46.9	81.1
	Cement/concrete	173	14.7	18.8	99.9
	Others	1	.1	.1	100.0
	Total	919	78.3	100.0	
Missing	Non Response	31	2.6		
	System	224	19.1		
	Total	255	21.7		
Total		1174	100.0		

TABLE A.8.3. TYPE OF MATERIAL THE HOUSEHOLD FLOOR IS MADE OF

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rammed earth	353	30.1	38.6	38.6
	Cement/concrete	556	47.4	60.8	99.5
	Others	5	.4	.5	100.0
	Total	914	77.9	100.0	
Missing	Non Response	36	3.1		
	System	224	19.1		
	Total	260	22.1		
Total		1174	100.0		

TABLE A.8.4. NUMBER OF ROOMS IN THE HOUSE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1room	279	23.8	32.9	32.9
	2 rooms	268	22.8	31.6	64.4
	3 rooms	225	19.2	26.5	90.9
	More than 3 rooms	77	6.6	9.1	100.0
	Total	849	72.3	100.0	
Missing	Non Response	101	8.6		
	System	224	19.1		
	Total	325	27.7		
Total		1174	100.0		

TABLE A.8.5. BUSINESS CONDUCTED WITHIN THE HOUSE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	78	6.6	9.5	9.5
	No	741	63.1	90.5	100.0
	Total	819	69.8	100.0	
Missing	Non Response	131	11.2		
	System	224	19.1		
	Total	355	30.2		
Total		1174	100.0		

TABLE A.8.6. NATURE OF THE BUSINESS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Petty trade	37	3.2	58.7	58.7
	Retail	15	1.3	23.8	82.5
	wholesale	1	.1	1.6	84.1
	Others specify	10	.9	15.9	100.0
	Total	63	5.4	100.0	
Missing	Not Applicable	872	74.3		
	Non Response	15	1.3		
	System	224	19.1		
	Total	1111	94.6		
Total		1174	100.0		

TABLE A.8.7. OCCUPANCY STATUS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Owner	546	46.5	66.3	66.3
	Rent	264	22.5	32.1	98.4
	Government/NGO	8	.7	1.0	99.4
	Others	5	.4	.6	100.0
	Total	823	70.1	100.0	
Missing	Non Response	127	10.8		
	System	224	19.1		
	Total	351	29.9		
Total		1174	100.0		

TABLE A.8.8. MONTHLY RENT CHARGE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 10,000=	30	2.6	12.1	12.1
	10,000-30,000=	78	6.6	31.6	43.7
	31000-50,000=	83	7.1	33.6	77.3
	51,00-80,000=	50	4.3	20.2	97.6
	More than 80,000=	6	.5	2.4	100.0
	Total	247	21.0	100.0	
Missing	Not Applicable	616	52.5		
	Non Response	87	7.4		
	System	224	19.1		
	Total	927	79.0		
Total		1174	100.0		

TABLE A.8.9. INVOLVEMENT IN DECISION MAKING, PLANNING OR IMPLEMENTATION OF ANY WATER SUPPLY ACTIVITY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	546	46.5	58.4	58.4
	No	389	33.1	41.6	100.0
	Total	935	79.6	100.0	
Missing	Non Response	15	1.3		
	System	224	19.1		
	Total	239	20.4		
Total		1174	100.0		

TABLE A.8.10. WAYS OF INVOLVEMENT IN DECISION MAKING, PLANNING OR IMPLEMENTATION OF ANY WATER SUPPLY ACTIVITY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decision-making	88	7.5	9.6	9.6
	Construction work	16	1.4	1.8	11.4
	Maintenance	268	22.8	29.3	40.7
	No participation	376	32.0	41.1	81.8
	1 and 2	38	3.2	4.2	86.0
	1 and 3	102	8.7	11.2	97.2
	2 and 3	26	2.2	2.8	100.0
	Total	914	77.9	100.0	
Missing	Not Applicable	34	2.9		
	Non Response	2	.2		
	System	224	19.1		
	Total	260	22.1		
Total		1174	100.0		

TABLE A.8.11. DESIRE TO PARTICIPATE IN FUTURE PLANNING AND DECISION-MAKING FOR THE WATER SUPPLY

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	739	62.9	79.7	79.7
	No	188	16.0	20.3	100.0
	Total	927	79.0	100.0	
Missing	Non Response	23	2.0		
	System	224	19.1		
	Total	247	21.0		
Total		1174	100.0		

ANNEX B. KITGUM TOWN BASELINE HOUSEHOLD SURVEY QUESTIONNAIRE

A QUESTIONNAIRE IDENTIFICATION

1. Household sample no. _____ Address_____
2. Date of interview _____ August 2009
3. Interviewers name _____
4. LCI Leader/Guide _____ Signature.....
   Field editing Supervisor Signature…….…… Date……
   Checking by Social Scientist Signature……. Date…….....

Location of Interview:

5. Ward = LC2 _____
6. Cell = LC1 _____

B EXPLANATION OF THE SURVEY

To be read by the interviewer to the respondent: ***Hello. My name is _____, and am a volunteer working for BEC Engineers. BEC Engineers have been instructed by USAID NUWATER to carry out a baseline survey on water supply systems and services in Kitgum Town. "The purpose of the survey is to get information about your water needs." Responses given will be kept confidential and shall be used only in decision making and planning for the improvement of water supply to your community. Your co-operation is highly appreciated.***

C BACKGROUND CHARACTERISTICS

7. Sex of respondent Male ☐ Female ☐

8.a Are you the head of household? Yes ☐ No ☐

8.b If no to 8.a, what is your relation to the household head?
Wife/husband ☐ Relative ☐
Son/Daughter ☐ Other ☐

Note to interviewer:
If the respondent is not the head of the household or the wife/husband, you need to terminate the interview and come back when the head of household or the wife/husband is present.

9. How old are you? _____ Years

10. What is your marital status?
Married ☐ Single ☐ Widow ☐ Divorced ☐ Separated ☐
Other ☐

11. What is your ethnicity or tribe?_____

12. What is your religion?
Catholic ☐ Protestant ☐ Moslem ☐ Other ☐

13a. What is your place of birth? _____

13b. If born outside this locality, what was the main reason for coming here? (Only one answer)
Security ☐ Employment ☐ Education ☐ Marriage ☐ Relatives ☐
Facilities (amenities) ☐ Other ☐

14) How long have you lived in this place?
Less than 1 year ☐ 1-3 years (12-36 months) ☐
3-8 years (37-96 months) ☐ 9 years and above ☐

Now I want to ask you a few questions about the composition of your household

15a) How many persons live in your household? _____(Total number of persons)

15b)

Initials of member of household	Age	Sex	# of boys below 18 years old	# of girls below 18 years old	# of men 18 years old	# of women 18 years older

D. SOCIOECONOMIC SITUATION

16) What is your highest level of Education? None ☐ Primary ☐
Secondary ☐ College training ☐ University ☐ Other ☐

17) Can you read and write

a) Luo Yes ☐ No ☐
b) English Yes ☐ No ☐

18) What is the main occupation of the head of household? **(*Note: only one answer*)**
Peasant Cultivation ☐ Casual Laborer ☐ Petty retail trader ☐ NGO Staff ☐
Trader ☐ Public Servant (teachers, health workers etc) ☐ Housewife ☐ Other ☐

19) What is your household's main source of income? (***Note: only one answer***)
Sale of agricultural products ☐ Wages/salaries ☐ Trading ☐
Allowances etc ☐ Support from family members ☐ Other ☐

20) The Last time your household received income from your main source, how much was it? Daily, weekly, monthly or annually?

Daily	**Weekly**	**Monthly**	**Annually**	**Other period, specify**
/=	/=	/=	/=	/=

21) The last time you received income from your second most important source, how much was it? Daily, weekly, monthly or annually

Daily	Weekly	Monthly	Annually	Other period specify
/=	/=	/=	/=	/=

Comments regarding income, if any_____
_____

22) How do you obtain the main food items for your household?
(Note: select only the most important method)
Own produce ☐ Purchase from market ☐ Relief ☐
Gift from relatives/parents in the village ☐ Other ☐

23) On which of the following did you spend money and how much? (In Ush)

Item	Daily	Weekly	Monthly	Annually	Other period specify
a. Health Expenses					
b. School expenses					
c. Buying food for the household					
d. Water					
e. Contribution to cultural family obligations (funerals, marriage, etc)					
f. Travel					
g. Drinking and Smoking					
h. Housing (e.g. rent, repairs)					
i. Fuel (firewood, charcoal, paraffin, electricity etc)					

24) Does your household have the following items?
a) Electricity Yes ☐ No ☐
b) If yes to a), Observe if there is a functioning meter Yes ☐ No ☐
c) Color TV Yes ☐ No ☐
d) Black & White TV Yes ☐ No ☐
e) Radio Yes ☐ No ☐
f) Bicycle Yes Own ☐ Yes Govt ☐ Yes NGO ☐ No ☐
g) Motor cycle Yes Own ☐ Yes Govt ☐ Yes NGO ☐ No ☐
h) Motor vehicle Yes Own ☐ Yes Govt ☐ Yes NGO ☐ No ☐

E. TRENDS IN HEALTH STATUS

25) In the last 30 days what kind of water related diseases attacked one or more members of?
your household? Diarrhoea ☐ Malaria ☐ Typhoid ☐ Dysentery ☐
Cholera ☐ Bilharzia ☐ Intestinal worms ☐

26.a) What was the Age group of the members of the household affected most?
0-1year ☐ 1-9years ☐ 10-17years ☐ 18-60 years ☐
60 and above ☐

26.b) How many times did these members fall sick in the last 12 months?
1☐ 2☐ 3☐ 4☐ 5☐ 6☐ 7☐ 8☐ 9☐ 10☐

27) Did your household lose a member as a result of death in last 12 months?
Yes ☐ No ☐

28) If yes, what was the likely cause of death of that person?
Heart problem (cardiovascular) ☐ Upper Respiratory (asthma, bronchitis) ☐
Tuberculosis ☐ Aids-related ☐ Malaria ☐
Stomach/digestion (diarrhea, dysentery etc) ☐ Hepatitis ☐ Other (Specify) ☐

F WATER UTILISATION

29) What is the most frequently used source of water for drinking and cooking for your household?
(Note: Tick only one answer for each season)

Most frequently used water source	**a) Dry season**	**b) Wet season**
Protected well/spring	1	1
Open well/spring	2	2
Water Kiosk	3	3
Private outside connection	4	4
Private inside tap	5	5
Water vendor	6	6
Bore Hole	7	7
Neighbouring household	8	8
River/Lake/Pond	9	9
Rain harvesting	10	10
Other (please specify...)	11	11

Note: if answer is private outside connection or private inside tap continue with 30, otherwise skip to 31

30a) Do you have a water meter? Yes ☐ No ☐
30b) (if yes) can I see the meter?
30c) Record last meter reading day _____Month_____ Year_____
30d) Record last meter reading_____

30e) Can I see the last water bill? Yes seen ☐ No not seen ☐
30f) (if yes) record the billing day _____Month_____Year_____
30g) Record the amount billed_____/=

30h) When is the last time you logged a complaint or problems with the operator? 7 days ☐
2 weeks ☐ 1 month ☐ 3 months ☐ 6 months ☐ other ☐

30i) What was the nature of complaint or problem reported? Incorrect billing ☐ Leak ☐
Breakage ☐ Low pressure ☐ Water quality issues ☐ Other ☐

30j) How long did it take to resolve the problem? 7 days or less ☐
2 weeks ☐ 1 month ☐ 3 month ☐ 6 months ☐ Other ☐

31) Give reason for the choice of water source mentioned in (29) above
(Note: only one answer per season)
31a) Dry season: Distance ☐ convenience ☐ quality water ☐ price ☐ other ☐
31b) Wet season: Distance ☐ convenience ☐ quality water ☐ price ☐ other ☐

32) What is the most frequently used source of water for your household for bathing, laundry etc?
(Note: Tick only one answer for each season)

Most frequently used water source	a) Dry Season	b) Wet season
Protected well/spring	1	1
Open well/spring	2	2
Water kiosk	3	3
Private outside connection	4	4
Private inside tap	5	5
Water vendor	6	6
Bore hole	7	7
Neighboring household	8	8
River/Lake/Pond	9	9
Rain harvesting	10	10
Other (please specify...)	11	11

33. What is the distance to your most frequently used source of water for drinking and cooking?

33a) Dry season: less than 250 meters ☐ 250-500 meters ☐ 501-1000 meters ☐
1-3 km ☐ 3.1-5km ☐ greater than 5km ☐

33b) Wet Season: less than 250 meters ☐ 250-500 meters ☐ 501-1000 meters ☐
1-3 km ☐ 3.1-5km ☐ greater than 5km ☐

34) Who fetches most of the water for your household?
Adult women ☐ adult men ☐ boys ☐ girls ☐

35) How much time does one person spend for one trip fetching water? (including going, waiting, paying if relevant and return) _____minutes

36a) How many people normally go together to collect water? 1 ☐ 2 ☐ 3 or more ☐

36b) How often do you collect water from your main source? Daily ☐ On alternative days ☐
Once in 3 days ☐ Other ☐

36c) What time of the day do you collect water from your main source?
Before sunrise ☐ Morning ☐ Afternoon ☐ After sunset ☐

37) How many water collection trips per day for the water needs for the whole household?

37a) Dry season_____trips per day 38b) Wet season_____trips per day

38) Does your household use water for the following?

38a) Dry season 1) Small scale irrigation ☐ 2) Livestock feeding ☐

38b) Wet season 1) Small scale irrigation ☐ 2) Livestock feeding ☐

39) How many jerrycans of water (20ltr each) does your household use in a day? (Total for all members of the household incl. drinking, cooking, washing, bathing, irrigation, animals, etc.)

39a) Dry season_____jerrycans per day 30b) Wet season_____jerrycans per day

40. What is your assessment of the quality of water that you use for drinking and cooking from your present source?

40.a Smell/ Odour: Smelly ☐ Very smelly ☐ A little smelly ☐ Not Smelly ☐

40.b Purity: Very good ☐ Good ☐ Average ☐ Poor ☐ Very Poor ☐

40.c Taste: Very good ☐ Good ☐ Average ☐ Poor ☐ Very Poor ☐

40.d What is your overall assessment of the quality of the water that you use for drinking or cooking from your present source?
Very good ☐ Good ☐ Average ☐ Poor ☐ Very Poor ☐

41. What is your assessment of the quality of piped water supplied in Kitgum Town?

☐ ☐ ☐ ☐

41.a Smell/ Odour: Smelly ☐ Very smelly ☐ A little smelly ☐ Not Smelly
41.b Purity: Very good ☐ Good Average Poor ☐ Very Poor ☐
41.c Taste: Very good Good ☐ Average ☐ Poor ☐ Very Poor ☐
41.d What is your overall assessment of the quality of piped water supplied in Kitgum Town?
Very good ☐ Good ☐ Average ☐ Poor ☐ Very Poor ☐
42.a Do you treat water before drinking? Yes ☐ No ☐ Sometimes ☐
42.b How do you treat water before drinking?
Boiling ☐ Add chemicals such as water guard ☐ Filtration with cloth ☐ Other ☐

43.a Do you pay for water from your main source? Yes ☐ No ☐
43.b Since the beginning of this year (2009) has water from your main source been available regularly, whenever you need it?
Yes all the time ☐ Yes most of the time ☐ Unavailable occasionally ☐
Unavailable only rarely ☐
43.c Did your main water source supply water when you needed it through out last week?
Yes ☐ No ☐
43.d What is your assessment of the current reliability of piped water services in Kitgum Town?
Reliable ☐ Moderately reliable ☐ Not reliable ☐

44. What is your water preference by its source? **(Only one answer)**
Borehole ☐ Protected Spring ☐ River/Lake/ Pond ☐ Rain water ☐
Water kiosk ☐ Water vendor ☐ Neighbours tap ☐ Other ☐

45. What is the reason for your preference above?
Good taste ☐ Price ☐ Perceived quality ☐ Distance or convenience ☐ Other ☐

46. Who is responsible for taking decisions regarding water acquisition and utilization in your household?
Husband ☐ Wife ☐ Any member of the household ☐

47. Does your household buy water from private vendors or from water kiosks?
Yes ☐ No ☐
(Note: If yes in 47, continue with 48. If no, skip to 49)

48. Use of water from private vendors and water kiosks

	Source	**Season**	**Total # of jerrycans per day**	**Price per jerrycan**
a	Private vendors	Dry		
b	Private vendors	Wet		
c	Water kiosks	Dry		
d	Water kiosks	Wet		

G. WILLINGNESS TO PAY

A. HOUSE CONNECTION

Explain house connection to your respondent: ***House connection is where an owner / occupier of a household pays a connection fee of normally 50,000/= to the operator, who then extends the distribution main with a water meter within 3 meters from the nearest yard boundary. The cost of in-house connections will be borne by the owner. Payment for water used is monthly following a monthly bill sent by the operator to the owner.***

49.a What is the most you would be willing to pay per jerrycan for a house connection?_____ /=
49.b If the price you are charged for water is 40/= per jerrycan, would you like a piped water system to connect to your household? Yes ☐ No ☐
49.c If the price you are charged for water is 30/= per jerrycan, would you like a piped water system connected to your household? Yes ☐ No ☐
49.d If the price you are charged for water is 20/= per jerrycan, would you like a piped

water system to connect to your household? Yes ☐ No ☐

50.a What is the most you would be willing to pay for installation of a piped water connection inside your household?_____ /=

50.b If the initial fee of installing a piped water connection inside your household is 125,000/=, would you still go ahead and have the connection?
Yes ☐ No ☐

50.c If the initial fee of installing a piped water connection inside your household is 50,000/=, would you still go ahead and have the connection?
Yes ☐ No ☐

B. PUBLIC STAND POST

***Explain Public Stand Post as:* It is a public water service point where water supplied from the operator is sold to members of the public. Usually it is charged per 20 liter jerrycan.**

51.a What is the most you would be willing to pay per jerrycan at a public stand post? _____ /=

51.b If the price you are charged at a public stand post is 100/= per jerrycan, would you prefer to buy water from the kiosk? Yes ☐ No ☐

51.c If the price you are charged at a public stand post is 50/= per jerrycan, would you prefer to buy water from a kiosk? Yes ☐ No ☐

C. YARD CONNECTION (Private outside connection)

***Explain Yard Connection as:* It is a domestic connection from the operator following payment of normally 50,000/=. It is installed with a meter within three meters of your courtyard.**

52.a What is the most you would be willing to pay per jerrycan for a connection within your yard ?_____ /=

52.b If the price you are charged for water is 40/= per jerrycan, would you like a piped water system to connect within your yard? Yes ☐ No ☐

52.c If the price you are charged for water is 30/= per jerrycan, would you like a piped water system to connect within your yard? Yes ☐ No ☐

52.d If the price you are charged for water is 20/= per jerrycan, would you like a piped water system to connect within your yard? Yes ☐ No ☐

53.a What is the most you would be willing to pay for installation of a piped water connection within your yard ?_____ /=

53.b If the initial fee of installing a piped water connection within your yard is 100,000/=, would you still go ahead and have the connection? Yes ☐ No ☐

53.b If the initial fee of installing a piped water connection within your yard is 50,000/=, would you still go ahead and have the connection? Yes ☐ No ☐

54.a Which of the following four options would you prefer? ***(Note: tick the preferred option)***

#	Option	Price per jerrycan (20 liters)	Connection charge	Monthly metered bills
1	House Connection	20/=	50,000 /=	Yes
2	Yard Connection	20/=	50,000/=	Yes
3	Public Stand Post	25/=	0	No
4	Water from another source other than the above	0	0	No

54.b For the option you have chosen in 54.a, how many jerrycans on average would you use per day_____, per month_____?

54.c For the option you have chosen in 54.a, how much would you spend on water per

day_____/=, per month_____/=?

H. SANITATION AND SOLID WASTE DISPOSAL

55.a Is your household connected to a sewerage system? Yes ☐ No ☐
55.b If yes to 55.a, do you pay for sewerage disposal services? Yes ☐ No ☐

56.a Does your household have a functional private toilet or latrine? Yes ☐ No ☐
56.b If yes to 56.a, what type of toilet is used by your household?
Flush toilet ☐ Pit latrine (cement) ☐ Pit latrine (mud) ☐ Other ☐
56.c How many other households do you share the toilet with?_____
56.d Who cleans the toilet? This household ☐ Other users ☐
56.e Are you satisfied with your latrine facility? Yes ☐ No ☐
56.f Do you wash your hands every time you use the toilet Yes ☐ No ☐
(***Interviewer, note the physical presence of a hand washing facility)***

56.f If no to 56.a, why is your household without toilet facilities? Cannot afford ☐
No space ☐ Landlord's responsibility ☐ Other ☐

56.g If no to 56.a, where do you defecate? Neighbour's toilet/latrine ☐
Bush or open space ☐ In Polythene bag ☐ Other ☐

57.a Where do you discharge grey water from your household?
Open area ☐ Disposal ☐ Drainage system ☐ Other ☐

57.b Where do you dispose of solid waste from your household?
Garbage pit ☐ Gazetted collection point ☐ Open area or anywhere else ☐

I. HOUSING

57.a What type of material is your house made of?

a. Roof	b. Walls	c. Floor
CODES		
1. Grass	1. Unburned bricks	1. Rammed earth
2. Iron sheets	2. Mud and wattle	2. Cement/concrete
3. Asbestos	3. Burnt bricks	3. Other
4. Other	4. Cement/concrete	
	5. Other	

57.b How many rooms are there in your house?_____
57.c Do you conduct any business within your house? Yes ☐ No ☐
57.d If yes to 57.c, specify the nature of business?_____

58. Occupancy status: Owner ☐ Rent ☐ Govt/NGO ☐ Other ☐

59. If the house is rented, how much do you pay per month?_____

J. LOCAL PARTICIPATION IN MANAGEMENT OF WATER SUPPLY

60.a Have you ever been involved in decision-making, planning or implementation of any water supply activity? Yes ☐ No ☐

60.b In what ways were you involved?
Decision-making ☐ Construction work ☐ Maintenance ☐

No Participation ☐ I and 2 ☐ 1 and 3 ☐ 2 and 3 ☐

61. Would you like to participate in future planning and decision-making for the water supply in your locality? Yes ☐ No ☐

K. FINAL COMMENTS

62. Before finishing the interview, do you have any other comments you would like to make?

_____

_____

Thank you, very much for taking time to answer these questions

Comments by the interviewer:

_____

_____

ANNEX C. KITGUM TOWN BASELINE SURVEY KEY INFORMANT CHECKLIST

KITGUM OPERATOR

SUBSIDIES:

1) Operating costs (by months in 2009, by months and year in 2008)
2) Administrative costs: What administrative expenses? How are administrative costs met?
3) What O&M expenses? How is O&M financed?
4) Other costs?
5) What is the operational deficit?
6) Amount required for subsidy at base year (2009) by month and year
7) Are there any cash transfers between operator and authority
   Note: What is the price of water (cubic meter, jerrycan); What is the cost of delivering a cubic meter /jerrycan of water to the consumer (HC, YC, PSPs, relief);Do PSPs charge users? What is the price per jerrycan? How was it set?
   Ask for revenue projections and cost projections

COLLECTION RATE/ RATIO:

8) Revenues collected in 2008, 2009 by month;
9) Total bill 2008, 2009 by month
10) Water tariffs paid by customers- perception of operator about the tariff charged
11) Seek explanation for the current collection ratio and rate
    (Review and photocopy current operator financial records and current bank statements)
12) Are collection rates different among different segments of the population?
13) What are the factors responsible for existing collection rates?
14) *(Review performance and management contracts)*

RECORDS AND REPORTS:

15) Review operator records kept and reports to the authority for content, quality and frequency of reporting *(are the financial and administrative reports up to date at the end of quarter)*
16) Check for: Technical data updates (e.g. number of connections, increases, decreases, O&M activities)
17) Complaints/ problems and resolution log, billing, collection statistics
18) Revenues and expenditures (receipt books, invoices/ bills, delivery of bills and movement of cash between customer and operator/ and between operator and authority)
19) Capacity building/ Technical assistance in preparing administrative, technical and financial records.

COMPLAINTS/ PROBLEM LOG:

20) Review operator problem log for nature of complaints (number of: disconnections, reconnections, non functional taps, billing related issues)
21) Probe response time for the different types of problems such as leaks, breakages, low pressure, water quality issues, incorrect billing
22) Are all problems reported by the customers entered into log book? If so are they handled in time and accordingly?
23) Are stoppages in production logged in the complaints/problem register, with the time taken to resolve the situation? *See through register and provide specific cases*
    NOTE: Who does repairs and maintenance work on the system? How effective are they?
    Who are your core customers?
    Do you have a manual for the town water system?

WATER AVAILABILITY RECORDS:

24) Hours of operation per day (visit plant, boreholes, tanks, take notes on functionality, etc)- physically monitor production to ascertain actual hours of operation
25) When was the last breakdown in the water supply system, what was its cause and for how long did it last?
26) Do you treat the water before supply? How is the water treated? How often do you treat the water?

27) Whom do you supply water? Paying (number of HC, number of YC, number of PSPs); Free water supplied; Relief Program; etc

NUMBER OF CONNECTIONS:

28) Current water production
29) Number of people and households covered (directly and by proxy)
30) Inventory of current physical structures (no. of new connections, new and repaired pipes, new and repaired boreholes, new and repaired storage tanks, generators, solar system, etc)
31) Sketch map of current pipe network and connections (which lines are functional and non functional) and estimate how many people use each type of connection -HC, YC, PSP; or how many are affected by non functional lines
32) Visit PSPs and ask how many people get water from the taps; how many jerrycans or cubic meters are sold per day; average distance covered by households to the PSPs *(Repeat process for other public water points such as boreholes and springs)*

PRIVATE SECTOR CAPACITY:

33) Verify procedures (and quality) for physical works undertaken prior to this project, during recent rehabilitation works- do they conform to GOU procedures on procurement
34) Did the improvements carried out result into increasing system delivery, expanding customer base, reducing NRW, increasing delivery efficiency (increasing returns and commercially viable), and improved quality

AUDITS:

35) Quality and number of audits performed on operator; who carried out audits (see Audit reports)
36) Do they conform to standard processes mirroring PPDA and OAG audits

WATER SAMPLES/ WATER QUALITY STANDARDS:

37) View water sample test results

SWOT:

38) Are you content with your service? *(Strength, Weaknesses, Opportunities, Threats)*
39) What is your current response time?
40) What would you require to reduce on the response time?
41) What will it take to improve collection rates?
42) What kind of improvements are planned for your water system or service?
43) In view of the planned improvements or rehabilitation:
44) How many people and HHs will be served in 2009_, 2010_, 2011_, 2012 ___
45) How many connections will be made by 2009___, 2010___, 2011__, 2012 _____
46) How many hours will consumers be supplied water in 2009_, 2010_, 2011_, 2012 _
47) How much reduction in subsidies is expected by 2009_, 2010__, 2011_, 2012
48) Are the operator staff committed and confident about doing their work? Explain

WATER CONSUMING INSTITUTIONS/ POTENTIAL INSTITUTIONS

49) Institutional water needs; when was the last bill and receipt; their assessment of piped water quality and reliability (Ask for water bills and receipts)
50) Is the water pressure adequate?

TOWN CLERK/ WATER AUTHORITY/ TOWN AUTHORITY

51) Quality and number of audits performed on operator by who (Audit reports)
52) Number and names (disaggregated by gender) of town council officials trained on contract management (include modules trained in, attendance, discussions)
53) See reports, records and minutes of water authority meetings and log of activities undertaken

54) Assess whether trained and non trained staff and councillors assume duties, review and approve books, consider capital improvements and represent their constituency (through open access to meetings and pro-active community relations)?
55) Review turnover in authority- because trained people leaving offices for new persons could mean constantly training new people
56) Does community bypass the operator and deal directly with authority?
57) Comment on customer care skills of the operator?
58) In this town/ region do you have firms with the required experience, expertise and knowledge of operating urban water systems?
59) How was current operator procured?
60) How was the system managed in the past?
61) Are you content with the service? *(Strength, Weaknesses, Opportunities, Threats)*
62) What is your current response time?
63) What would you require to reduce on the response time?
64) What will it take to improve collection rates?
65) What kind of improvements are planned for your water system or service?
66) In view of the planned improvements or rehabilitation:
67) How many people or hhs will be served in 2009_, 2010_, 2011_, 2012 ___
68) How many connections will be made by 2009___, 2010___, 2011__, 2012 _____
69) How many hours will consumers be supplied water in 2009_, 2010_, 2011_, 2012 _
70) How much reduction in subsidies is expected by 2009_, 2010__, 2011_, 2012

WATER VENDORS

71) How many vendors in the town?
72) From which source do they get water?
73) What is the jerrycan price?
74) How many jerrycans are sold per day by each vendor?
75) Who are their consumers?
76) Which areas of town do they operate? Why?
77) What is their perception about piped water and the future of their business?
78) Their comments about ability and willingness to pay in the town?

NUWATER

79) Quality and number of audits performed on operator by who (Audit reports)
80) Number and names (disaggregated by gender) of town council officials and operator staff trained on contract management and other water related issues (include modules trained in, attendance, discussions)
81) See reports, records and minutes of Program office meetings and log of activities undertaken

NGOS/ LOCAL GOVERNMENT

82) How many people and households receive free water/ relief water?
83) Indicate numbers getting water from: Public boreholes_____ Private boreholes Springs _____ Piped system_____(give names of all sources and PSPs with the population using them
84) How is the trend -is it likely to increase or decrease- provide statistics

POTENTIAL WATER USERS/ COMMUNITY MEMBERS

85) Socioeconomic status of pipe water or water consumers (vulnerable, those who cannot go back to their original settlement, the number of People Living With Aids (PLWA) and orphaned children being cared for
86) (use rapid wealth ranking, see vulnerability or poverty mapping reports)
87) Number of households that pay for water

88) Number of households using the system who have been granted relief from billing due to vulnerability or hardship (e.g., PLWA, women headed households, child headed households, former combatants, etc)
89) Total number of paying customers
90) Total number of non paying customers
91) (see billing records for piped system or PSPs and households served under relief)
92) (ask NGOs for vulnerability data or reports- population served water under relief)
93) Is the water operator staff customer friendly?

ANNEX D. SELECTED PICTURES FROM THE STUDY AREA

A Busy Borehole Next to a Water Kiosk in Staff Quarters

Typical Institution which does not Receive Water
(District Directorate of Health Services)

Transporting Water to Good Foundation Nursery and Day Care Centre

Another Borehole with Typical Long Lines Next to a Water Kiosk

A Water Vendor Delivering Water to Los Angeles Guest House

A Warning Not to Use the Toilet for Lack of Water

ANNEX E. LIST OF KEY PERSONS INTERVIEWED

Oola Eugene	District Planner, Kitgum District Local Government
Lucy Otto	District Probation Officer, Kitgum District Local Government
Obalim Christopher	Senior Education Officer, Kitgum District Local Government
Willy	District Water Officer, Kitgum District Local Government
Okwera Richard	Mayor, Kitgum Town Council
Ocen George Albert	Town Clerk, Kitgum Town Council
Ocaya Owen	Town Engineer, Kitgum Town Council
Alexis	Urban Water Officer, Kitgum Town Council
Atube Benson	Former Urban Water Officer, Kitgum Town Council
Lawoko Dennis	Director, WASH Consults Limited
Owot Peter	Finance and Administration, WASH Consults Ltd.
Mwaka Phillip Isaac	Technical Director, WASH Consults Ltd.
Makmot Micheal	Water Technician, WASH Consults Ltd.
Ocan Fredrick	Water Technician, WASH Consults Ltd.
Ocan Ben Makako	Trainee Water Technician, WASH Consults Ltd.

ANNEX F. COVER PAGE OF SPECIAL AUDIT REPORT ON ACTIVITIES OF PREVIOUS OPERATOR

Received 21/07/2006

SPECIAL AUDIT REPORT ON THE ACTIVITIES OF TOWN COUNCIL WATER SUPPLY PRIVATE OPERATOR

KTC / 265

Kitgum Town Council
P.O Box 139
Kitgum
18/7/2006

The Town Clerk
Kitgum Town Council
P.O. Box 139
Kitgum

The Chairman Urban Council III
Kitgum
P.O. Box139
Kitgum

1.0 INTRODUCTION

This report is prepared on request by the management of Kitgum Town council water Authority as a result of irregular supply of water to the town residents in spite of the availability of power generating facilities such as Generator, Solar Energy, Electricity and Money. The one final issue which has caused concern is the non remittance of the money collected from the water charges for the months of May and June 2006.

1.1 PERIOD OF THE REPORT

The period covered is mainly for the months of May and June2006. Trend analysis was performed from December 2005 to June 2006.

1.2 COVERAGE

- Production of Water
- Unaccounted for Water / Losses
- Billing
- Collection of Revenue
- Outstanding Collection
- Operational Costs

1.3 AIMS AND OBJECTIVES

i. To find out the production capability of the Private Operator.
ii. To study and report the Going Concern of the water supply system under the Private Operator.
iii. To report whether or not the entity keeps proper records of the system for the Authority to make Decisions
iv. To report on how the entity manages the assets and liabilities of the Authority.

ANNEX G. COVER PAGE OF MINUTES OF PREVIOUS WSSB'S MEETING

(107)

MINUTES OF EMMERGENCY WSSB MEETING HELD ON 8TH JUNE 2005 IN THE TOWN CLERK'S OFFICE.

Members present	Designation
Mr. Oryem William	Chair person
Mr. Ochan Simon	Member
Mrs. Agnes okello	"
Mr. G.A. Ocen	Town clerk

In attendance	
Mrs. Ayat Rose	For T. H. Inspector
Mr. Nyero Maxwell	A/ Assistant
Mr. Atube Benson	Ag. Water officer/ Minute's secretary.
Mr. Okeny Mario	Town Agent
Mr. Ayella Patrick	Private operator
Mr. Nyeko Tony	"
Mrs. Agwang Angela	A/ assistant

Agenda:

1- Short prayer / communication from the chair and reaction.
2- Tendering of civil works (lot 2) on 4th phase project.

Min.1/2004/2005: prayer and communication from the chair.

1.1: **Prayer**: the meeting was opened with a short prayer led by secretary at 10:55am.
1.2: **communication**.

The chairman welcomed member, technocrats and private operator present. Markous gave us technical evaluation reports qualifying two firms for lot 1 and 2 and he went to Kampala to negotiate with them as it was resolved in the previous meeting.

Lot 1

He negotiated with the representative of BBM and it was reduced from 190,000 euros to 167,194.34 euros and they signed two addendum.
Addendum 1: Request was made to DWD to pay for taxes sum of 6,000,~~000~~ Euros if they fail, then the authority should pay.
Addendum 2: If the casings for Y.Y pump hole is large enough to received their motor of 6" without difficulties, then the sum of 2, 640 Euros shall not be paid.

Negotiation on lot 2

In the previous meeting it was resolved that this issue be taken to tender board and when he was going to Kampala Urban water officer listed items for negotiation.
But when I came back technical staff observed an anomaly on tendering, that since the private operator is on board, management contract clause 10.0 sub clause 10.1 states that; the operator shall be responsible for managing all repairs or replacements to system

ANNEX H. RESULTS OF WATER QUALITY TESTS FOR NOVEMBER 2009

NATIONAL WATER AND SEWERAGE CORPORATION

CENTRAL LABORATORY - BUGOLOBI.
P.O.BOX 7053 KAMPALA.
Tel: 257548, 341144. Fax: 256 41 255441
E-mail: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: USAID-NUWATER C/O BEC Engineers Limited

Sample Source: Borehole Water, **Kitgum** District

Date Sample Received: 23-11-2009

Serial No: ES/RF/575-1

Sampled by: Client

Date of Report: 01-12-2009

Table of Analytical Results

Parameters	Units	Point Source Borehole I (YY OKOT S.S.	National Standards for potable water. (Maximum Permissible)
WS Sample Nr	--	K1121/09	
pH	--	6.35	6.5 – 8.5
Electrical Conductivity	µS/cm	537	2500
Colour: apparent	PtCo	50	15
Turbidity	NTU	9.2	10.0
Total Dissolved Solids	mg/L	344	1200
Total Suspended Solids	mg/L	9	0.0
Alkalinity: total as $CaCO_3$	mg/L	216	500
Hardness: total as $CaCO_3$	mg/L	238	500
Calcium: Ca^{2+}	mg/L	48.0	75
Magnesium: Mg^{2+}	mg/L	28.3	50
Bi-Carbonate: as $CaCO_3$	mg/L	216	500
Chloride: Cl^-	mg/L	0.7	500
Fluoride: F^-	mg/L	0.09	1.5
Iron: total	mg/L	0.44	1.0
Sulphate: SO_4^{2-}	mg/L	3	200
Nitrate – N	mg/L	0.05	5.0
Faecal Coliforms	CFU/100mL	0	0

CFU – Colony Forming Units

Remarks

The sample showed good bacteriological and satisfactory physical-chemical characteristics of the water source though colour was slightly higher than the National Standards for potable water quality. The source, however, may be used for domestic and livestock water supply.

Herbert Wataga
ANALYST

NATIONAL WATER AND SEWERAGE CORPORATION
01 DEC 2009
THE CENTRAL LABORATORY

Lance E. Okwerede
For QUALITY CONTROL MANAGER

NB: The NWSC certificate of analysis by no means constitutes a permit to any person or undertaking to conduct business

NATIONAL WATER AND SEWERAGE CORPORATION

CENTRAL LABORATORY - BUGOLOBI.
P.O.BOX 7053 KAMPALA.
Tel: 257548, 341144. Fax: 256 41 255441
E-mail: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: USAID-NUWATER C/O BEC Engineers Limited

Serial No: ES/RF/575-2

Sample Source: Borehole Water, **Kitgum** District

Sampled by: Client

Date Sample Received: 23-11-2009

Date of Report: 01-12-2009

Table of Analytical Results

Parameters	Units	Point Source Borehole II (Boma Grounds)	National Standards for potable water. (Maximum Permissible)
WS Sample Nr	--	K1122/09	
pH	--	6.18	**6.5 – 8.5**
Electrical Conductivity	µS/cm	932	**2500**
Colour: apparent	PtCo	49	**15**
Turbidity	NTU	8.8	**10.0**
Total Dissolved Solids	mg/L	596	**1200**
Total Suspended Solids	mg/L	7	**0.0**
Alkalinity: total as $CaCO_3$	mg/L	344	**500**
Hardness: total as $CaCO_3$	mg/L	370	**500**
Calcium: Ca^{2+}	mg/L	68.8	**75**
Magnesium: Mg^{2+}	mg/L	47.5	**50**
Bi-Carbonate: as $CaCO_3$	mg/L	344	**500**
Chloride: Cl^-	mg/L	1.3	**500**
Fluoride: F^-	mg/L	0.00	**1.5**
Iron: total	mg/L	0.37	**1.0**
Sulphate: SO_4^{2-}	mg/L	14	**200**
Nitrate – N	mg/L	0.03	**5.0**
Faecal Coliforms	CFU/100mL	0	**0**

CFU – Colony Forming Units

Remarks

The sample showed good bacteriological and satisfactory physical-chemical characteristics of the water source though colour was slightly higher than the National Standards for potable water quality. The source, however, may be used for domestic and livestock water supply.

Herbert Wataga
ANALYST

NATIONAL WATER AND SEWERAGE CORPORATION
01 DEC 2009
THE CENTRAL LABORATORY

Lance E. Okwerede
For QUALITY CONTROL MANAGER

NATIONAL WATER AND SEWERAGE CORPORATION

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P.O.BOX 7053 KAMPALA.
Tel: 257548, 341144. Fax: 256 41 255441
E-mail: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: USAID-NUWATER $^{C}/_{O}$ BEC Engineers Limited
Serial No: ES/RF/575-3

Sample Source: Borehole Water, **Kitgum** District
Sampled by: Client

Date Sample Received: 23-11-2009
Date of Report: 01-12-2009

Table of Analytical Results

Parameters	**Units**	**Point Source Borehole III (Ayur Borehole)**	**National Standards for potable water. (Maximum Permissible)**
WS Sample Nr	--	**K1123/09**	
pH	--	6.50	**6.5 – 8.5**
Electrical Conductivity	µS/cm	1200	**2500**
Colour: apparent	PtCo	43	**15**
Turbidity	NTU	7.2	**10.0**
Total Dissolved Solids	mg/L	768	**1200**
Total Suspended Solids	mg/L	4	**0.0**
Alkalinity: total as $CaCO_3$	mg/L	380	**500**
Hardness: total as $CaCO_3$	mg/L	400	**500**
Calcium: Ca^{2+}	mg/L	88.0	**75**
Magnesium: Mg^{2+}	mg/L	43.2	**50**
Bi-Carbonate: as $CaCO_3$	mg/L	380	**500**
Chloride: Cl^-	mg/L	1.8	**500**
Fluoride: F^-	mg/L	0.16	**1.5**
Iron: total	mg/L	0.33	**1.0**
Sulphate: SO_4^{2-}	mg/L	25	**200**
Nitrate – N	mg/L	0.04	**5.0**
Faecal Coliforms	CFU/100mL	0	**0**

CFU – Colony Forming Units

Remarks

The sample showed good bacteriological and satisfactory physical-chemical characteristics of the water source though colour was slightly higher than the National Standards for potable water quality. The source, however, may be used for domestic and livestock water supply.

Herbert Wataga
ANALYST

NATIONAL WATER AND SEWERAGE CORPORATION
01 DEC 2009
THE CENTRAL LABORATORY

Lance E. Okwerede
For QUALITY CONTROL MANAGER

NATIONAL WATER AND SEWERAGE CORPORATION

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E-mail: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: USAID-NUWATER $^{C}/_{O}$ BEC Engineers Limited

Serial No: ES/RF/575-4

Sample Source: Borehole Water, **Kitgum** District

Sampled by: Client

Date Sample Received: 23-11-2009

Date of Report: 01-12-2009

Table of Analytical Results

Parameters	Units	Distribution Point I (Oryem William, Pageri Crescent)	National Standards for potable water. (Maximum Permissible)
WS Sample Nr	--	K1124/09	
pH	--	6.70	**6.5 – 8.5**
Electrical Conductivity	µS/cm	748	**2500**
Colour: apparent	PtCo	33	**15**
Turbidity	NTU	4.7	**10.0**
Total Dissolved Solids	mg/L	479	**1200**
Total Suspended Solids	mg/L	5	**0.0**
Alkalinity: total as $CaCO_3$	mg/L	300	**500**
Hardness: total as $CaCO_3$	mg/L	318	**500**
Calcium: Ca^{2+}	mg/L	60.0	**75**
Magnesium: Mg^{2+}	mg/L	40.3	**50**
Bi-Carbonate: as $CaCO_3$	mg/L	300	**500**
Chloride: Cl^-	mg/L	1.0	**500**
Fluoride: F^-	mg/L	0.13	**1.5**
Iron: total	mg/L	0.29	**1.0**
Sulphate: SO_4^{2-}	mg/L	6	**200**
Nitrate – N	mg/L	0.04	**5.0**
Faecal Coliforms	CFU/100mL	0	**0**

CFU – Colony Forming Units

Remarks

The sample showed good bacteriological and satisfactory physical-chemical characteristics of the water source. The source may be used for domestic and livestock water supply.

Herbert Wataga
ANALYST

NATIONAL WATER AND SEWERAGE CORPORATION
01 DEC 2009
THE CENTRAL LABORATORY

Lance E. Okwerede
For QUALITY CONTROL MANAGER

NB: The NWSC certificate of analysis by no means constitutes a permit to any person or undertaking to conduct business

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CERTIFICATE OF ANALYSIS

CLIENT: USAID-NUWATER C/O BEC Engineers Limited

Sample Source: Borehole Water, **Kitgum** District

Date Sample Received: 23-11-2009

Serial No: ES/RF/575-5

Sampled by: Client

Date of Report: 01-12-2009

Table of Analytical Results

Parameters	Units	Distribution Point II (Lower Ayur kiosk)	National Standards for potable water. (Maximum Permissible)
WS Sample Nr	--	K1125/09	
pH	--	6.90	6.5 – 8.5
Electrical Conductivity	µS/cm	803	2500
Colour: apparent	PtCo	0	15
Turbidity	NTU	0.2	10.0
Total Dissolved Solids	mg/L	514	1200
Total Suspended Solids	mg/L	0	0.0
Alkalinity: total as $CaCO_3$	mg/L	294	500
Hardness: total as $CaCO_3$	mg/L	308	500
Calcium: Ca^{2+}	mg/L	66.4	75
Magnesium: Mg^{2+}	mg/L	34.1	50
Bi-Carbonate: as $CaCO_3$	mg/L	294	500
Chloride: Cl^-	mg/L	0.9	500
Fluoride: F^-	mg/L	0.26	1.5
Iron: total	mg/L	0.04	1.0
Sulphate: SO_4^{2-}	mg/L	7	200
Nitrate – N	mg/L	0.01	5.0
Faecal Coliforms	CFU/100mL	0	0

CFU – Colony Forming Units

Remarks

The sample showed good bacteriological and physical-chemical characteristics of the water source that were commensurate with the National Standards for potable water quality. The source may be used for domestic and livestock water supply.

Herbert Wataga
ANALYST

NATIONAL WATER AND SEWERAGE CORPORATION
01 DEC 2009
THE CENTRAL LABORATORY

p/Lance E. Okwerede
For QUALITY CONTROL MANAGER

NATIONAL WATER AND SEWERAGE CORPORATION

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Tel: 257548, 341144. Fax: 256 41 255441
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CERTIFICATE OF ANALYSIS

CLIENT: USAID-NUWATER C/O BEC Engineers Limited

Sample Source: Borehole Water, **Kitgum** District

Date Sample Received: 23-11-2009

Serial No: ES/RF/575-6

Sampled by: Client

Date of Report: 01-12-2009

Table of Analytical Results

Parameters	Units	Distribution Point III (Town Council Tank)	National Standards for potable water. (Maximum Permissible)
WS Sample Nr	--	K1126/09	
pH	--	7.25	6.5 – 8.5
Electrical Conductivity	µS/cm	692	2500
Colour: apparent	PtCo	0	15
Turbidity	NTU	0.3	10.0
Total Dissolved Solids	mg/L	443	1200
Total Suspended Solids	mg/L	0	0.0
Alkalinity: total as $CaCO_3$	mg/L	244	500
Hardness: total as $CaCO_3$	mg/L	240	500
Calcium: Ca^{2+}	mg/L	56.0	75
Magnesium: Mg^{2+}	mg/L	24.0	50
Bi-Carbonate: as $CaCO_3$	mg/L	244	500
Chloride: Cl^-	mg/L	0.7	500
Fluoride: F^-	mg/L	0.19	1.5
Iron: total	mg/L	0.04	1.0
Sulphate: SO_4^{2-}	mg/L	5	200
Nitrate – N	mg/L	0.00	5.0
Faecal Coliforms	CFU/100mL	0	0

CFU – Colony Forming Units

Remarks

The sample showed good bacteriological and physical-chemical characteristics of the water source that were commensurate with the National Standards for potable water quality. The source may be used for domestic and livestock water supply.

Herbert Wataga
ANALYST

NATIONAL WATER AND SEWERAGE CORPORATION
01 DEC 2009
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Lance E. Okwerede
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CERTIFICATE OF ANALYSIS

CLIENT: USAID-NUWATER C/O BEC Engineers Limited

Serial No: ES/RF/575-7

Sample Source: Borehole Water, **Kitgum** District

Sampled by: Client

Date Sample Received: 23-11-2009

Date of Report: 01-12-2009

Table of Analytical Results

Parameters	Units	YY OKOT PUMP	National Standards for potable water. (Maximum Permissible)
WS Sample Nr	--	K1127/09	
pH	--	6.58	6.5 – 8.5
Electrical Conductivity	µS/cm	654	2500
Colour: apparent	PtCo	0	15
Turbidity	NTU	0.2	10.0
Total Dissolved Solids	mg/L	419	1200
Total Suspended Solids	mg/L	0	0.0
Alkalinity: total as $CaCO_3$	mg/L	260	500
Hardness: total as $CaCO_3$	mg/L	278	500
Calcium: Ca^{2+}	mg/L	54.4	75
Magnesium: Mg^{2+}	mg/L	34.1	50
Bi-Carbonate: as $CaCO_3$	mg/L	260	500
Chloride: Cl^-	mg/L	0.6	500
Fluoride: F^-	mg/L	0.23	1.5
Iron: total	mg/L	0.03	1.0
Sulphate: SO_4^{2-}	mg/L	4	200
Nitrate – N	mg/L	0.02	5.0
Faecal Coliforms	CFU/100mL	0	0

CFU – Colony Forming Units

Remarks

The sample showed good bacteriological and physical-chemical characteristics of the water source that were commensurate with the National Standards for potable water quality. The source may be used for domestic and livestock water supply.

Herbert Wataga
ANALYST

NATIONAL WATER AND SEWERAGE CORPORATION
01 DEC 2009
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Lance E. Okwerede
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CERTIFICATE OF ANALYSIS

CLIENT: USAID-NUWATER C/o BEC Engineers Limited

Sample Source: Borehole Water, **Kitgum** District

Date Sample Received: 23-11-2009

Serial No: ES/RF/575-8

Sampled by: Client

Date of Report: 01-12-2009

Table of Analytical Results

Parameters	Units	LANGA LANGA	National Standards for potable water. (Maximum Permissible)
WS Sample Nr	--	K1128/09	
pH	--	6.40	6.5 – 8.5
Electrical Conductivity	µS/cm	605	2500
Colour: apparent	PtCo	27	15
Turbidity	NTU	3.2	10.0
Total Dissolved Solids	mg/L	387	1200
Total Suspended Solids	mg/L	4	0.0
Alkalinity: total as $CaCO_3$	mg/L	266	500
Hardness: total as $CaCO_3$	mg/L	248	500
Calcium: Ca^{2+}	mg/L	60.2	75
Magnesium: Mg^{2+}	mg/L	23.0	50
Bi-Carbonate: as $CaCO_3$	mg/L	266	500
Chloride: Cl^-	mg/L	0.7	500
Fluoride: F^-	mg/L	0.14	1.5
Iron: total	mg/L	0.37	1.0
Sulphate: SO_4^{2-}	mg/L	5	200
Nitrate – N	mg/L	0.06	5.0
Faecal Coliforms	CFU/100mL	0	0

CFU – Colony Forming Units

Remarks

The sample showed good bacteriological and satisfactory physical-chemical characteristics of the water source. The source may be used for domestic and livestock water supply.

Herbert Wataga
ANALYST

NATIONAL WATER AND SEWERAGE CORPORATION
01 DEC 2009
THE CENTRAL LABORATORY

Lance E. Okwerede
For QUALITY CONTROL MANAGER

NB: The NWSC certificate of analysis by means constitutes a permit to any person or undertaking to conduct business

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CERTIFICATE OF ANALYSIS

CLIENT: USAID-NUWATER C/O BEC Engineers Limited

Serial No: ES/RF/575-9

Sample Source: Borehole Water, **Kitgum** District

Sampled by: Client

Date Sample Received: 23-11-2009

Date of Report: 01-12-2009

Table of Analytical Results

Parameters	Units	KTI	National Standards for potable water. (Maximum Permissible)
WS Sample Nr	--	K1129/09	
pH	--	6.66	**6.5 – 8.5**
Electrical Conductivity	µS/cm	865	**2500**
Colour: apparent	PtCo	36	**15**
Turbidity	NTU	4.5	**10.0**
Total Dissolved Solids	mg/L	554	**1200**
Total Suspended Solids	mg/L	6	**0.0**
Alkalinity: total as $CaCO_3$	mg/L	300	**500**
Hardness: total as $CaCO_3$	mg/L	286	**500**
Calcium: Ca^{2+}	mg/L	57.6	**75**
Magnesium: Mg^{2+}	mg/L	34.2	**50**
Bi-Carbonate: as $CaCO_3$	mg/L	300	**500**
Chloride: Cl^-	mg/L	0.9	**500**
Fluoride: F^-	mg/L	0.10	**1.5**
Iron: total	mg/L	0.26	**1.0**
Sulphate: SO_4^{2-}	mg/L	8	**200**
Nitrate – N	mg/L	0.05	**5.0**
Faecal Coliforms	CFU/100mL	0	**0**

CFU – Colony Forming Units

Remarks

The sample showed good bacteriological and satisfactory physical-chemical characteristics of the water source though colour was slightly higher than the National Standards for potable water quality. The source, however, may be used for domestic and livestock water supply.

Herbert Wataga
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01 DEC 2009
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Sample Source: Borehole Water, **Kitgum** District

Date Sample Received: 23-11-2009

Serial No: ES/RF/575-10

Sampled by: Client

Date of Report: 01-12-2009

Table of Analytical Results

Parameters	Units	K – NEW	National Standards for potable water. (Maximum Permissible)
WS Sample Nr	--	K1130/09	
pH	--	6.46	6.5 – 8.5
Electrical Conductivity	µS/cm	970	2500
Colour: apparent	PtCo	40	15
Turbidity	NTU	6.3	10.0
Total Dissolved Solids	mg/L	621	1200
Total Suspended Solids	mg/L	7	0.0
Alkalinity: total as $CaCO_3$	mg/L	318	500
Hardness: total as $CaCO_3$	mg/L	308	500
Calcium: Ca^{2+}	mg/L	64.8	75
Magnesium: Mg^{2+}	mg/L	35.0	50
Bi-Carbonate: as $CaCO_3$	mg/L	318	500
Chloride: Cl^-	mg/L	1.4	500
Fluoride: F^-	mg/L	0.07	1.5
Iron: total	mg/L	0.36	1.0
Sulphate: SO_4^{2-}	mg/L	11	200
Nitrate – N	mg/L	0.03	5.0
Faecal Coliforms	CFU/100mL	0	0

CFU – Colony Forming Units

Remarks

The sample showed good bacteriological and satisfactory physical-chemical characteristics of the water source though colour was slightly higher than the National Standards for potable water quality. The source, however, may be used for domestic and livestock water supply.

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01 DEC 2009
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