

**PROGRESS REPORT FOR JULY TO DECEMBER 2003****PROJECT NUMBER:** AIACC AF\_91**PROJECT TITLE:** CAPACITY BUILDING TO EVALUATE  
AND ADAPT TO CLIMATE CHANGE-  
INDUCED VULNERABILITY TO  
MALARIA AND CHOLERA IN THE LAKE VICTORIA  
REGION**PRINCIPAL  
INVESTIGATOR:** SHEM O. WANDIGA**SUPPORTING  
ORGANIZATIONS:** GLOBAL SYSTEM FOR ANALYSIS,  
RESEARCH AND TRAINING (START),  
THIRD WORLD ACADEMY SCIENCES (TWAS),  
UNITED NATIONS ENVIRONMENT PROGRAMME  
(UNEP)**A. SUMMARY:**

The second phase of the project started on schedule and completed most of the tasks set out in the Workplan for the period. The data collection and analysis of the socio-economic data has been finalised for both the quantitative and qualitative methodologies. The climate and hydrological data collection and analysis is still on-going, with outputs from meteorological stations and study sites in the Lake Victoria basin for Kenya, Uganda and Tanzania already completed. The climate analysis included validation of the gridded rainfall climatology and actual rainfall climatology from the station network within the area of interest. The gridded data set was obtained from the Climatic Data Research Unit (CRU) website <http://www.cru.uea.ac.uk/cru/data/hrg.htm>. Secondly, the GCM projections (which are also in the form of gridded data sets) were validated with actual data to ensure that the models simulate the station information accurately. Quality assurance and quality control of the hydrological data for all the study sites is on-going. Preliminary analyses of health data for Kenya and Tanzania have been done.

The GIS digitization of maps for Uganda and Tanzania is now complete. A training workshop for the research team members in GIS applications was held in August 2003. With the completion of digitization, the process of integrating the baseline data into GIS format and producing GIS layers is continuing.

Participatory meetings with local communities took place in all the three countries between July and October 2003. A Regional Research Group Meeting to review and assess project activities will be held in Uganda in January 2004. One of our graduate students has successfully completed her M.A. degree. Preparation of papers for publication is underway, with tentative drafts to be presented in the January Meeting.

## **B. TASKS PERFORMED AND OUTPUTS:**

### **I. Data Collection and Analysis**

#### **1.1 Primary and Secondary Data**

- Completion of primary and secondary data collection for socio-economic data.
- Quantitative and qualitative analysis of questionnaire survey and focus group discussions (Output 1, 2, 3 and 4).
- Stakeholder meetings reports (Output 5,6 and 7).
- Initial correlations established between health and socio-economic variables.
- Collection of data series for all study sites in the Lake Victoria basin completed.
- Utilization of the MAGIC/SCENGEN scenarios to identify the closest model for the East African region (Output 8). Similar work is ongoing with the ensemble models of Canadian CCM, UKMO, GFDL Ver 2 and 3; and Japanese climate model with the objective of identifying the “best-fit” models for the region.
- Hydrological data collected and preliminary analysis (Output 9).
- Health data analysis (Output 10).
- Retrieval and analysis of secondary information from published and grey materials.
- Preparation of progress report.

#### **1.2. GIS Analysis**

- Completion of GIS digitization of maps for Uganda and Tanzania (Output 11).
- Training research team members in GIS applications undertaken (Output 12).

### **II. Meetings**

- Participatory stakeholder meetings with local communities.
- Preparation of paper for publication ongoing.  
During this period, primary data collection and stakeholders meetings involved travel activities of the researchers and research assistants to the field within the respective countries. However, the GIS Training Workshop involved travel to Kenya by participants from Uganda and Tanzania.

### **III Administrative Outputs**

Project funds were received at the end of September 2003, subsequently the following the administrative activities have been undertaken:

- (i) Disbursement of funds to Tanzanian and Ugandan Principal Researchers
- (ii) Organisation of workshops and meetings
- (iii) Coordination and management of data collection, entry and analysis
- (iv) GIS Training of researchers, postgraduate students and research assistants

## **C. DIFFICULTIES ENCOUNTERED**

Although tremendous efforts have been made by AF 91 to catch up on the time framework of AIACC, time constraints vis-à-vis the work plan still remains because AF 91 started in September 2002 and the reporting period for the AIACC is July and January this means that our report does not cover the planned bi-annual and annual activities as it should.

The intricacies of coherency and harmonisation of a multi-disciplinary and multi-country research continues to pose a challenge for coordination. This sometimes slows the pace of work.

We are yet to resolve the issue of factoring micro scale socio-economic data into health and climate models. Efforts are being made to analyse these data using the SWAT and ACRU models. We are also still looking for a group with experience in this area so that we can work with them. Although a number of experts (such as Sari Kovats, ) have been contacted this is yet to translate into a tangible proposal. However, these contacts have enhanced AF 91's exposure to the climate research community. One of the researchers in our project was a reviewer for the WHO *Climate Change and Human Health – Risks and Responses* Book.

#### **D. CONTACT WITH UNFCCC PERSONS**

Contacts with UNFCCC persons were established in the second biannual period of the project. These persons have been invited and participated in in-country meetings such as the National Planning and Coordination or Stakeholders Meetings. They have received a progress report of the AF 91 projects. And efforts are underway to invite one UNFCCC person to the Second AIACC Africa and Indian Ocean Regional Workshop to be held in Dakar, Senegal.

#### **E. TASKS TO BE PERFORMED IN THE NEXT EIGHT MONTHS**

The following tasks will be undertaken in the next eight months:

##### **1. Data Analysis:**

- Statistical downscaling of climate models.
- A statistical analysis will be run for the time series data in order to estimate the probability distribution functions for temperatures and precipitation for each decade (baseline variability for 1960-70, 1970-80, 1980-90, 1990-2000). Descriptive statistics will be determined (mean, mode, median, standard deviation). Baseline is the state before any climate change variability is imposed.
- Downscale the outputs of the climate models and scenarios of changes in extreme events (the El-Nino years and La Nina years) and to assign probabilities to these.
- Use some regional climate models that are available (e.g Ssemazi, et.al.).
- Selected climate change models will be used to estimate possible changes to baseline conditions i.e. perturbations to temperature and precipitation.
- Use a range of increasing and decreasing synthesis of extreme seasonal rainfall and temperature scenarios, and some of the observed extremes and trends.
- Assemble all critical indicators (data) available to help identify vulnerability and adaptation measures for creating scenarios
- Construct socio-economic scenarios using the SWAT or ACRU model, whichever can better handle the socio-economic data alongside other components such as health data, climate data, land-use and hydrology.
- Validation and sensitivity testing of the climate and health data.
- Apply statistical and multiple regression analysis to correlate health, socio-economic, hydrology, habitat and climate data
- Estimate changes in risk magnitude using statistical models of P, T, vs. M,C.
- Uncertainty analysis of estimated risk scenarios.
- Statistical correlation of climate data (P, T) and health data (M, C)
- Time series analysis, climate-disease correlations and parametric modeling
- Integrate baseline data in GIS format
- Research group meeting to discuss results and flag data gaps;
- Complete manuscripts for 2 journal articles

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- Primary data collection from risk groups
- Workshop with key policy makers and international agencies (eg UNEP, WHO)
- Meeting with pilot communities to present initial results and initiate strategic planning
- Formation of local working groups
- Identification of all possible community based M, C risk adaptation/mitigation strategies

#### **F. EXPECTED DIFFICULTIES**

We do not anticipate any difficulties in carrying out the tasks.

#### **G. LESSONS LEARNED**

The perception of communities about diseases is at variance with government policy in health. Therefore, more stakeholder meetings with communities are required.

There has been little consideration of the role of socio-economic factors such as poverty, provision of health facilities in the development and implementation of policies related to prevention and cure of malaria and cholera.

#### **H. PUBLICATIONS**

Sigalla, Rehema J. (2003) : “Community response on the impact of climate change on water resources: a case study of Muleba and Biharamulo Districts in Kagera region”. MA Dissertation, University of Dar es Salaam, 133p.

**OUTPUT 1: SOCIO-ECONOMIC ANALYSIS FOR KENYA****Kenya Survey Baseline data**

Administrative units covered in the Kenya survey include three locations in Kericho district and seven locations in Kisumu district. In the Kericho survey 151 households are sampled including 50 from Kabianga location, 51 from Kaitui location and 50 from Waldai (Sosiot) location indicating a near equal distribution of location samples. In Kisumu survey, the distribution of households in the survey does not have equal size distribution, as is the case in Kericho survey.

**Administrative units in the Kenya survey sample data**

District	Location	Frequency	Percent
Kericho	Kabianga	50	33.1
	Kaitui	51	33.8
	Waldai in Sosiot	50	33.1
	Total	151	100.0
Kisumu	Central Seme	8	5.3
	East Seme	31	20.7
	Kisumu West	26	17.3
	Osiri	2	1.3
	South Central Seme	25	16.7
	South West Kisumu	42	28.0
	South West Seme	16	10.7
	Total	150	100.0

The households sampled tend to be located on three distinct relief surfaces in both Kericho and Kisumu surveys. In Kericho, majority of the households are located on the hill side (48.3%) followed by the valley bottom (32.5%) and hill top (19.2%). This reflects the relief characteristics of Kericho environment and human settlement patterns. In the Kisumu survey, majority of households are located on the valley bottoms (60.7%) followed by the hill side (37.3%) and hill top (2.0%) respectively. This reflects the rather gentle surface of the Kisumu West region where the survey was conducted.

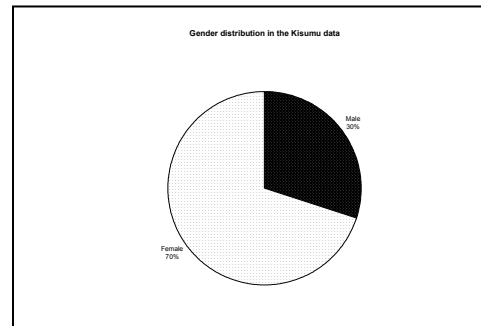
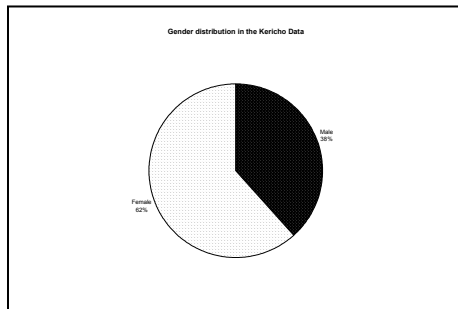
The households in the Kericho survey are generally located at relatively long distances from the lake placing them on the Lake Victoria basin rim, which form part of the general Western Kenya region highlands and uplands, characterised by relatively cooler weather and well distributed rainfall regimes. On the other hand, the households in the Kisumu survey are at distances locating them generally in the so-called lake littoral characterised by generally warm weather and erratic rainfall regimes.

The Kericho and Kisumu survey surfaces are generally within the equatorial belt but whose climatic conditions are modified by the influence of Lake Victoria and relief plus the regional circulations (*Location data [latitude/longitude] are not entered for the Kenya survey database*).

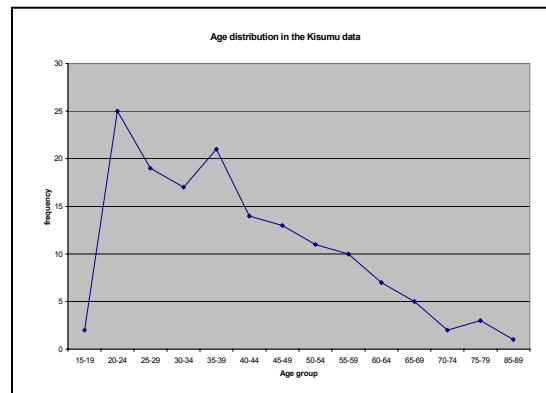
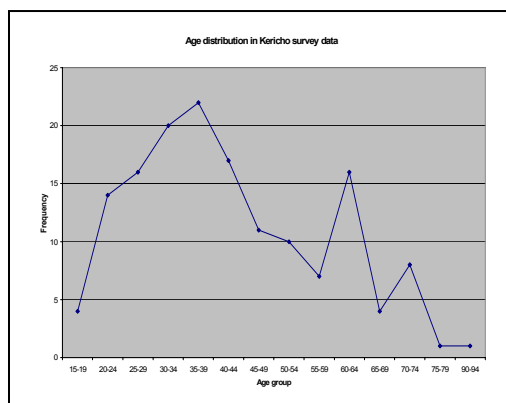
Presence of stagnant water bodies in the survey areas tend not to be a major factor as 73.6% of the households respondents in Kericho report no stagnant water bodies and 78.7% of the household respondents in Kisumu also report no presence of stagnant water bodies (note that lake Victoria is nearby!).

### Socio-Demographic Data

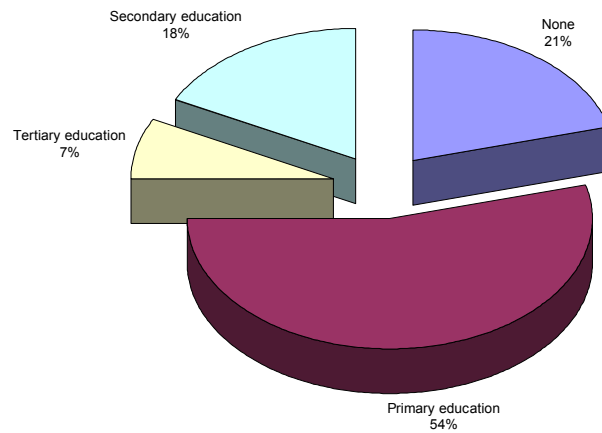
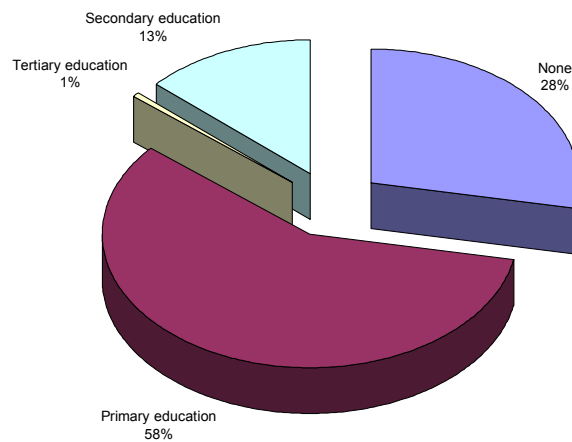
In the Kenya survey data, the females tend to dominate where 61.6% of respondents in the Kericho data are females and 70% are females in the Kisumu data. This condition tends to reflect the picture of homestead management responsibility in rural Kenya.



Age distribution in the survey data varies from 18 years to 90 years in the Kericho data and from 17 years to 86 years in the Kisumu data. In Kericho survey, most respondents are in the age group 20-49 years and in the Kisumu survey, the respondents are mostly in the age group 20-44 years (see graphs below).



Education levels of the respondents in the survey data vary from none to secondary education with majority having primary education. In Kericho, 54.1% of the respondents have primary education, 20.9% no education, 17.6% secondary education and 7.4% tertiary education. In the Kisumu data, 58% have primary education, 28% no education, 13.3% secondary education and 0.7% tertiary education.

**Education levels in Kericho survey****Education levels in the Kisumu data**

Most respondents are in some form of marital union as 74.2% of respondents in Kericho report being married, 15.9% are widowed and only 10 % are either divorced/separated or single. In the Kisumu data, 78% are married, 18% widowed, and only 4.0% either single or divorced/separated.

**Marital status of respondents**

District	Marital status	Frequency	Percent
<b>Kericho</b>	Single	6	4.0
	Married	112	74.2
	Divorced/separated	9	6.0
	Widowed	24	15.9
	Total	151	100.0
<b>Kisumu</b>	Single	5	3.3
	Married	117	78.0
	Divorced/separated	1	.7
	Widowed	27	18.0
	Total	150	100.0

Household sizes vary from 1 to 16 people in Kericho and from 1 to 15 people in Kisumu indicating relatively large households. In Kericho, most households are in the range of 3-7 persons while in Kisumu the common household size range is 2-6 persons per household.

**Sources of income**

District	Source of income	Frequency	%
<b>Kericho</b>	Formal employment	30	19.9
	Self employment	20	13.3
	Farming	145	96.7
	Fishing	0	0
	Children/offspring	3	2
	Cutting timber	1	0.7
	Matatu driver	1	0.7
	Casual	0	0
	Charcoal burning	0	0
	Parents	0	0
	Other	1	0.7
<b>Kisumu</b>	Formal employment	17	11.3
	Self employment	75	50.0
	Farming	78	52.0
	Fishing	34	22.7
	Children/offspring	7	4.7
	Cutting timber	0	0
	Matatu driver	0	0
	Casual	1	0.7
	Charcoal burning	1	0.7
	Parents	1	0.7
	Other	0	0

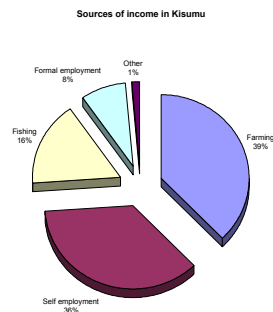
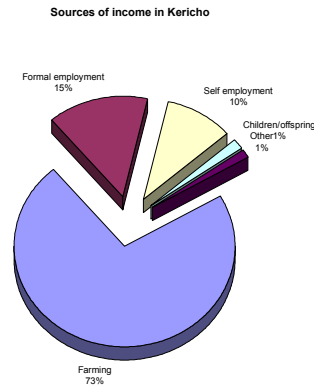
**Income and expenditure**

Income in the survey areas seemingly is dependent to a large extent on farming, self-employment, formal employment, and fishing. Other sources of income mentioned include children, parents, cutting timber/charcoal burning, casual work, and matatu work. This picture can be linked to education level and gender distribution in the database. Most respondents in Kericho tend to be largely dependent on farming for income while farming tend to be relatively of less important in Kisumu data. Self-



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employment tend to be ranked higher in Kisumu data as a source of income than in Kericho and this can be due to the fact that farming is less reliable as an income source in Kisumu area than in Kericho area.



Monthly total income varies from a low of Kenya shillings 180 in the Kisumu data to a high of Kenya shillings 30,000. The Kisumu total monthly income is largely less than the Kericho one. Since formal employment seems to be less important as a source of income, there are indications that farming and self employment tend to be the main source of income but because the Kisumu weather conditions are less favourable to agriculture than the Kericho one, income is then expected to be less in Kisumu than in Kericho.

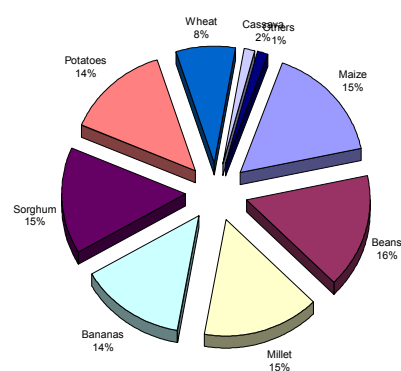
Staple foods of the survey data areas are given as maize, wheat, beans, cassava, potatoes, sorghum, millet, avocados, sugarcane, eggs, rice, tomatoes, vegetables, fish, groundnuts, and sweet potatoes. Consumption tendencies are outlined in the table below but generally grain crop foods are the main staple foods of both Kericho and Kisumu survey areas and definition of food shortage in the two areas should use scarcity of grain crops as a benchmark. Bananas and potatoes are also widely consumed in the survey areas and growing of which should be encouraged as supplements to grain crops in the staple foods consumption structure.

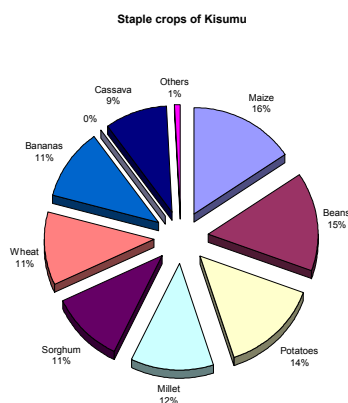
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**Staple Foods of households**

District	Foods consumed	Frequency	%
Kericho	Maize	150	100
	Wheat	71	47.3
	Bananas	130	86.7
	Beans	148	98.7
	Cassava	15	10
	Potatoes	127	84.7
	Sorghum	137	91.3
	Millet	143	95.3
	Avocadoes	2	1.3
	Sugarcane	2	1.3
	Eggs	1	0.7
	Rice	1	0.7
	Tomatoes	2	1.3
	Vegetables	4	2.6
Kisumu	Maize	150	100.0
	Wheat	106	70.7
	Bananas	105	70.0
	Beans	146	97.3
	Cassava	88	58.7
	Potatoes	138	92.0
	Sorghum	107	71.3
	Millet	118	78.7
	Rice	1	0.7
	Vegetables	5	3.3
	Fish	1	0.7
	Groundnuts	1	0.7
	Sweet potatoes	1	0.7

**Staple crops of Kericho**





On regular meals, breakfast, lunch and dinner (supper) are seemingly basic to the feeding habits in households of the survey area. In the Kericho data, 100% of respondents normally take breakfast, as is the case with lunch while dinner drops slightly in regularity to 99.3%. In Kisumu data, breakfast is normal in 96% of the respondents' households, lunch 95.3% and dinner 100%. The figures give indication that the three meals a day structure is fairly maintained in the survey areas and major drop in their availability can be used as indicator to either food shortage in the areas or drop in purchasing power of the respondents.

#### Regularity of major meals of the day

District	Meal normally taken	Frequency	%
<b>Kericho</b>	Breakfast	149	100.0
	Lunch	148	100.0
	Dinner (supper)	148	99.3
<b>Kisumu</b>	Breakfast	144	96.0
	Lunch	143	95.3
	Dinner (supper)	150	100.0

The variations in the percentage of respondents with numbers is explained by the omission of missing data and only actual number of responses to a particular question have been used in the calculation.

The quality of the meals taken is assessed by the protein foods and vegetables consumption.

#### Types of foods

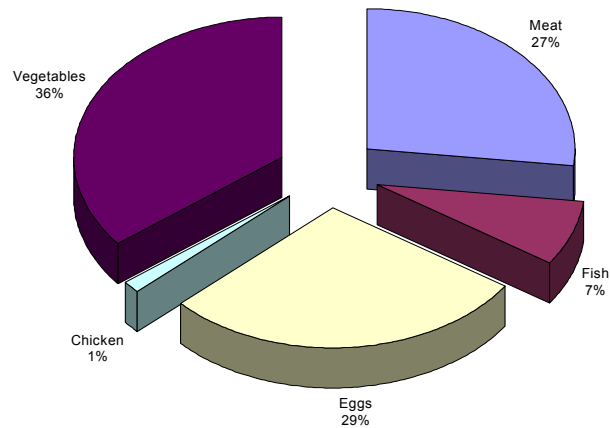
District	Type of Food taken at least once a week	Frequency	%of respondents
<b>Kericho</b>	Meat	113	74.8
	Fish	31	20.5
	Eggs	120	79.5
	Chicken	6	4.0
	Vegetables	149	98.7
<b>Kisumu</b>	Meat	16	10.7
	Fish	139	92.7
	Eggs	27	18
	Chicken	17	11.3
	Vegetables	149	99.3

From the table above and graphs below, it is obvious that even if meals of the day are normally taken, there are variations in the type by survey areas and these variations can be used to indirectly assess the poverty situation in the survey areas. Meat consumption seems to be high in Kericho area (74.8%) but very low in Kisumu area (10.7%) while fish consumption tends to be very high in Kisumu area but low in

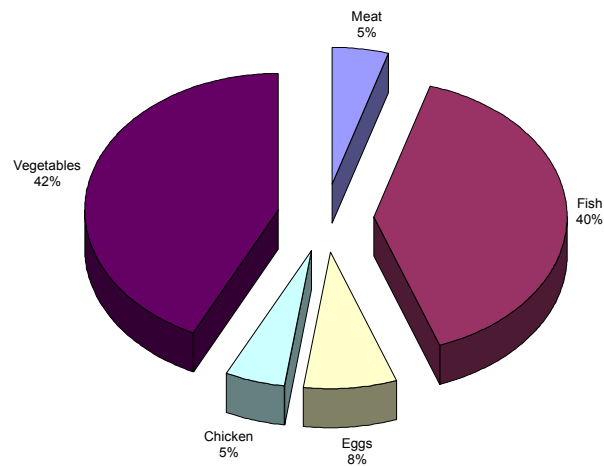
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Kericho area (20.5%). Eggs seem to be a staple food of the Kericho households (79.5%) but not so in Kisumu households (18.0%). Chicken consumption in both survey areas seems to be a rare event but vegetables are consumed in most households surveyed (98.7% for Kericho and 99.3% for Kisumu). It would have been reasonable to inquire about reasons for not having the type of meal.

Type of foods eaten at least once a week (Kericho)

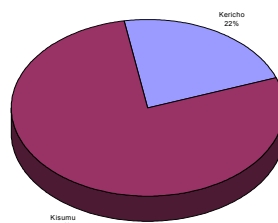


Types of food eaten at least once a week (Kisumu)



Checking on periods of food shortages in the households reinforces meals types question. In Kericho, only 25.3% of the households surveyed report days of not enough food while in Kisumu 89.3% of the households surveyed report days of not enough food. This can be interpreted as indicator of poverty level variation between the two regions or difference in food production and availability due to variation in climatic conditions.

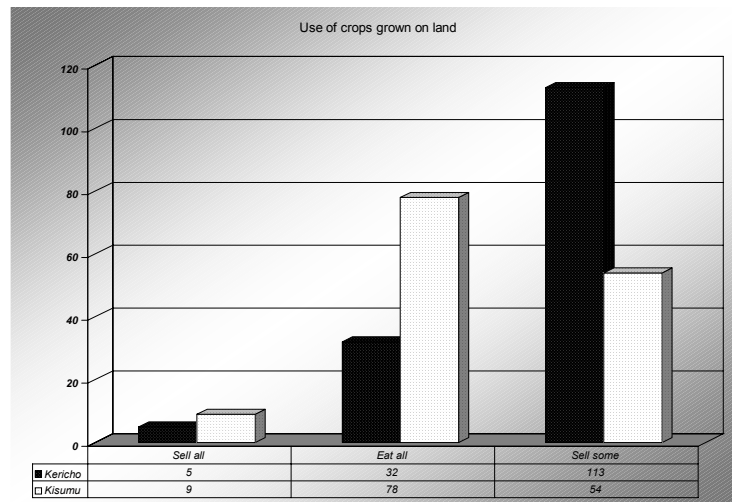
Days of not enough food in households



Access to agricultural land in both Kericho and Kisumu is high (94-96%) and it therefore seems that it is not access to land that affects food availability but It could be the problem of land productivity and other forces. A look at the types of crops grown on household lands may explain the observed anomaly in food availability between Kericho and Kisumu survey areas.

Crops grown on land			
District	Crop	Frequency	%
Kericho	Maize	149	99.3
	Beans	147	98.0
	Bananas	125	83.3
	Potatoes	127	84.7
	Sorghum	124	82.7
	Coffee	22	14.7
	Millet	137	91.3
	Tea	81	54.0
	Wheat	4	2.7
	Sugarcane	74	49.3
	Pyrethrum	1	.7
	Fruits	88	58.7
Kisumu	Maize	139	97.9
	Beans	117	82.4
	Bananas	36	25.4
	Potatoes	77	54.2
	Sorghum	38	26.8
	Coffee	1	.7
	Millet	83	58.5
	Wheat	1	.7
	Sugarcane	16	11.3
	Pyrethrum	0	0
	Fruits	62	43.7
	Cassava	4	2.6
	Green grams	1	.7
	Groundnuts	4	2.7
	Tomatoes	6	4.0
	Vegetables	34	22.6

What happens to the crop that is grown on land may also be used to indirectly measure poverty levels or reasons for food shortages in the survey areas. In Kericho survey data 75.3% of the respondents sell some crops, 21.3% eat all and 3.3% sell all while in Kisumu data 55.3% eat all, 38.3% sell some and 6.4% sell all. In this result there is a tilt toward eating all in Kisumu area and this can be due to the crops grown not meeting households demand while in Kericho there is a tilt toward selling some crops and this can be due to surplus outputs that have to be disposed of or the cash crops of tea, pyrethrum and coffee which must be disposed off.



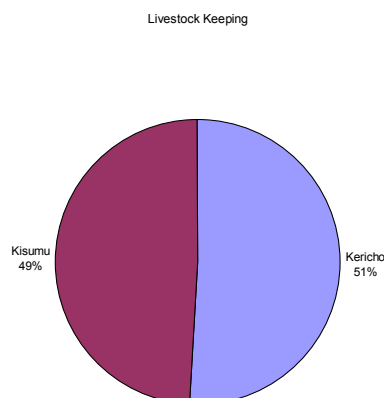
The use of crops grown on land is further filtered by checking on the households buying food from the markets and in both survey areas, nearly all buy food from markets (99.3% for Kericho and 98.7% for Kisumu).

### Wealth indicators

Wealth indicators in this baseline data are assessed using the following property ownership elements:

- Livestock keeping
- Land
- Size of land
- House type
- Radio
- Bicycle
- Access to newspapers

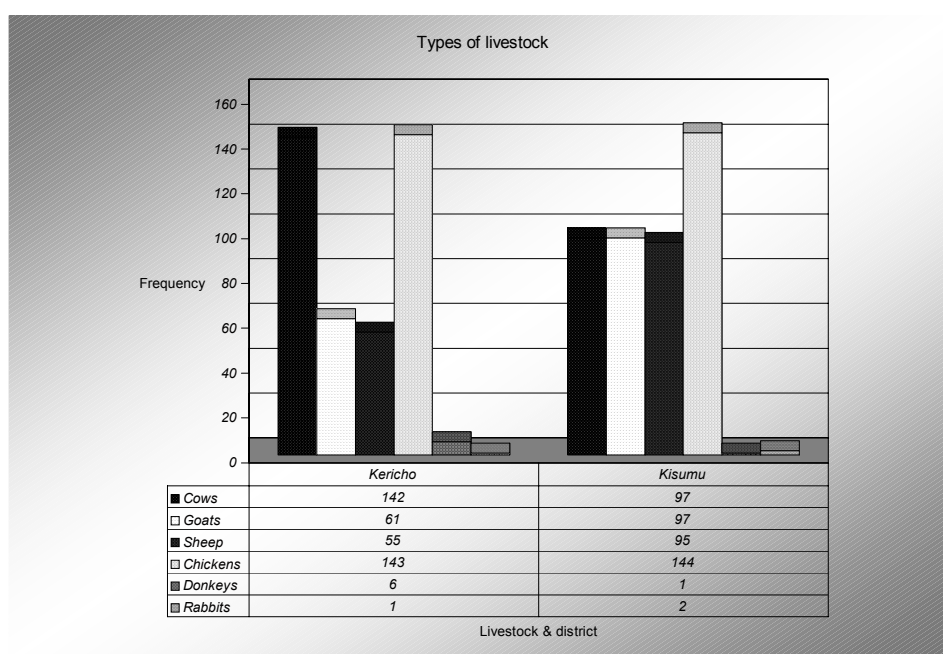
Livestock keeping seems to be a common practice in nearly all the households surveyed and this can be for economic reason (livestock are easy to dispose of in the local markets) but can also be cultural tools. It would have been useful to get the number of livestock and types of livestock.

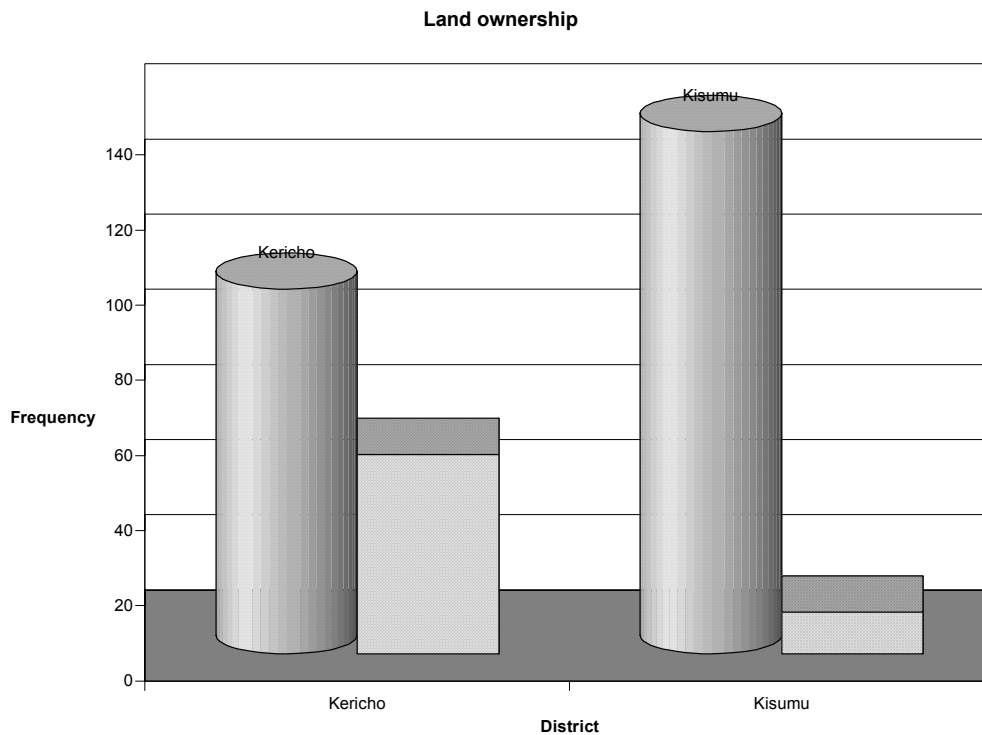


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# Types of livestock kept

District	Livestock Types	Frequency	%
Kericho	Cows	142	95.3
	Goats	61	41.5
	Sheep	55	37.4
	Chickens	143	96.0
	Donkeys	6	4.0
	Rabbits	1	0.7
Kisumu	Cows	97	66.0
	Goats	97	66.0
	Sheep	95	64.6
	Chickens	144	98.0
	Donkeys	1	0.7
	Rabbits	2	1.3



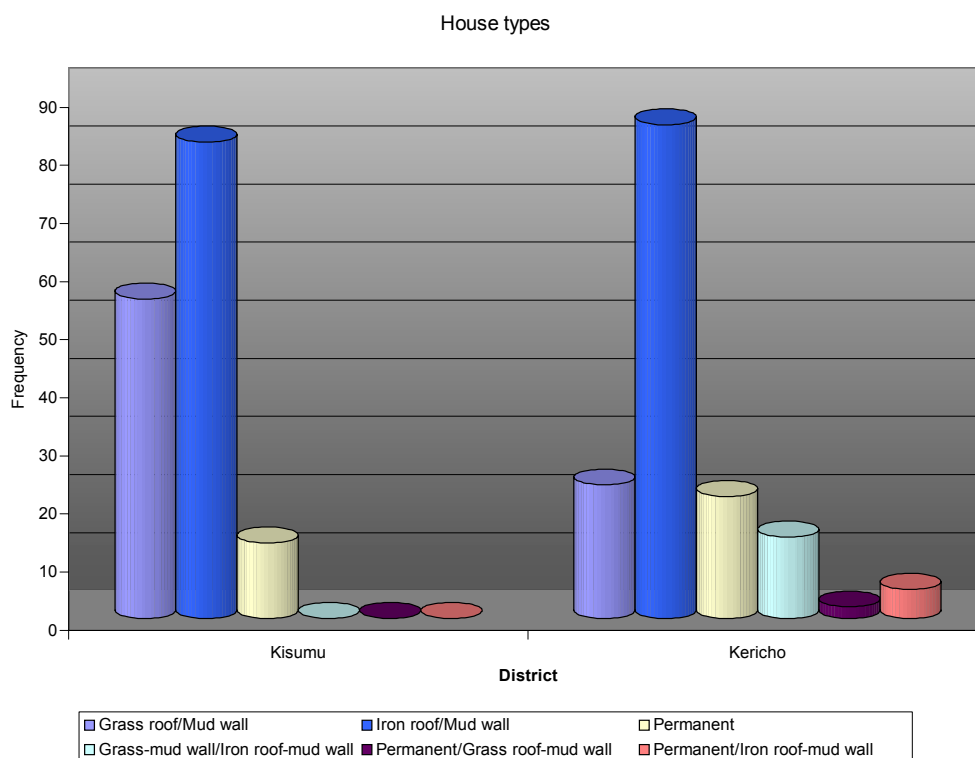


Respondents tend to have access to land in all survey areas as already observed above but when it comes to owning land, Kericho tend to lag behind Kisumu. The question of land ownership should be viewed in terms of age and gender in order to get a clearer picture. There are cultural practices in rural Kenya that sometimes limit land ownership to the community or male members of the household. In Kericho 64.75% of the respondents own land while in Kisumu 92.7% own land. A revisit to the survey areas is necessary to check for this disparity between access to land

Land sizes tend to vary widely in Kericho, ranging from 0.5 acres to 30 acres as compared to Kisumu land sizes, which is in the range 0.13 acres to 20 acres. In Kericho, most land parcels are in the range of 0.5 acres to 5 acres and in Kisumu most land parcels are in the range of 1 acre to 2 acres indicating that land parcels in Kericho tend to be larger than in Kisumu and this can be explained by restriction of land excision in the cash crop growing areas of Kericho. This can also explain the lower number of respondents owning land in Kericho as compared to Kisumu

Most houses in the survey areas are of the 'semi-permanent' types (iron roof and mud wall, accounting for 56.7% of the respondents' houses in Kericho and 54.7% in Kisumu. Grass thatched mud wall houses tend to be more common in Kisumu than in Kericho and permanent houses also tend to be fewer in Kisumu data than in the Kericho Data. This suggests relatively low-income levels in the Kisumu survey area than in Kericho area.





Owning a radio, a bicycle and having access to newspapers is sometimes considered a status symbol and some measure of wealth in rural Kenya. Radio is considered basic feature of households in rural Kenya and lack of it can be considered a measure of poverty. The bicycle tends to be of a higher status than a radio in the homestead, as it tends to cost more and used to be associated with those in formal employment. The presence of a bicycle can therefore be used to as an indicator of a relatively well to do household in the rural areas of Kenya although of late it has lost its appeal as a status symbol. Access to newspaper can be used to imply relatively good literacy and this can also be used to infer wealth or higher social status. Ownership of radio, bicycle and access to newspapers in the survey data are summarised in the table below:

#### Ownership of radio, bicycle and access to newspapers

District	Item	Frequency	%
Kericho	Radio	123	81.5
	Bicycle	23	15.2
	Access to newspaper	37	24.5
Kisumu	Radio	122	81.3
	Bicycle	73	48.7
	Access to newspaper	76	50.7

The relatively low percentage of respondents in Kericho to bicycle ownership and access to newspapers should also be viewed in terms of terrain of the survey area.

#### Health issues in the survey environments

Source of water used in the households can be a health hazard especially in terms of water borne diseases. In this survey, there is recognition that sources of water become a health hazard mainly during dry seasons when water is scarce.

Sources of water during dry seasons in the survey areas are summarised in the frequency table below. Rivers/streams seems to be a major source of water in both Kericho (76.8%) and Kisumu (46.7%) data and

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this is followed by borehole in Kericho (25.8%) and lake in Kisumu (34.0%). Availability of tap water tends to be higher in Kisumu (28.7%) than in Kericho (19.9%) and this could be due to the influence of Kisumu town or the water projects in the Area.

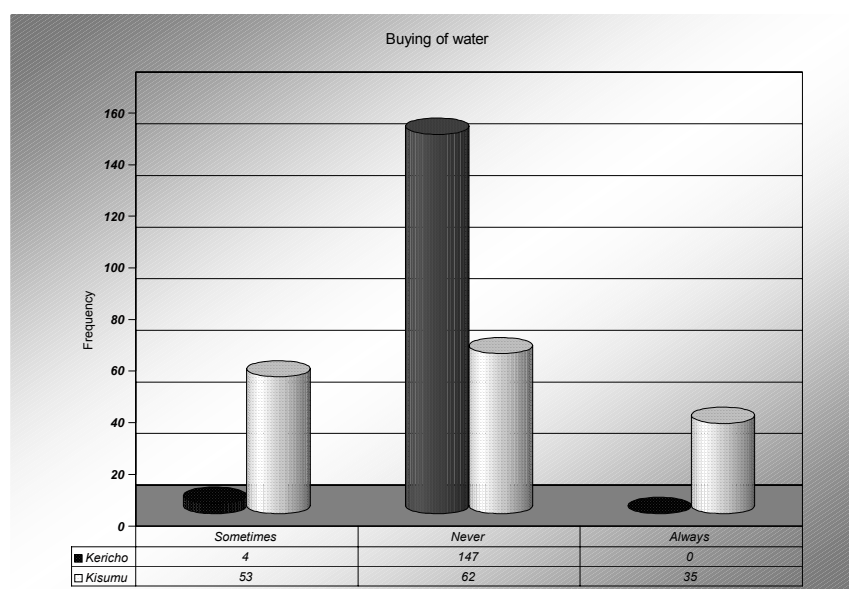
**Sources of water in dry seasons**

District	Source	Frequency	%
Kericho	Tap	30	19.9
	Borehole	39	25.8
	Roof catchment	15	9.9
	Lake	0	0.0
	Protected well	8	5.3
	River/stream	116	76.8
	Unprotected well	1	0.7
	Pond	1	0.7
	Spring	0	0.0
Kisumu	Tap	43	28.7
	Borehole	25	16.7
	Roof catchment	0	0.0
	Lake	51	34.0
	Protected well	17	11.3
	River/stream	70	46.7
	Unprotected well	7	4.7
	Pond	5	3.3
	Spring	5	3.3

Buying of water in the Kericho survey area is relatively very rare but Kisumu data indicate a relatively high tendency to buy water even though majority still never buy water and this can be used to imply relative aridity in the Kisumu survey area.

**Practice of buying water**

District	Do you buy water	Frequency	Percent
Kericho	Sometimes	4	2.6
	Never	147	97.4
	Total	151	100.0
	Always	35	23.3
Kisumu	Sometimes	53	35.3
	Never	62	41.3
	Total	150	100.0



How water is stored can be a health hazard as well as an indicator of water supply problems. In the survey areas, the respondents use the following facilities to store water:

#### Water storage units

Unit of storage	Kericho		Kisumu	
	Frequency	%	Frequency	%
Jerry cans	101	67.3	110	73.3
Drums	51	34.0	46	30.7
Large tanks	17	11.3	5	3.3
Pots	98	65.3	128	85.3

The results in the table above indicate that Jerry cans and pots are the preferred water storage units in the survey areas. Note the use of large tanks and drums difference between the survey areas; indicator of wealth or abundance of water?

In both Kericho and Kisumu, majority of respondents indicated no problem with water accessibility and this may explain the use of jerry cans and pots to store water. Kericho reported 94% of the respondents having no problem with access to water and Kisumu reported 87.3% of the respondents having no problem with water accessibility. It is possible that most households surveyed are either located near the river in Kericho or near the lake in Kisumu. Respondents identified major water problems as follows:

#### Major water problems

Water problem	Kericho		Kisumu	
	Frequency	%	Frequency	%
Availability	3	2.0	21	14.0
Quality	83	55.0	133	88.7
Quantity	0	0.0	1	0.7

It appears from the table results that it is the quality (55% in Kericho and 88.7%) that is a major problem to the respondents especially in Kisumu data.

Provision of health services in the survey areas seems to be largely centred on government health facilities especially health centres and local dispensaries. In Kericho, majority (64.9%) of respondents indicate their family members go to local dispensary for treatment and followed closely by health centres (33.1%). In Kisumu, most respondents indicated that family members receive treatment at health centres

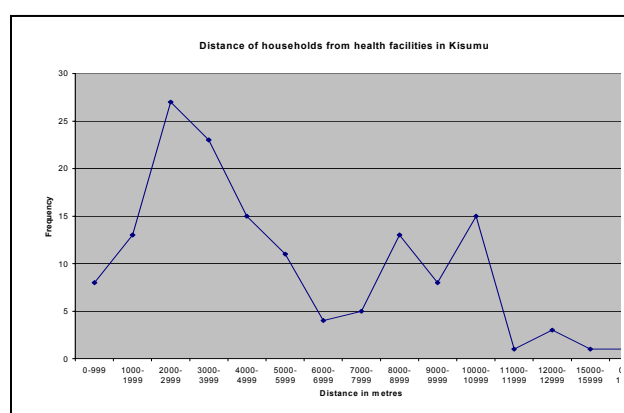
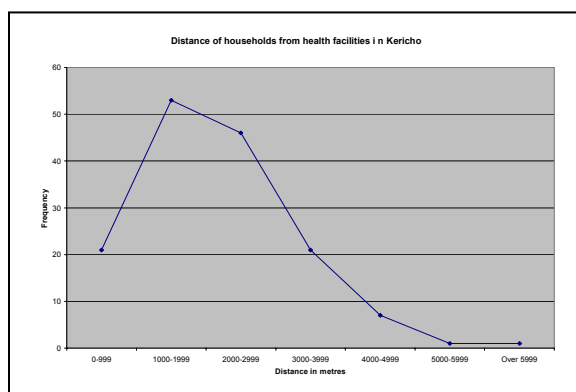
(66.7%) and at the local dispensary (20.0%). Provincial hospitals and private hospitals/clinics are seemingly not the treatment centres of choice in the rural areas of Kenya. Even if other factors are taken into account, the number of respondents who have reported using provincial hospitals and private health facilities are very few and would not make any difference in the analysis of difference.

### Family treatment centres

Centre	Kericho		Kisumu	
	Frequency	%	Frequency	%
Provincial hospital	0	0	2	1.3
District hospital	1	0.7	14	9.3
Health centre	50	33.1	100	66.7
Local dispensary	98	64.9	30	20.0
Private hospital	1	0.7	1	0.7
Private Clinic	1	0.7	3	2.0

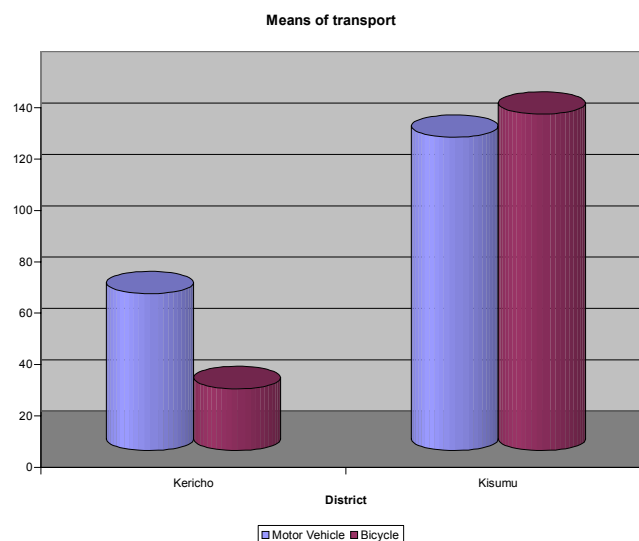
When ownership of the health facilities is considered, the role of government in health services provision becomes apparent. Kericho, the health facilities visited by 98.7% of respondents are government owned and in Kisumu the figure is 97.3%.

In the Kericho area, health facilities are seemingly located at distances ranging from 0.2 km to 20 km but most households are within 1 – 2 km range. In Kisumu survey, household are located at distances ranging from 0.1 km to 20 km and the majority of households are seemingly within the 1-6 km, indicating a wider dispersal of households from health facilities in Kisumu than in Kericho



Most respondents in both Kericho and Kisumu do walk to the health facilities. In Kericho 99.3% of the respondents indicate they walk to the health facilities and in Kisumu, 79.3% of the respondents can walk to the health facilities. This means that most of the health facilities visited by respondents are near their homesteads.

Means of reaching health facilities, a part from walking as indicated above include using motor vehicles and bicycles. In Kericho, 46.6% indicate they use vehicles to reach health facilities and in Kisumu the figure is 81.3%. Use of bicycles to reach health facilities is seemingly more widespread in Kisumu (87.3%) than in Kericho (18.3%) and this can be due to terrain problem or distance to health facilities. Boats are definitely out as means of transport to health facilities in both the survey areas and indicates that there are either no health facilities in the lake or there is no need to use a boat. Note that most respondents can walk to health facilities.



Health centres visitations tend to be rare in Kericho data as 44.4% of the respondents indicate no member of the family having visited the hospital and where visitation has occurred, numbers are mostly between 1 and 2 persons. The same picture is also true of the Kisumu survey data.

#### Visits to hospitals in the last three months by household members

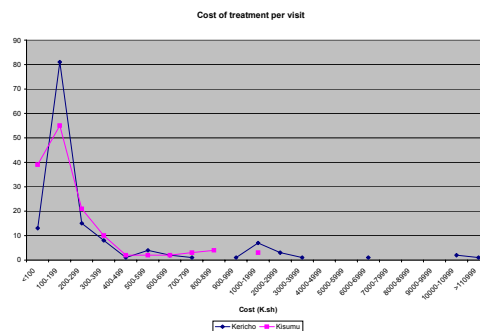
Number of visits	Kericho		Kisumu	
	Frequency	%	Frequency	%
0	67	44.4	70	46.7
1	37	24.5	34	22.7
2	24	15.9	26	17.3
3	15	9.9	13	8.7
4	3	2.0	5	3.3
5	2	1.3	2	1.3
6	2	1.3		
9	1	0.7		



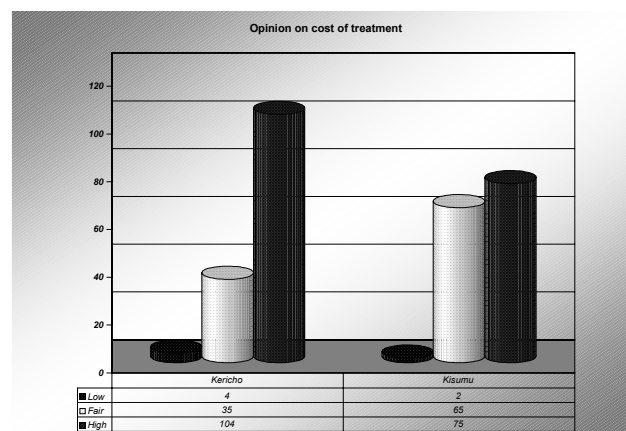
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The health facilities visited by respondents tend to satisfy patients needs in terms of services as indicated by 64.2% in Kericho data and 85.9% in Kisumu. This is further supported by indication that majority of family members always get well after treatment (87.4% in Kericho and 96.6% in Kisumu).

Treatment of cholera in the health facilities tends to be based on payment as 68 (45%) respondents who answer the question in Kericho indicate they always pay and in Kisumu, out of the 150 respondents, 147 (98.7%) indicate they always pay for the treatment of cholera. This situation is also true for the treatment of malaria where 99.3% of the respondents in Kericho indicate they pay and in Kisumu the figure is 96.7%. This situation can be explained by the cost-sharing policy in health provision and payments vary from as low as Kenya shillings 15 to Kenya shillings 12,100. Respondents pay between 100 shillings and 200 shillings. Patient admission tends to be rare and this can be explained by the fact that most health facilities visited are health centres or local dispensaries, which generally have limited admission facilities. In Kericho, 16.9% of the respondents report admission of patients and the figure drops in Kisumu to only 9.8%.



Even if the cost of treatment tends to be relatively low, the respondents generally feel they are high (Kericho, 72.7% and Kisumu, 52.8%). Note that most of the respondents have low monthly total income and tend to rely on land for income.



In case of increased cholera cases, coping mechanisms mentioned include selling some animals and selling some food. In Kericho, respondents would tend to sell some food (75.5% of respondents) to cope with increased cholera cases while in Kisumu the tendency is to sell some animals (82.0% of respondents). Other ways of respondents coping with coping with increased cholera cases are borrowing, revenue from business, help from children or relatives or from spouse. The coping mechanisms tend to make use of respondents' resources and can lead to increased debts and poverty.

Mechanisms applied in coping with increased malaria cases is the same with those of coping with increased malaria cases, where Kericho respondents tend to sell food crops or borrow and Kisumu respondents tend to sell animals or borrow. Other mechanisms of coping with increased malaria cases include harambee, selling cash crops, and taking loans, all of which may make the respondents poorer.

**Malaria and Cholera Data**

Respondents tend to think that health of family members is associated with weather conditions (see table below) and this belief is based on experience in the environments where the surveys have been conducted.

**Opinion on relation between health of household members and weather**

<i>District</i>	<i>From your experience, is the health of your family members associated with weather</i>	<i>Frequency</i>	<i>Percent</i>
Kericho	Yes	138	94.5
	No	8	5.5
	Total	146	100.0
Kisumu	Yes	129	86.6
	No	20	13.4
	Total	149	100.0

**Malaria data**

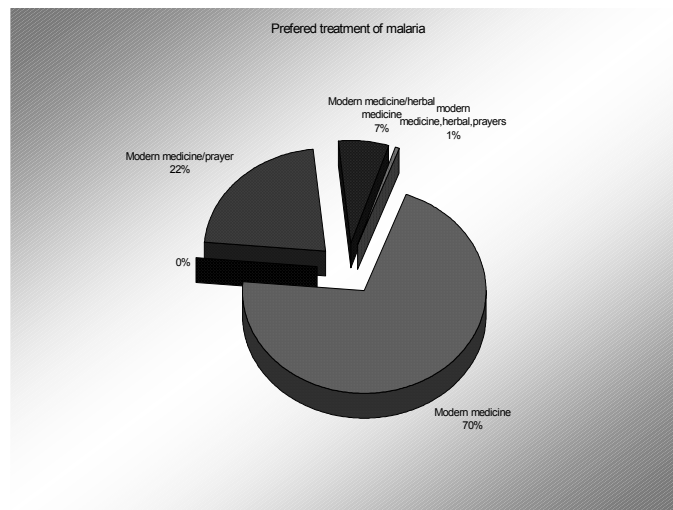
The respondents experience is tested further by seeking from them the characteristics or signs they use to identify malaria cases and the results is as follows:

**Opinion on signs of malaria**

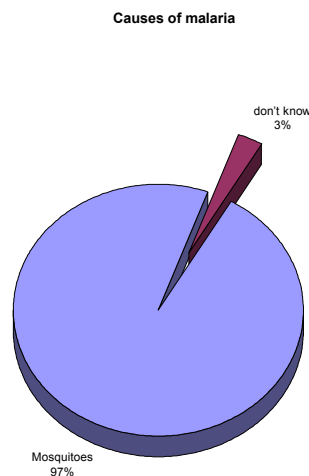
<i>Sign</i>	<i>Kericho</i>		<i>Kisumu</i>	
	<i>Frequency</i>	<i>%</i>	<i>Frequency</i>	<i>%</i>
Fever	123	82.0	43	95.6
Headache	115	76.2	40	88.9
Stomach ache	24	15.9	19	42.2
Joint ache	56	37.1	29	64.4
Vomiting	69	45.7	37	82.2
Lack of appetite	52	34.4	29	64.4
Convulsion	8	5.3	10	22

Kisumu survey, they are used just to weigh the discussions. In the Kericho data, respondents indicate that it is fever (82%) that they tend to use to identify a malaria attack and this is followed very closely by headache (76.2%). This pattern appears in the Kisumu data where some respondents answer this question. Other signs in order of rank of opinion in the Kericho data are vomiting (45.7%), joint ache (37.1%), lack of appetite (34.4%) and stomach ache (19.9%), all of which are part of 'popular opinion on signs of malaria.

Opinion on malaria attack is filtered further in the Kericho data by using respondents' opinion on how malaria is treated and the results tends largely to use of modern medicine (70.9%), followed by modern medicine plus faith (21.9%), modern medicine and herbs (6.6%) and finally combination of modern medicine, herbs, and prayers (0.7). This tends to suggest that the respondents favour use of modern medicine in treating malaria. This may further suggest that the respondents are sensitive to modern medicine use in the treatment of malaria.



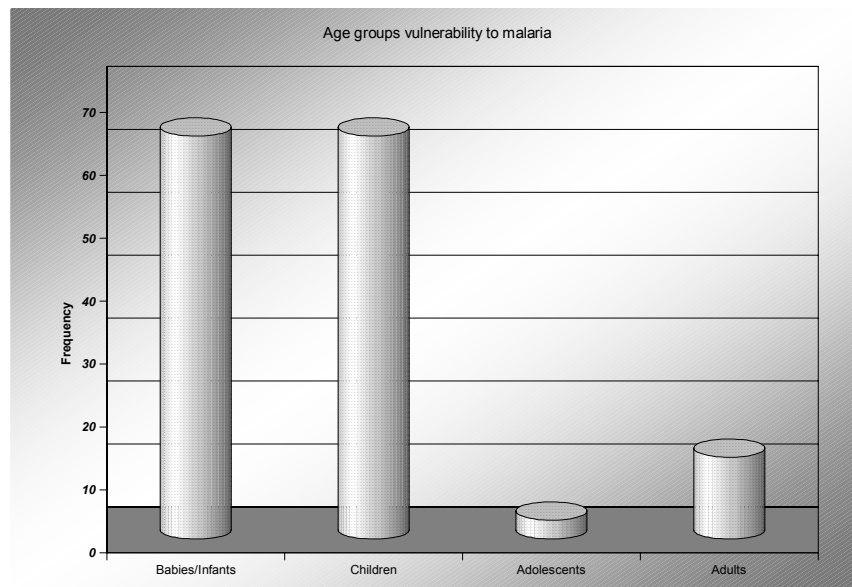
Malaria prevention according to the respondents in Kericho survey data include clearing bushes (40.1%), use of mosquito nets (23.1%), draining water and clearing bushes (9.5%), draining stagnant water, using mosquito coils and burning cow dung (0.7%). The respondents are united in the opinion that malaria is caused by mosquitoes (97.4%) and the rest indicating not knowing the cause. This is an indication of high awareness of the dangers caused by mosquitoes to human health.



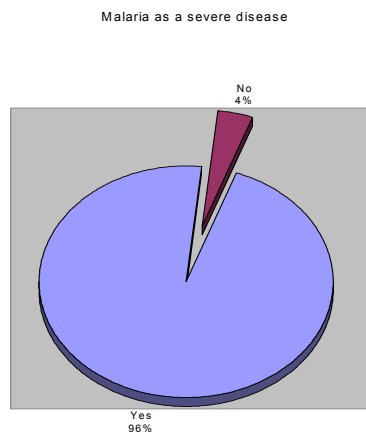
On other causes of malaria, cold weather, use of cooking fat and dirty environment have been mentioned as possible cause of malaria. There is need for further probe on these three views to determine the sources of these views.

In the Kericho data, babies or infants and children are considered as the age groups most at risk to malaria attack (each accounting for 44.4% of the responses). Adults (9.0%) and adolescents (2.1%) are viewed to be less at risk to malaria attack. This view may lead to complacency in measures against as already discussed above.





On malaria peak periods in the calendar year, the wet season (78.0%) has been singled out as the period when malaria is most common even though a small percentage (21.4%) of the respondents considers dry period or both wet and dry periods as possible malaria peak time. In the Kericho data, the general view on malaria is that of a severe disease as indicated by 96.0% of the respondents and only 6.0% saying no.



On payment of malaria treatment, it seems to be the view of the respondents in the Kericho data that it is the responsibility of the government (66.9%), even though both the government and the family (23.8%) or the family (9.3%) are also mentioned. On prevention of malaria, the respondents consider the family (76.8%) to be the party to pay but also indicate the need to share the cost (14.6%) or the government (8.6%) to take the responsibility.

In case of a member of the family having malaria, it is the opinion of the respondents that the person should go to the health facility for treatment (100%) and no any other alternative opinion are offered in the Kericho data. This is further supported by opinion on local herbalists ability to treat malaria where only 15.8% of the respondents are in favour and 84.2% having no faith on the herbalists ability.

Strong opinion is expressed in the Kericho data that members of the family should sleep under bed nets (84.7%) with only 15.3% not in favour.

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Action to be taken when one has malaria are clear in the data and no action is clearly not an option as expressed in the frequency scores below:

### Action to be taken in case of malaria

Action	Frequency	%
Go to health facility	149	99.3
Treat at home	63	42.0
Visit herbalist	7	4.7
Pray	1	0.7
Do nothing	0	0.0

Action taken when children have malaria also does not include not doing anything and are as follows:

### Action to be taken when a child has malaria

Action	Frequency	%
Go to health facility	149	99.3
Treat at home	63	42.0
Visit herbalist	7	4.7
Pray	1	0.7
Do nothing	0	0.0

When a child has malaria or an individual has malaria, the action on top of priority list is to go the health centre and this action has already been expressed early in the report.

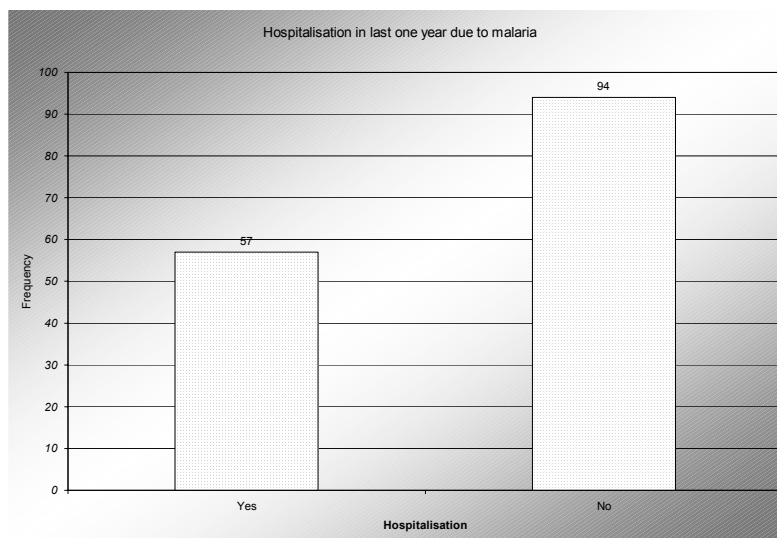
In medicine used to treat malaria, opinions vary in names of drugs but there is a tendency to have a combination of 'on counter' pain killer drugs and known prescription anti-malaria drugs such as Fansidar, Metakelfin and the quinine family.

Effectiveness of control measures against malaria may be affected by household size and in the Kericho data, number of people in the households varied from 1 person to 13 people but aggregating around 3 people to 6 people yet number of bed nets in most cases (84.8%) is nil or at most 2. This clearly 'put' the rest of the household members exposed to mosquito bites and malaria. Use of bed nets is also not very common in the Kericho database as 78.9% of the respondents indicating no use of bed nets (after all, bed nets are usually few in the households).

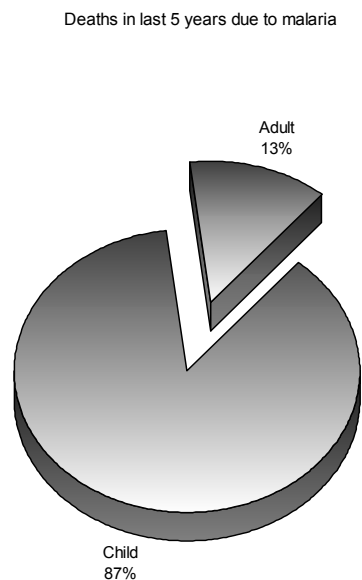
Those using bed nets tend not to treat the nets with insecticides (75.0%) and if it happens there is treatment, it is likely to be once to twice a year (25.0%). Treatment of nets with insecticides is clearly not a common practice in the Kericho data.

Mosquito control measures in households in the Kericho data include use of insecticides spray (100%), mosquito coils (3.3%), bush clearance (62.3%), draining of stagnant water (11.3%) and screening of houses (0.7%).

Hospitalisation due to malaria tend not to be common in the Kericho data but 37.7% of the respondents reported admission to health facility for treatment of malaria. The remaining 62.3% reported no admission or hospitalisation in the last one year due to malaria.



Deaths in households due to malaria cases tend to be rare events in the Kericho data with only (8.1%) reporting loss of family members in the last five years due to malaria. In cases where deaths due to malaria in the last five years are reported, the majority of cases are children as is represented in the graph below.



### Diarrhoea and Cholera data

Diarrhoea and cholera issues are focused in the Kisumu survey data but where Kericho data are available, they may be used to balance the discussion.

Good sanitation is one the major measures against diarrhoea and cholera and type of toilet used is crucial in the sector. In all cases toilets are pit latrines (100% in Kericho and 67.3% for Kisumu) or bush (32.7% in Kisumu). Pit latrines if not located and constructed properly may pollute sub-surface water storage or nearby surface water systems, thus a danger to the health of the people. Use of bush as a toilet is one of the major health hazards especially in terms of infectious diseases such as cholera and diarrhoea.

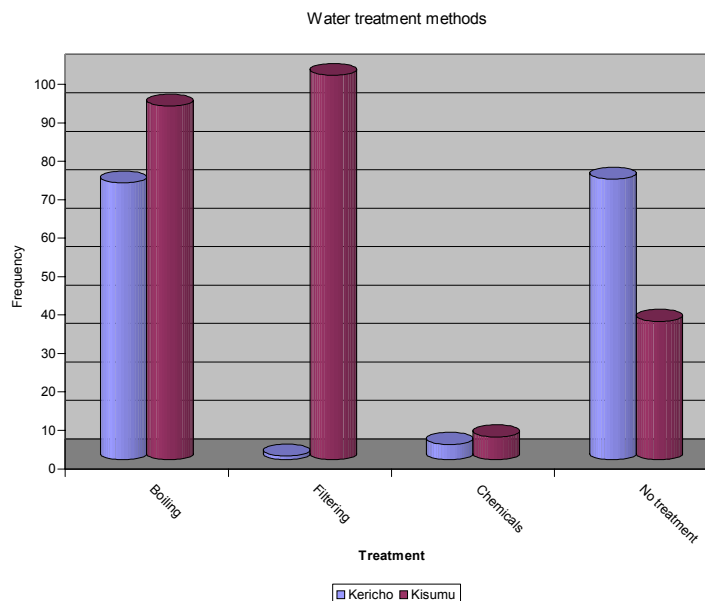
Access to sewage system is generally lacking in the Kericho data with 99.3% of the respondents not having access and only 1.3% in the Kisumu data having access.

Sanitation issues within an area are usually addressed through institutions but presence of such institutions are generally lacking in rural Kenya. In the data survey, only 16% of respondents in Kericho survey report presence of institutions dealing with sanitation and 21.3% in the Kisumu data.

Water is an essential element to the survival of living beings but can also be a source of diseases if not treated properly. There are many ways of treating water so as to make it safe for use and the respondents in the survey data for both Kericho and Kisumu have given the following treatment preferences:

#### Water treatment methods

<i>Treatment</i>	<i>Kericho</i>		<i>Kisumu</i>	
	Frequency	%	Frequency	%
Boiling	72	48.0	92	61.3
Filtering	1	0.7	100	66.7
Chemicals	4	2.7	6	4.0
No treatment	73	48.7	36	24.0



Reasons for not treating water include boiled water fermenting, boiled water not good due to sedimentation, no health effect, no need to treat water, water is clean, water safe, lack of time, lack of fuel, river water is clean, used to drinking untreated water, vomiting if boiled water is taken, spouse not aware of need to treat water and borehole water is clean and safe. It seems that those not treating their water are of the opinion that the water is safe especially if it is from a flowing river and a borehole while others think water does not affect their health because they are used to it.

Awareness on the consequences of using untreated water is very high with Kericho recording 83.9% awareness and Kisumu 88.9% awareness. The consequences are given in the table below and it is disease that is considered the major consequence (81.9% for Kericho and 87.1% for Kisumu).

**Consequences of drinking untreated water**

<i>Consequences</i>	<i>Kericho</i>		<i>Kisumu</i>	
	Frequency	%	Frequency	%
Disease	122	81.9%	128	87.1
None	13	8.7	6	4.1
Don't know	14	9.4	13	8.8

Information on consequences of using untreated water tend to be received through mass media, health service providers, community awareness programmes, formal sources and informal networks, all of which are scored in the table below:

**Means of receiving information on consequences of drinking untreated water**

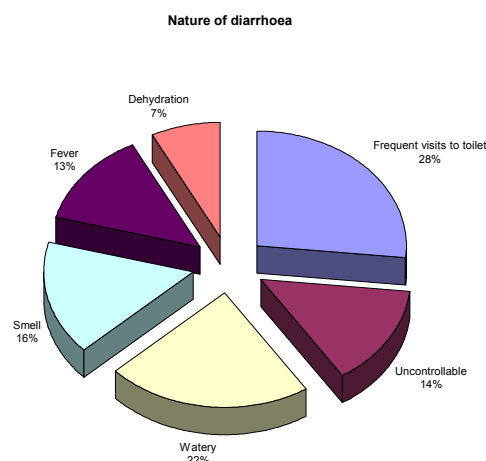
	<i>Kericho</i>		<i>Kisumu</i>	
	Frequency	%	Frequency	%
Means				
Media	81	65.3	16	11.9
Health service providers	51	40.8	31	22.5
Community awareness programmes	4	3.2	23	16.7
Formal sources	26	21.0	47	35.1
Informal networks	13	10.5	50	37.3

Washing of hands before meals is one of the main hygienic practices basic to protection against infectious diseases such as cholera and diarrhoea, and in the survey data 99.3% of the Kericho respondents and 98.6% of Kisumu respondents do practice it but there is need to filter this further by focusing on the quality of washing hands.

Prevalence of a disease is usually measured within a time period and in this survey, the last five-year period is used to measure prevalence of diarrhoea in Kericho and Kisumu areas. In the Kericho survey data, only 2.8% of the respondents reported diarrhoea occurrence in household members while in Kisumu the figure is 28%. This tends to suggest low prevalence of diarrhoea in both Kericho and Kisumu data. For respondents to recognise a diarrhoea case, there are certain characteristics of the disease that can be used to describe it. In the survey data, the diarrhoea cases reported in the Kisumu data (the focus data for diarrhoea and cholera cases) have the following characteristic scores:

**Nature of Diarrhoea cases**

Nature	Frequency	%
Frequent visits to toilet	36	90
Uncontrollable	19	47.5
Watery	30	75.0
Smell	22	55.0
Fever	18	45.0
Dehydration	10	25.0



Diarrhoea as a communicable disease is transmitted through various interaction levels and the how of it is transmitted in the Kisumu survey data are in terms of using water from lake (10.3%), piped water (.07%), pond water (0.7), stream/river water (6.9%), roof water (6.9%), eating food (62.1%), after taking alcohol (0.7%) and after attending a funeral (6.9%), all of which are related to hygienic practices. These possible causes of diarrhoea can be summarised into two groups; use of untreated water and poor eating habits.

Where a diarrhoea occurrence occurs in the Kisumu data, 60.0% of the respondents indicate the disease is life threatening.

Awareness on cholera is seemingly very high in the two survey areas of Kericho and Kisumu. In the Kericho environment, 98.7% of the respondents indicate they know of the disease cholera and in Kisumu data, 99.3% indicate they know the disease. High awareness of a disease usually is an indicator of the disease having been experienced in a geographical area over duration of time. Awareness may also indicate a deliberate information campaign through official channels or through non-governmental organizations.

How cholera is transmitted according to the respondents is given in the table below:

### Causes of Cholera

How one gets cholera

	Kericho		Kisumu	
	Frequency	%	Frequency	%
Drinking untreated water	33	22.1	39	26.9
Eating contaminated food	3	2.0	11	7.6
Drinking untreated water/eating contaminated food	76	51.0	77	53.1
Don't know	37	24.8	18	46.9
Breathing contaminated air	0	0.0	3	2.0
Cold weather	0	0.0	1	0.7*
Using dirty plates (utensils)	0	0.0	1	0.7*
Eating uncooked foods	0	0.0	1	0.7*
Low hygiene	0	0.0	1	0.7*
Using dirty hands	0	0.0	1	0.7*
Wading in stagnant water	0	0.0	1	0.7*

\*Additional information provided by respondents in Kisumu survey.

When cholera strikes, there is need for urgent action and in the Survey data, most respondents are of the opinion that when one gets cholera, the right action is to take the person to the health facility (100% in

Kericho and 96.6% in Kisumu). In the Kisumu data, there are four cases (2.7%) of suggestion to treat at home or treat at home and take to health facility (0.7%).

In case of treatment at home, suggestions in the survey data indicate the following treatment modes:

- Use of oral rehydration salts
- Use of fluids (porridge)

The two measures can be classified as first aid or emergency measures before proper treatment at health facilities. This seems to suggest that even treatment at home suggested in the Kisumu data can be just a stopgap measure before taking to health facility. Other measures that are suggested in the Kisumu data include use of antibiotic drugs such as ampicylone, flagyl and tetracycline and use of boiled rice water, all of which are emergency measures before proper treatment at health facilities.

The weather conditions, which might promote cholera, are used as a measure of relation between weather conditions and cholera outbreak. Most respondents seem to suggest that cholera occurs mostly during wet weather conditions (20.4% in Kericho and 51.7% in Kisumu data respectively). In the Kisumu data, dry condition (36.9%) is also mentioned as weather state that promote cholera occurrence. In the Kericho data, a large proportion (64.6%) of the respondents do not seem to know the weather conditions that promote cholera. The opinion on weather condition promoting cholera occurrence seem to be at variance with the idea that cholera is most like to occur during period of low water supply usually associated with dry conditions.

To prevent the disease, respondents have suggested use of treated/boiled water and washing of hands before eating/after toilet (good hygienic practices) as the most important measures. In the Kericho data, drinking treated or boiled water (31.5%) and drinking treated water/washing hands (17.1%) are seemingly the preferred cholera prevention methods. Washing hands after toilet visit and covering foods are also mentioned but not as overall priority. In the Kisumu data, drinking treated water and washing hands (36.9%) is seemingly the preferred method of cholera prevention and is followed by drinking treated or boiled water (27.5%). What emerges from the question of how to prevent cholera is the recognition of using safe water and good hygienic practices especially washing hands.

A cholera episode requires immediate action to be taken and in the survey data, both Kericho and Kisumu, the overall preferred action is to take the person to a health facility. In Kericho data, 99.3% of the respondents preferred taking to health facility and in Kisumu data, the figure is 96.6% with immediate measure at home given a slight edge over the Kericho figure. The respondents in all cases seemingly have no alternative to taking the affected person to hospital and treating at home. This indicates awareness on the serious nature of cholera that is better handled at a health facility.

The number of people affected by cholera in last outbreak can be used as a measure of the magnitude of the cholera problem last time round. In the survey, the question of number of people affected in households in the last outbreak of cholera focused on the Kisumu data. The Kisumu figures on number of people affected by cholera in last outbreak seem to suggest no cholera cases (74.0%) in the survey area and this indicates that last cholera outbreak was either an isolated event or the sampled households largely not affected (see table below). In cases where cholera is reported, the number tends to be only one individual, 30.0% overall but for reported cases, 76.9%.

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**Action to be taken if cholera strikes**

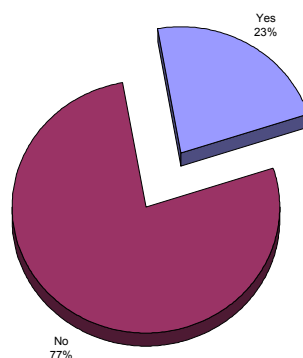
District	Action	Frequency	Percent
Kericho	Treat at home	1	.7
	Treat in a health facility	145	99.3
	Total	146	100.0
Kisumu	Treat at home	3	2.0
	Treat in a health facility	144	96.6
	Treat at home/treat in health facility	2	1.3
	Total	149	100.0

**Number of people affected by cholera in homesteads**

District	Number	Frequency	Percent
Kisumu	0	111	74.0
	1	30	20.0
	2	4	2.7
	3	2	1.3
	4	2	1.3
	5	1	.7
	Total	150	100.0

The low number of reported cholera cases above is further reinforced by few cases of visitation to health facility for cholera treatment. In Kisumu data, 77.3% of the respondents indicate no visit to health facility for cholera treatment and only 22.7% report cases of health facility visit. This situation needs to be checked against hospital records as most respondents do go to health facilities when sick (earlier mentioned).

Health facility visitation to treat cholera

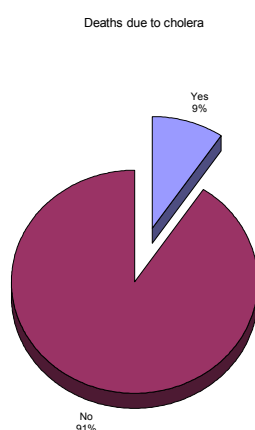




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Cholera treatment at health facilities is considered further by analysing cases of hospitalisation (admission) of household members to health facility for cholera treatment. The Kisumu data still indicate low hospitalisation cases since only 20.0% of respondents report hospitalisation due to cholera. This links to few visitation cases reported above.

Cost of treating cholera cases varies from 100 to 2,600 Kenya shillings indicating low (mean of 610 Kenya shillings) expenditure on cholera treatment. This may be linked to few cases of hospitalisation as well as few visitations to health facilities for cholera treatment. There is also need to take into account low income levels in the Kisumu data, which may affect number of visits to health facility for treatment as well as what is spent on treatment of cholera. One would expect increased deaths due to cholera if there were few visits to health facilities for treatment of cholera. In the Kisumu data, few cases of deaths due to cholera are reported with only 9.3% of respondents indicating deaths due to cholera. This should be seen in terms of reported cases of cholera in households, which is also very low (mentioned in previous paragraphs). If there were no cases of cholera in the first place then no deaths due to cholera should be expected.



Of the reported cases of deaths due to cholera (15 in number) only one is a child and the remaining 14 are adults. This may indicate that cholera in Kisumu survey area affects adults more than children or it may be just a case of better hygienic conditions for children and increased risk exposure for adults.

### Daily schedules for categories of household members

#### Normal daily schedule of female adult (4.am to 12 midnight)

Time	Kericho	Kisumu
4 am - 6 am	Wash utensils	Wake up
	Wake up	Milk cow
	Milk cow	Make breakfast
	Make breakfast	Farm work
	Clean up	Clean up
	Child care	Business

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6 am - 8 am

Wash utensils	Wake up
Wake up	Tend livestock
Milk cow	Milk cow
Make breakfast	Make breakfast
House chores	House chores
Formal work	Formal work
Farm work	Fetch water
Clean up	Farm work
Child care	Clean up
Business	Business

**Normal daily schedule of female adult (4.am to 12 midnight) cont**

<b>Time</b>	<b>Kericho</b>	<b>Kisumu</b>
<b>8 am - 10 am</b>	Tend livestock	Tend livestock
	Rest	Rest
	House chores	House chores
	Formal work	Formal work
	Fetch water	Fetch water
	Farm work	Farm work
	Clean up	Clean up
	Child care	Business
	Business	Breakfast
<b>10 am - 12.00 noon</b>	Tend livestock	Tend livestock
	Make lunch	Rest
	House chores	Make ropes
	Formal work	Make lunch
	Farm work	House chores
	Clean up	Formal work
	Child care	Fetch water
	Business	Fetch firewood
		Farm work
		Clean up
<b>12.00-2 pm</b>	Tend livestock	Child care
	Rest	Business
	Prepare lunch	Breakfast
	Lunch	Tend livestock
	House chores	Rest
	Formal work	Prepare Lunch
	Farm work	Lunch
	Child care	House chores
	Business	Formal work
		Fetch water
		Fetch firewood
		Farm work
		Business

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2 pm – 4 pm

Tend livestock	Wash
Rest	Visits
Market	Tend livestock
House chores	Rest
Formal work	Prepare food
Fetch water	Market
Farm work	House chores
Clean up	Group meeting
Child care	Formal work
Business	Fetch water
	Fetch firewood
	Farm work
	Clean up
	Church activities
	Business

**Normal daily schedule of female adult (4.am to 12 midnight) cont**

Time	Kericho	Kisumu
4 pm – 6 pm	Tend livestock Rest Prepare food Milk Market House chores Formal work Fetch water Farm work Clean up Child care Business	Visits Tend livestock Rest Prepare food Market Make ropes House chores Formal work Fetch water Fetch firewood Farm work Community functions Church activities Child care Charcoal burning Business Bathe/wash
6 pm – 8 pm	Tend livestock Supper Sleep Rest Prepare food Milk cow House chores Fetch water Farm work Child care Business	Tend livestock Supper Rest Prepare food Market House chores Fetch water Business
8 pm – 10 pm	Supper Sleep Rest House chores Child care	Supper Sleep Prepare food Make ropes
10 pm – 12.00 midnight	Sleep	Wake up Supper Sleep Fishing

**Normal daily schedule of male adult (4.am to 12 midnight)**

Time	Kericho	Kisumu
4 am – 6 am	Wake up Take breakfast Sleep Milk cow Feed cattle Cut grass for cattle Casual work Bathe	Wake up Take breakfast Sleep Milk cow Formal work Fishing Farm work Business
6 am – 8 am	Wake up Tend livestock Take breakfast Milk cow Formal work Farm work Cut timber Cut grass for cattle Casual work Bathe Assign duties Arrive from work	Work at lakeside Wake up Tend livestock Take breakfast Sleep Self employment Milk cow Homestead work Formal work Fishing Farm work Cut papyrus reeds Construction work Business

8 am – 10 am	Tend livestock Supervise work at home Rest Formal work Farm work Do nothing (sick) Cut timber Business	Work at lakeside Wake up Tend livestock Take breakfast Sleep Self employment Rest Formal work Fishing Farm work Cut papyrus reeds Construction work Carpentry Business
10 am – 12 noon	Tend livestock Supervise work at home Rest Formal work Farm work Cut timber Business	Work at lakeside Visits Tend livestock Take breakfast Supervise work at home Sleep Self employment Rest Part time work Lunch Homestead work Formal work Fishing Farm work Cut papyrus reeds Construction work Church activities Carpentry work Business Boda boda Bathe
12 – 2 pm	Visits Supervise work at home Sleep Rest Lunch Formal work Farm work Church activities Business	Visits Tend livestock Self employment Rest Lunch Formal work Fishing Farm work Construction work Church activities Carpentry work Business Boda boda

2 pm – 4 pm	Visits Tend livestock Supervise work at home Sleep Rest Market Centre Lunch Formal work Farm work Cut timber Church work Business	Work at lakeside Visits Tend livestock Self employment Rest Politics Mend fishing nets Lunch Homestead work Fishing Farm work Drink alcohol with friends Church activities Carpentry work Business Boda boda Bathe
4 pm – 6 pm	Visits Tend livestock Supervise work at home Sleep Rest Milk cow Market centre Maintenance work Formal work Farm work Cut timber Church work Business	Visits Tend livestock Sleep Self employment Rest Politics Play football/games Milk cow Homestead work Formal work Fishing Farm work Drink alcohol with friends Church activities Carpentry work Business Boda boda
6 pm – 8 pm	Visits Tend livestock Supper Supervise work at home Sleep Rest Milk cow Maintenance work Formal work Farm work Business Bathe	Visits Tend livestock Supper Rest Prepare food Play football/games Milk cow Make ropes Formal work Fishing Drink alcohol with friends Carpentry work Business Bathe

8 pm – 10 pm	Supper Sleep Rest Formal work	Supper Sleep Rest Make ropes Listen to radio Fishing
10 pm – 12 midnight	Sleep Formal work	Sleep Fishing

**Normal daily schedule of female child (4.am to 12 midnight)**

Time	Kericho	Kisumu
4 am – 6 am	Wake up Take breakfast School Prepare for school Play	Wake up Take breakfast Study Business
6 am – 8 am	Wake up Take breakfast School Prepare for school Play House chores Farm work Clean up Childcare	Wake up Take breakfast School Prepare breakfast Milk cow Fetch water Clean up Business
8 am – 10 am	School Play House chores Farm work	Wake up Take breakfast Stay home School Prepare food Play House chores Fetch water Fetch firewood Farm work Clean up Casual work Business
10 am – 12 noon	School Play Farm work	Wash Tend livestock Stay home School Prepare food Play House chores Fetch water and firewood Farm work Clean up Casual work Business
12 – 2 pm	Stay home School Play Lunch	Tend livestock Stay home School Prepare food

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	Farm work	Play Lunch House chores Casual work Business
2 pm – 4 pm	Tend livestock Stay home Sleep School Rest Play Lunch House chores Childcare	Wash Visits Tend livestock Stay home Sleep School Rest Play Lunch House chores Help at home Fetch water Fetch firewood Clean up Casual work Business
4 pm – 6 pm	Tend livestock Stay home School Rest Play House chores Farm work	Wash Tend livestock Stay home Sleep School Rest Play Market House chores Fetch water Fetch firewood Errands Clean up Childcare Casual work Business



6 pm – 8 pm	Supper Sleep Rest Prepare food Play House chores Fetch water Farm work Clean up Childcare	Wash Visits Supper Study Sleep Rest Prepare food Play House chores Heal at home Clean up Business Bathe
8 pm – 10 pm	Supper Study Sleep House chores	Supper Study Sleep House chores
10 pm – 12 midnight	Sleep	Supper Study Sleep

**Normal daily schedule of male child (4.am to 12 midnight)**

Time	Kericho	Kisumu
4 am – 6 am	Wake up School Prepare for school Milk cow	Wake up Take breakfast Fishing
6 am – 8 am	Wake up Take breakfast School Prepare for school Play Feed cattle	Wake up Take breakfast School Milk Fishing Fetch water Farm work Clean up
8 am – 10 am	Farm work Tend livestock Casual work Play Rest School	Play School Farm work Childcare Take breakfast Clean up Fishing House chores Stay home Wake up

10 am – 12 noon	Tend livestock School Rest Play Farm work Casual work	Wake up Tend livestock Take breakfast Stay home School Rest Play Homestead work Fishing Farm work Childcare Burn charcoal Bathe
12 – 2 pm	Stay home School Rest Lunch Assist parents	Tend livestock Stay home School Play Lunch Homestead work Fishing Casual work Burn charcoal
2 pm – 4 pm	Tend livestock Sleep School Rest Play Farm work Casual work Assist parents	Tend livestock Stay home Sleep School Rest Play Lunch House chores Fishing Casual work Assist parents
4 pm – 6 pm	Tend livestock Stay home School Rest Play Farm work Casual work Assist parents	Visits Tend livestock Stay home Sleep School Rest Rest Play Milk cow House chores Homestead work Fishing Errands Assist parents

6 pm – 8 pm	Tend livestock Supper Study Stay home Sleep School Rest Play Milk cow Fetch water Farm work Assist parents	Visits Tend livestock Supper Study Stay home Rest Play football/games Play Milk cow Clean up Childcare Bathe Assist parents
8 pm – 10 pm	Sleep Rest Study Supper	Sleep Supper Study
10 pm – 12 midnight	Supper Study Sleep Rest	Study Sleep

The normal daily schedules of different categories of household members tend to indicate a gender difference with a bias toward housework for females and homestead work for male.

The description of the database so far has relied on descriptive statistics without any attempt to carry out a statistical comparison. The basic comparison statistical method is descriptive and is usually useful where data is largely at the ordinal (category measures) level as is the case in the survey database. Below is an attempt to analyse the described data so as to extract association especially between demographic profiles of individual respondents with other elements in the database, malaria and environmental characteristics, cholera and environmental characteristics and cholera versus hygienic practices.

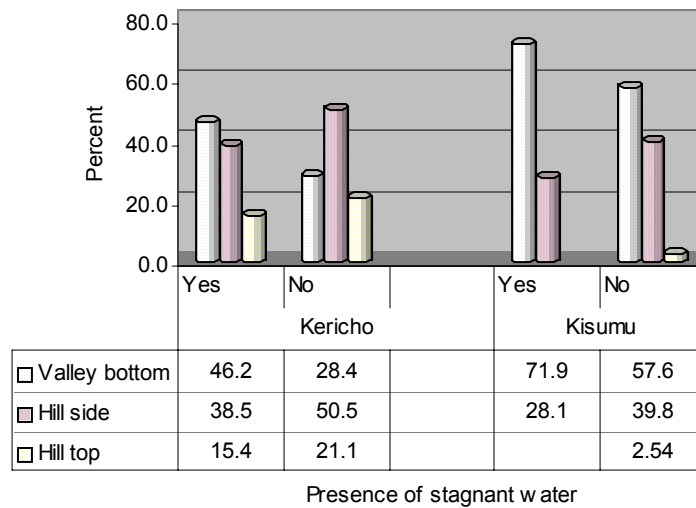
### Measures Associations

The location of a household in a given environment affects exposure or contact with conditions that may promote the occurrence of certain diseases. In this analysis attempt is made to associate the sitting of a household to the presence of stagnant water.

### Presence of stagnant water by location of households

The figure below shows cross-tabulation relationships between presence of stagnant water and location of households on both the Kericho and Kisumu surface areas. Indication from the figure below is that Kisumu surface is largely a flat terrain. Presence of stagnant water in both Kericho and Kisumu data are largely in the valley bottom.

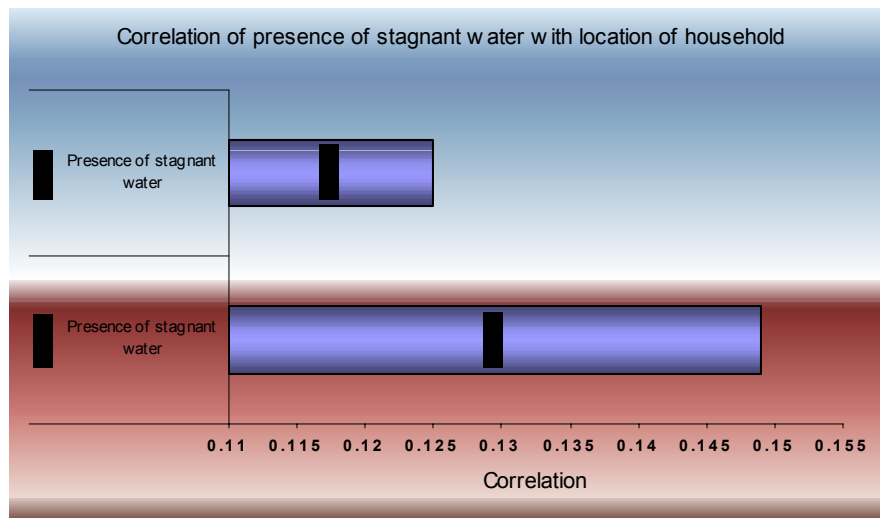
Presence of stagnant water by location of households



A spearman's rank correlation analyses of the two variables indicate weak and no significant association between location of households and presence of stagnant waters. There may be need to investigate why people in both Kisumu and Kericho data tend not to locate near stagnant water bodies.

Spearman's correlation of presence of stagnant water with location of households

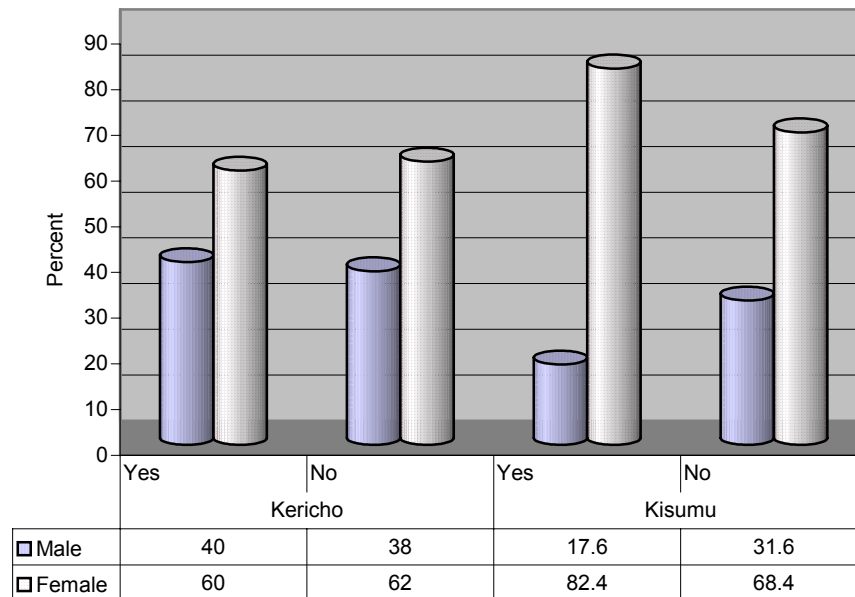
District			Location of household
Kericho	Presence of stagnant water	Correlation Coefficient	.149
		Sig. (2-tailed)	.070
		N	148
Kisumu	Presence of stagnant water	Correlation Coefficient	.125
		Sig. (2-tailed)	.128
		N	150



### Source of income by socio-economic variables

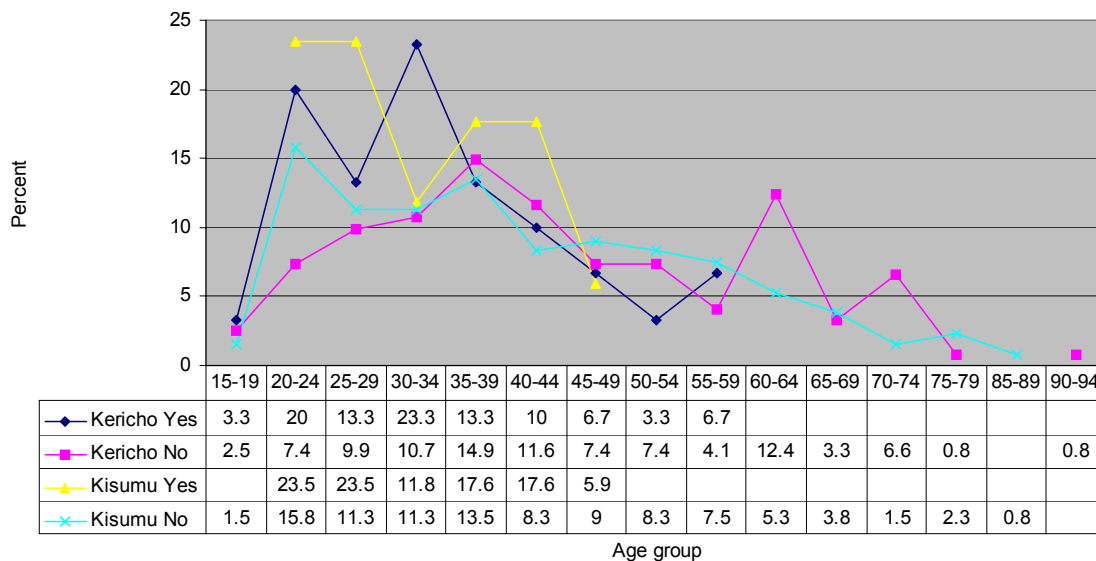
Assumption is made that socio-economic variables do affect opportunities in economic well being. In this study, the socio economic variables used to test this assumption are gender, education level, marital status and age as they relate to source of income, which is a factor in level of income. Figures below indicate the cross-tabulation relationship between socio-economic variables and sources of income.

Formal employment as source of income by gender

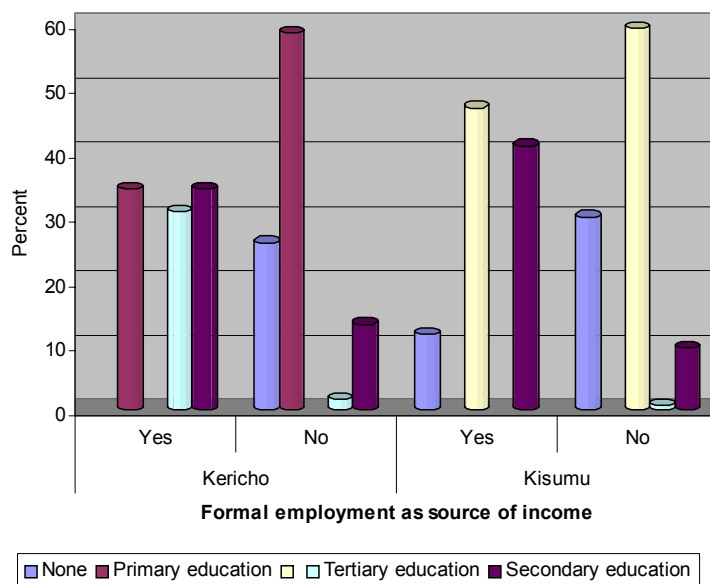


Formal employment as source of income

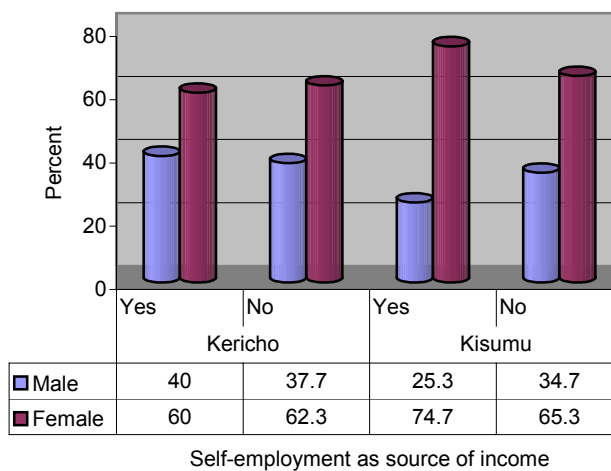
Formal employment as source of income by age



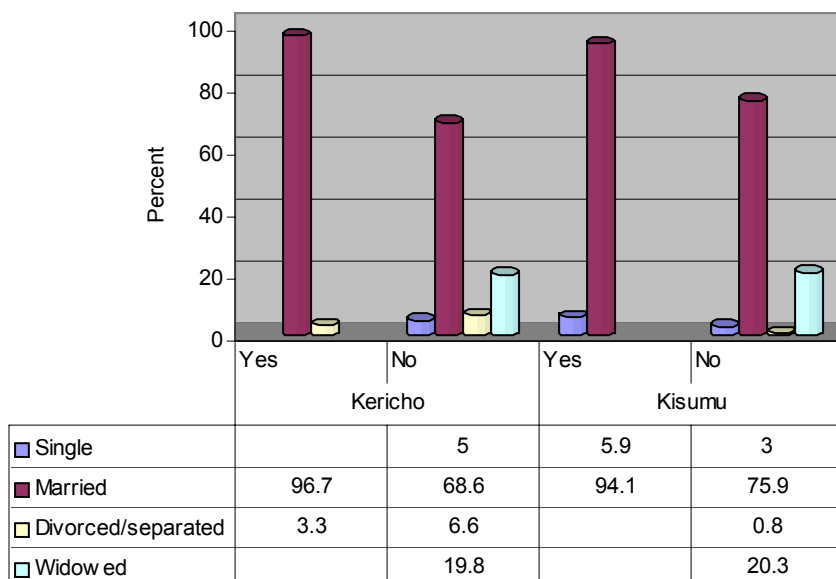
Formal employment as source of income by education level



Self-employment as source of income by gender

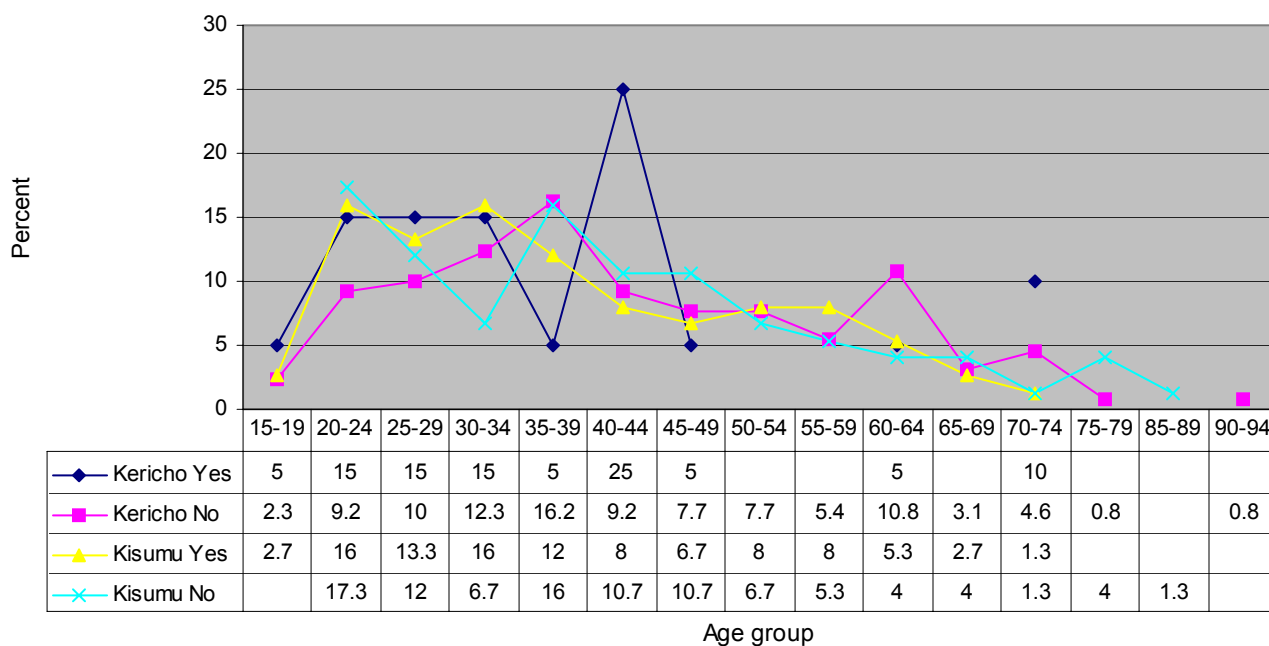


Formal employment as source of income by marital status



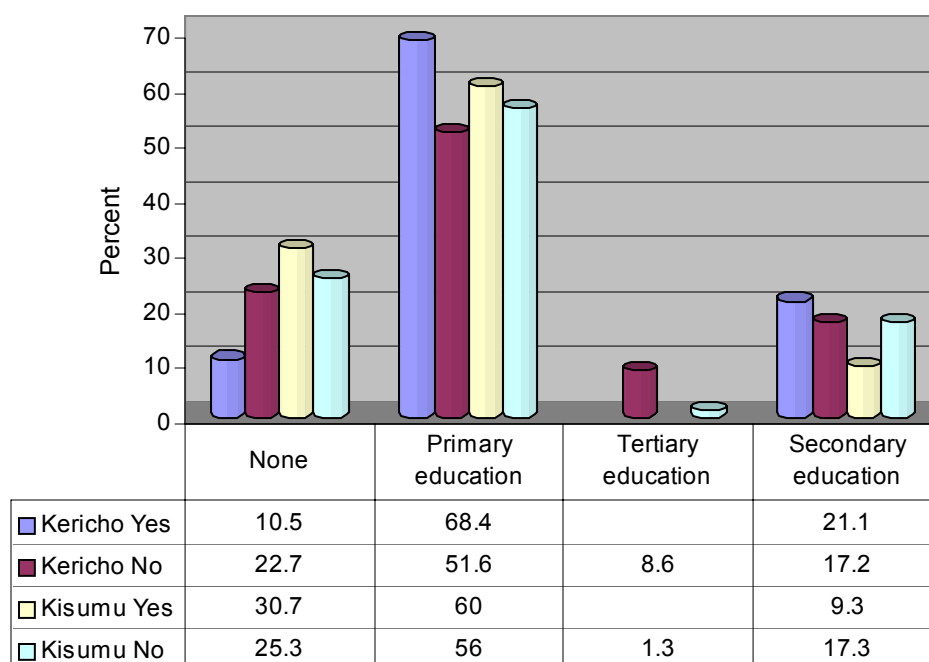
Formal employment as source of income

Self-employment as source of income by age



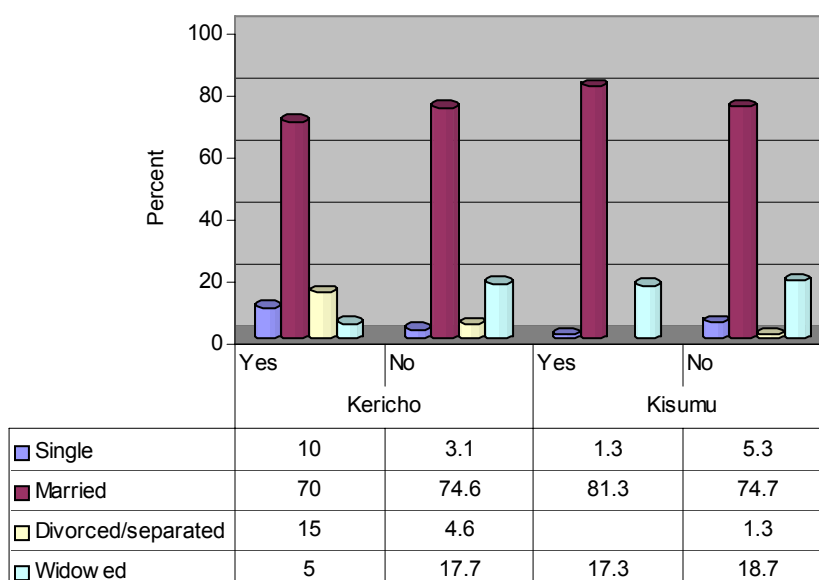
Age group

Self-employment as source of income by education level



Self-employment as source of income

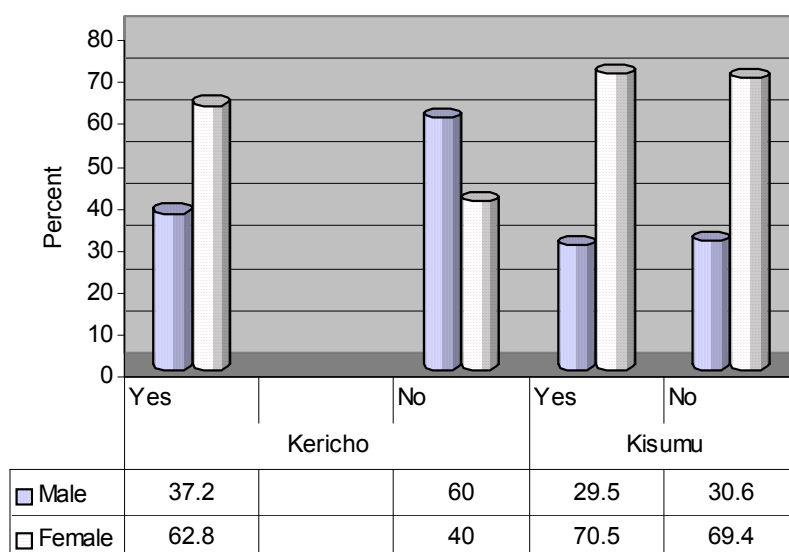
Self-employment as source of income by marital status



Self-employment as source of income

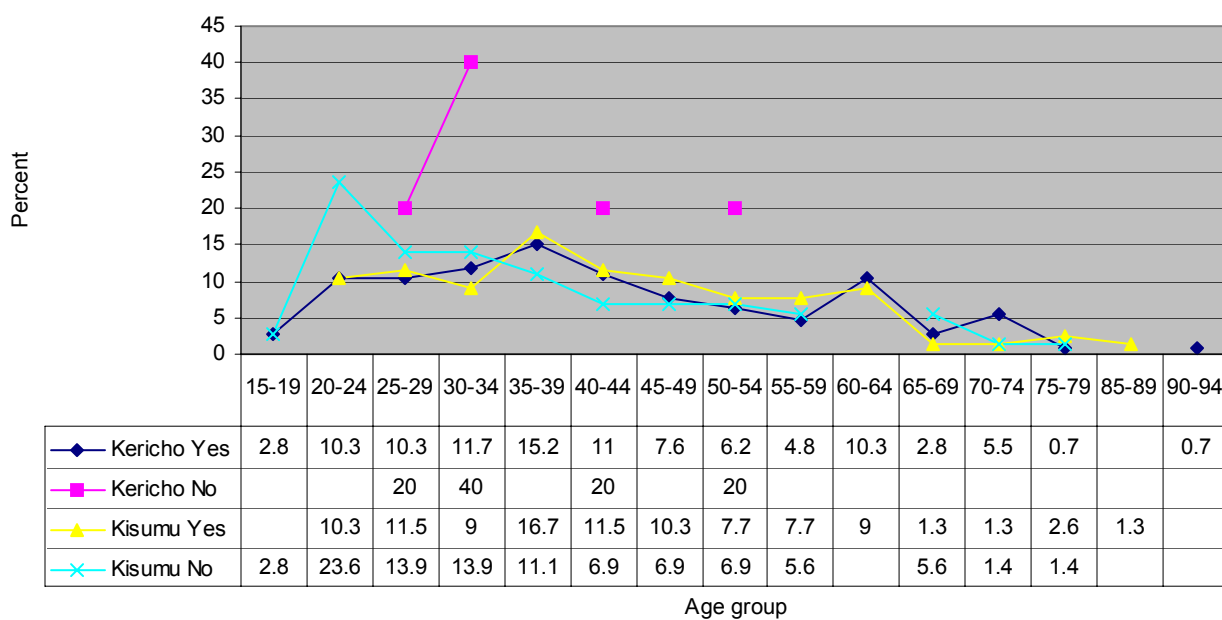


Farming as source of income by gender



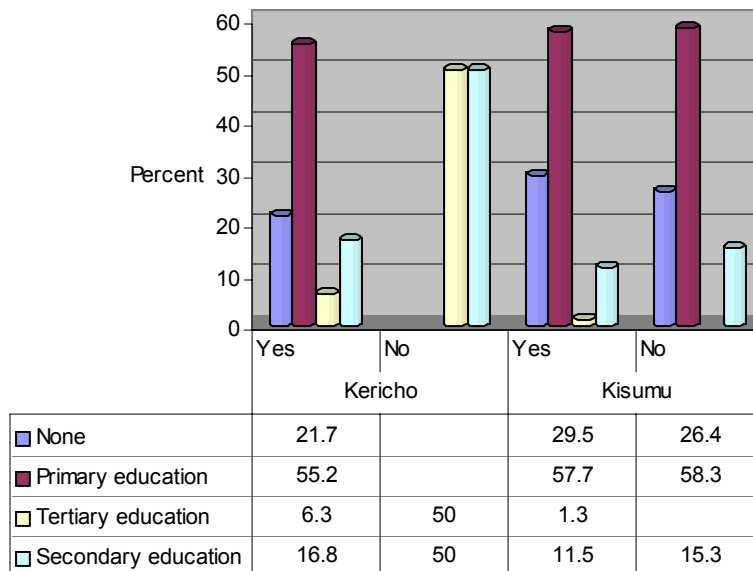
Farming as source of income

Farming as source of income by age



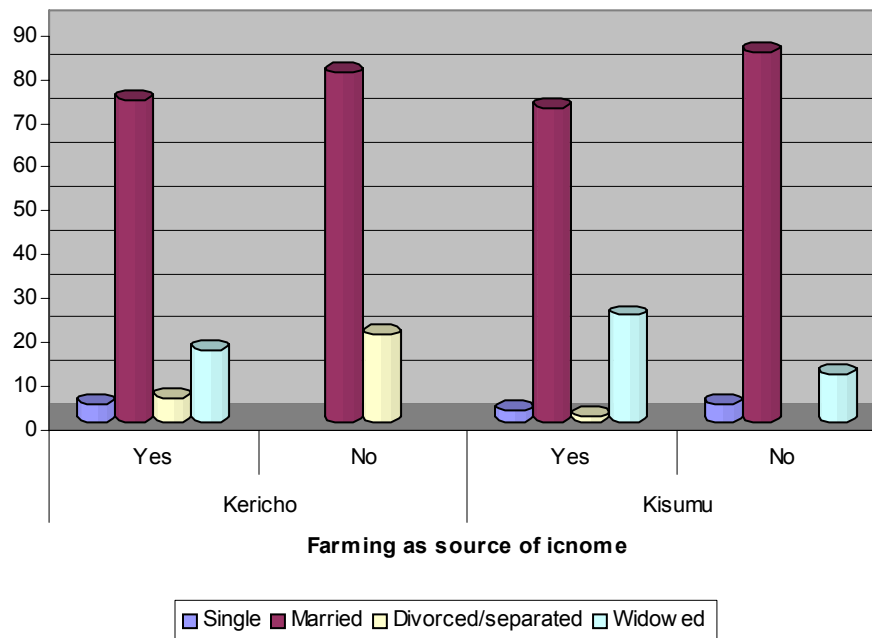
Age group

Farming as source of income by education level



Farming as source of income

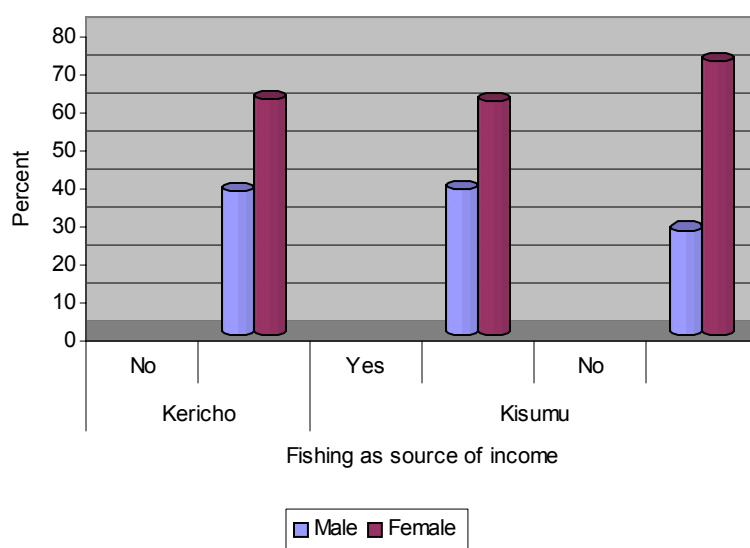
Farming as source of income by marital status



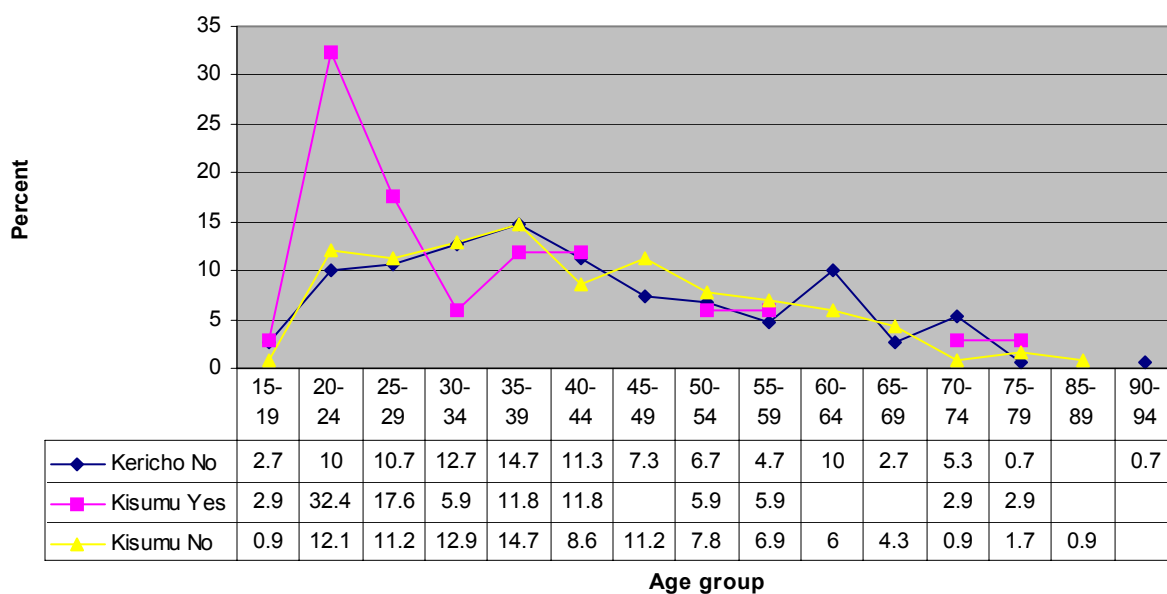
Farming as source of income

Single Married Divorced/separated Widowed

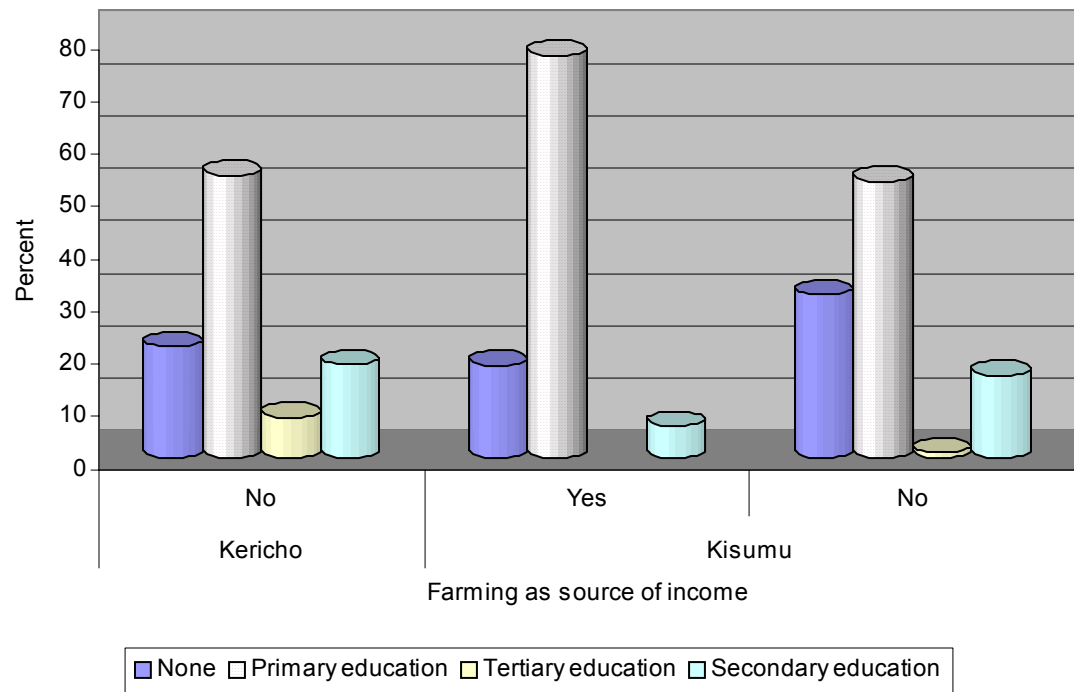
Fishing as source of income by gender



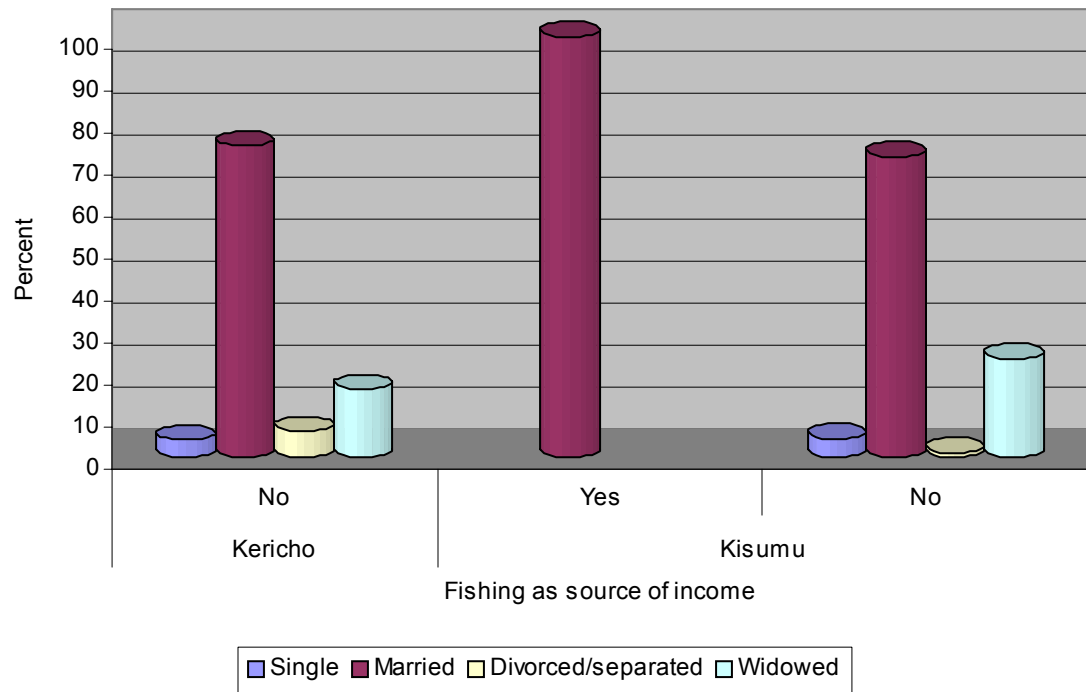
Fishing as source of income by age



Fishing as source of income by education level



Fishing as source of income by marital status



Statistical measures of association give indication to the strength of association and significance of the observed association. Where data measurements are not at the interval or ratio scale levels, it is advisable to use non-parametric inferential statistics. In this survey data analysis, a powerful measure of association that has been selected is the Spearman's rank correlation,  $r_s$ , which has 91% efficiency of the power of Pearson's product moment correlation.

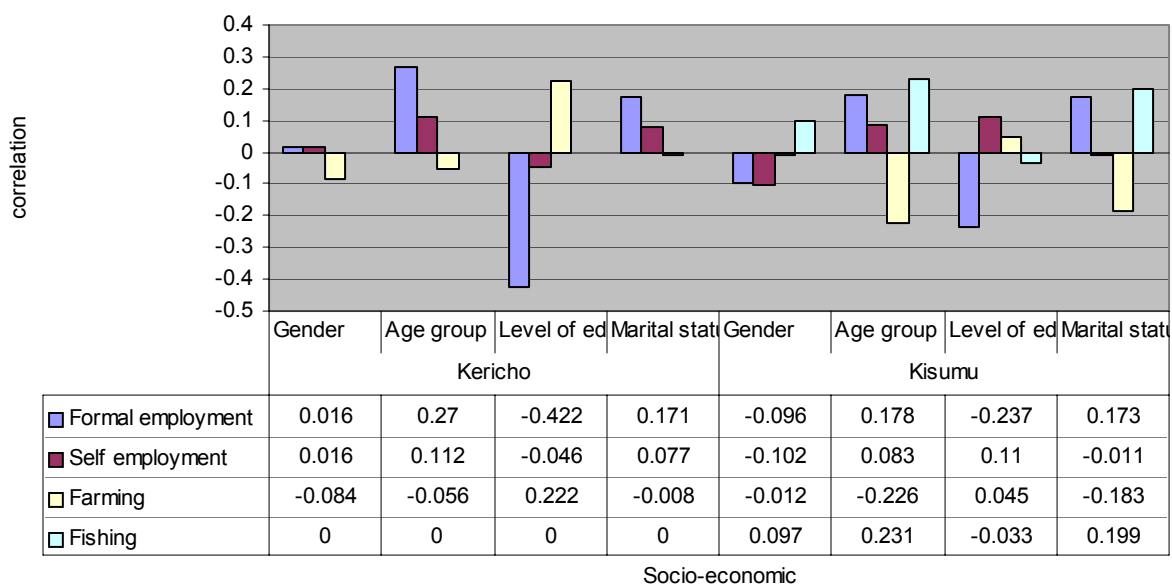
### Socio-economic variables by sources of income

In this survey data, socio-economic variables are gender, level of education, age and marital status. These variables are hypothetically taken to affect the type of economic activities individuals in the societies included in the survey (Kericho and Kisumu). The economic activities used in the survey are the sources of income, which include formal employment, self-employment, farming and fishing, primarily.

In Kericho data, the socio-economic variables with significant correlation with sources of income are age, level of education and marital status. Age group of individuals has weak but significant correlation (0.270 at  $\alpha = 0.01$ ) with formal employment as source of income. Level of education has a relatively strong negative but significant correlation (-0.422 at  $\alpha = 0.01$ ) with formal employment as source of income and a weak but significant correlation (0.222 at  $\alpha = 0.01$ ) with farming as source of income.

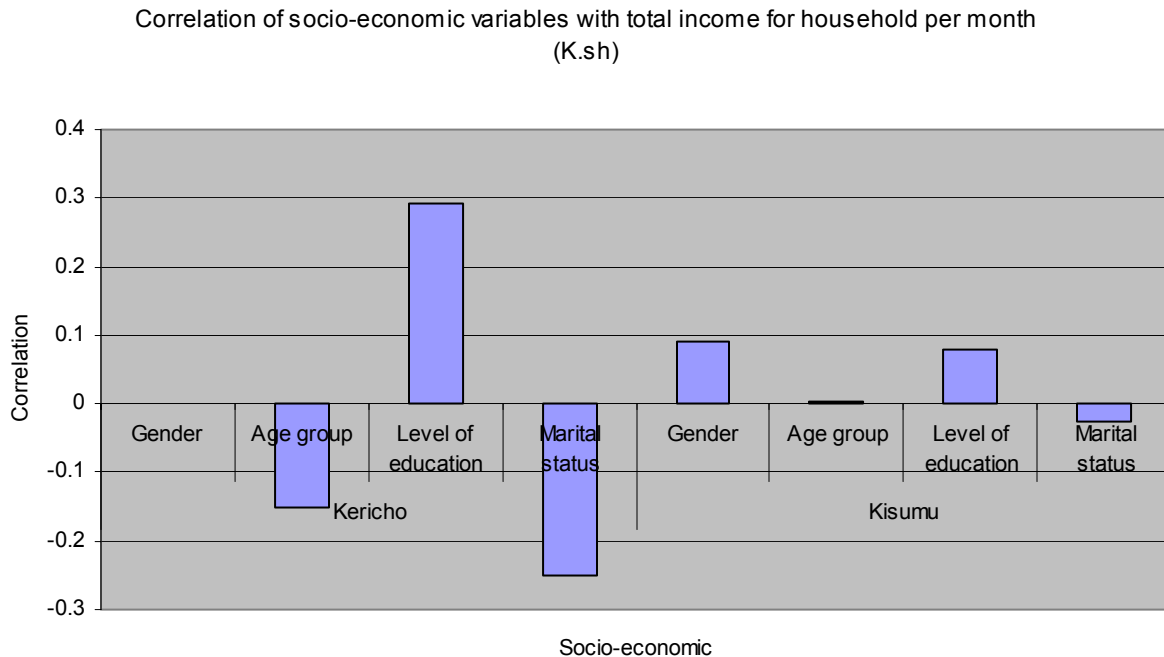
In the Kisumu data, again it is age, level of education and marital status amongst the socio-economic variables considered that have significant correlation with sources of income variables. Age group of individuals has a weak but significant correlation (0.178 at  $\alpha = 0.05$ ) with formal employment, weak negative but significant correlation (-0.226 at  $\alpha = 0.01$ ) with farming, and a weak but significant correlation with (0.231 at  $\alpha = 0.01$ ) with fishing. Level of education has a weak negative correlation (-0.237 at  $\alpha = 0.01$ ) with formal employment as source of income. Marital status has a weak but significant correlation (0.173 at  $\alpha = 0.05$ ) with formal employment, weak negative but significant correlation (-0.183 at  $\alpha = 0.05$ ) with farming, and weak but significant correlation (0.199 at  $\alpha = 0.05$ ) with fishing as source of income.

Correlation of socio-economic variables with sources of income



### Socio-economic variables by total monthly household income

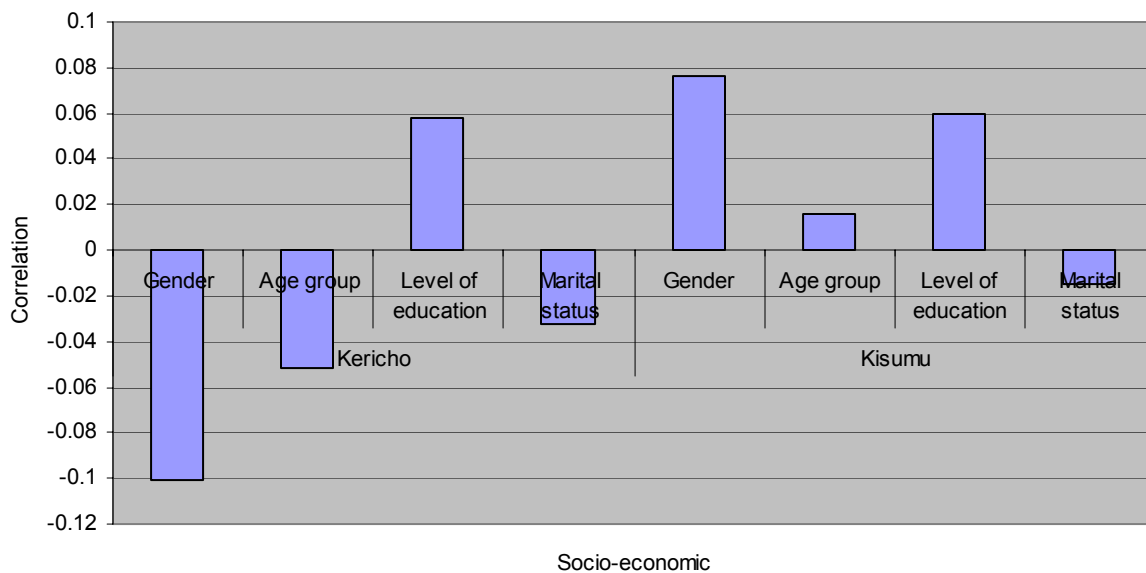
The assumption that socio-economic variables affect sources of income is by extension used to make assumption on the effects on total monthly incomes of households. It is only in the Kericho data where two socio economic variables of level of education and marital status have significant correlation with total income of households per month. Level of education has a weak but significant correlation (0.292 at  $\alpha = 0.01$ ) with total income of households per month and marital status has a weak negative but significant correlation (-0.251 at  $\alpha = 0.01$ ) with total income of households. In the Kisumu data, no significant correlation can be implied in any association between socio-economic variables and total income of households (associations are chance events).



### Socio-economic variables by use of food crops grown

Since some socio-economic variables affect sources of income and by extension total income of households, they can be assumed to affect the use of food crops grown. Spearman's correlation analyses indicate that in general there are weak insignificant correlations between socio-economic variables and use of crops grown. This means that use of crops grown can be explained by other factors other than socio-economic variables because the observed associations are simply chance events.

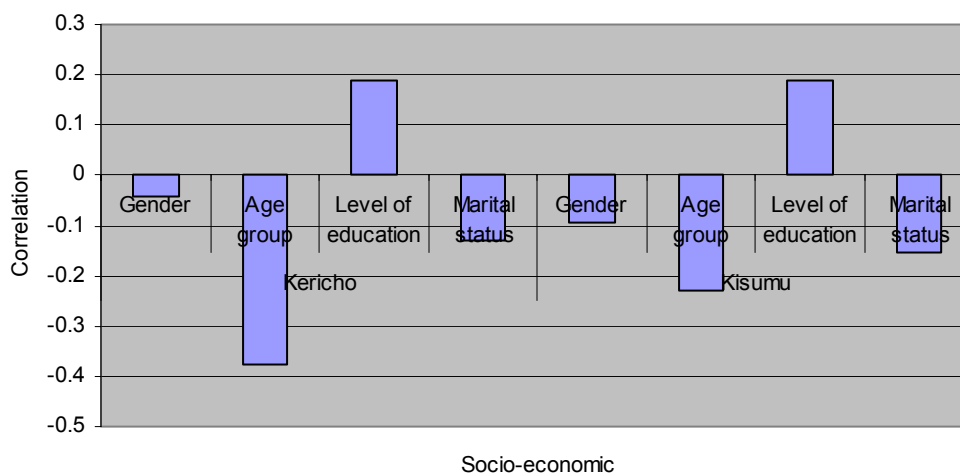
Correlation of socio-economic variables with use of food crop grown



### Socio-economic variables by land ownership

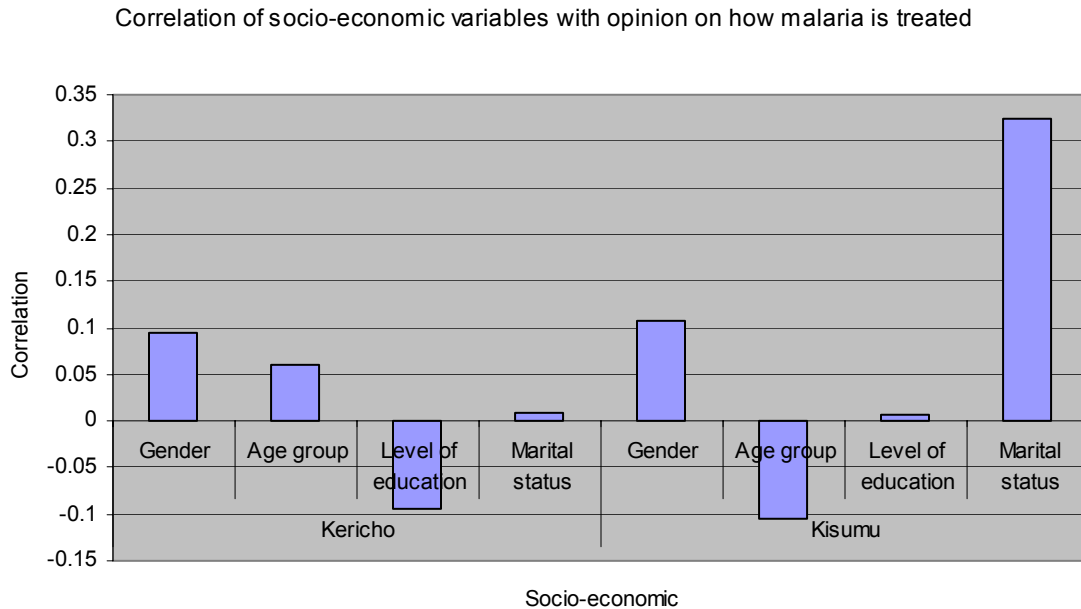
One of the main sources of income in the survey data as a whole is farming. The analysis of data has taken into consideration the assumption that socio-economic variables affect land ownership in the study area. In both Kericho and Kisumu data, age and level of education have weak but significant correlation with land ownership. In Kericho data, age group has a weak negative but significant correlation ( $-0.376$  at  $\alpha = 0.01$ ) with land ownership, while level of education has a weak positive but significant correlation ( $0.188$  at  $\alpha = 0.05$ ) with land ownership. In the Kisumu data, age group has a weak negative but significant correlation ( $-0.231$  at  $\alpha = 0.01$ ) with land ownership, and level of education has a weak positive but significant correlation ( $0.187$  at  $\alpha = 0.05$ ) with land ownership.

Correlation of socio-economic variables with land ownership



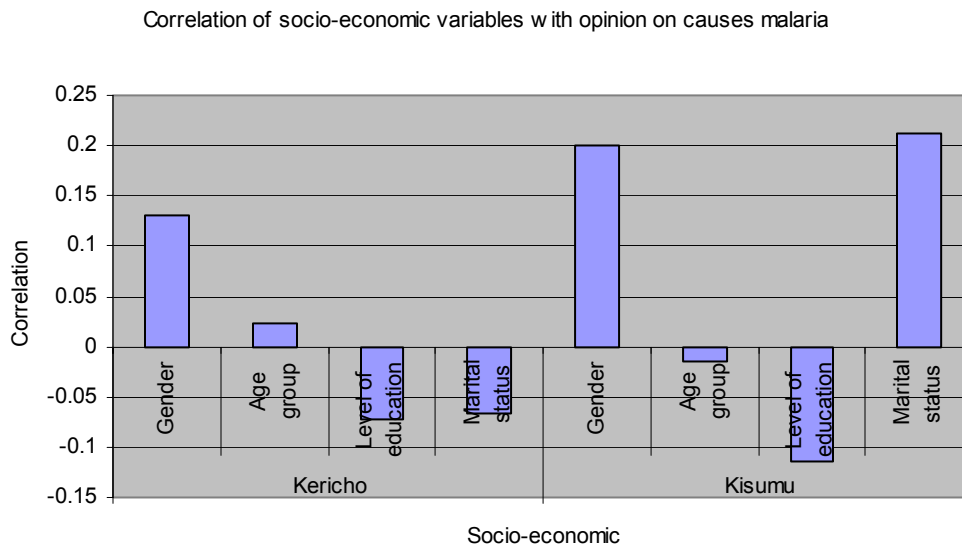
### Socio-economic variables by opinion on how malaria is treated

Socio-economic variables tend to have no significant correlation with opinion on how malaria is treated except for marital status variable in the Kisumu data. Marital status in the Kisumu data has a weak positive but significant correlation (0.325 at  $\alpha = 0.05$ ) with opinion on how malaria is treated. This calls for further investigation to confirm the situation and to seek for explanation.



### Socio-economic variables by opinion on cause of malaria

No socio-economic variable used in the survey has any significant correlation with opinion on how malaria is treated and any association is therefore purely a chance event.

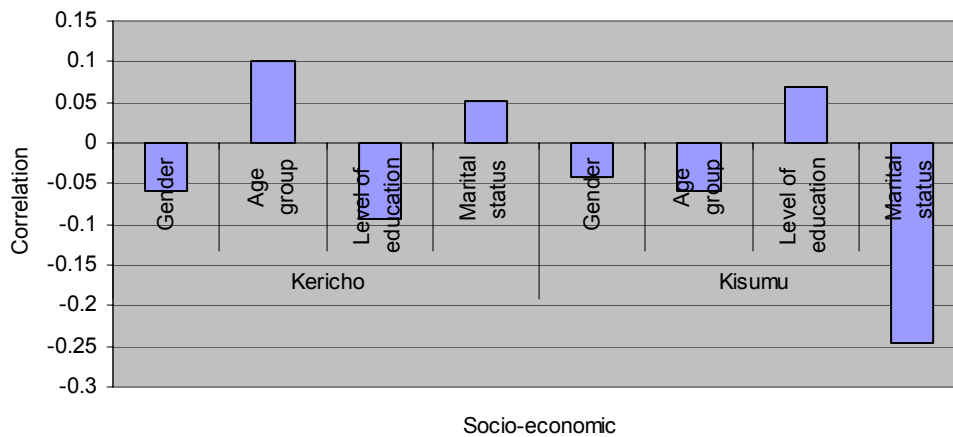


### Socio-economic variables by opinion on age group most affected by malaria

Opinion on age group most affected by malaria is seemingly not significantly correlated with socio-economic variables used in the study and there is need to seek other explanations for the opinion on age group most affected by malaria (see graph below).



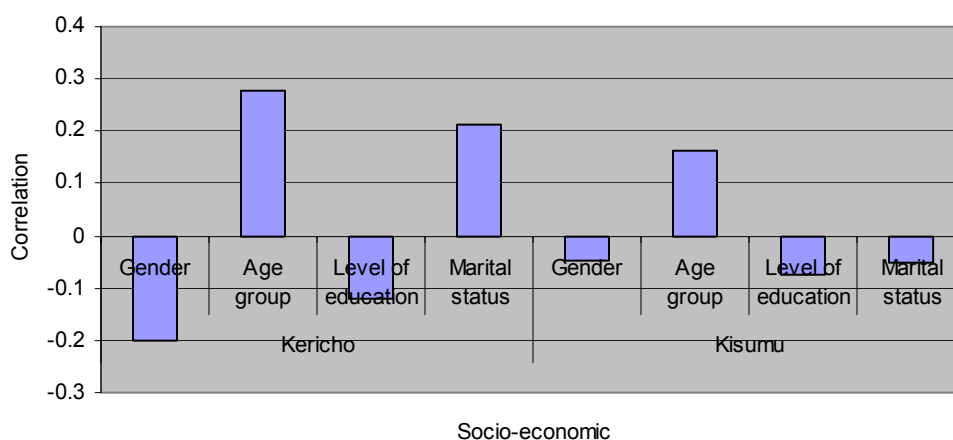
Correlation of socio-economic variables with opinion on age group most affected by malaria



Socio-economic variables by opinion on part of the year malaria is most common

Depending on sources of income and therefore activities an individual is involved as factors in exposure to malaria, socio-economic variables is assumed to impact on an individual's opinion on part of the year malaria is most common. Spearman's correlation analysis results indicate that in the Kericho data, gender (-0.202 at  $\alpha = 0.05$ ), age group (0.279 at  $\alpha = 0.01$ ) and marital status (0.214 at  $\alpha = 0.01$ ) have significant correlation with opinion on which part of the year malaria is most common while no socio-economic variable in the Kisumu data has significant correlation with opinion on which part of the year malaria is most common. This is an interesting outcome since malaria is more common in the Kisumu area than in Kericho area but this result can be explained by the fact that data on malaria in this survey focused on Kericho. Other possible explanation is that malaria is a common feature of Kisumu landscape that it does not matter which socio-economic variable one is using.

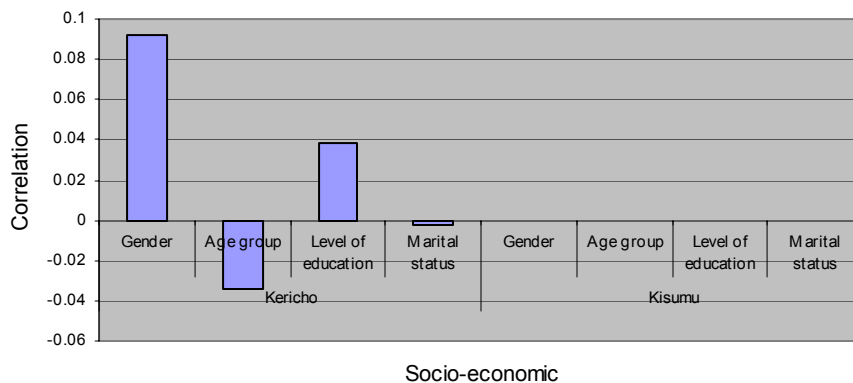
Correlation of socio-economic variables with opinion on which part of the year malaria is most common



Socio-economic variables by opinion on malaria as a severe disease

Socio-economic variables are seemingly not significantly correlated with opinion on malaria as a severe disease. In fact, in the Kisumu data, no rank correlation can be computed (see graph below).

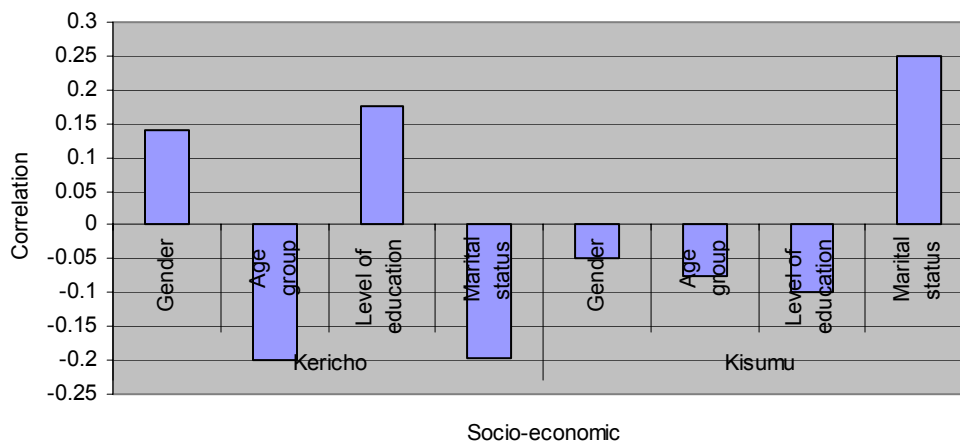
Correlation of socio-economic variables with opinion on malaria as a severe disease



#### Socio-economic variables by opinion on who should pay for malaria treatment

In the Kericho Data, socio economic variables with significant correlation with opinion on who should pay for the treatment of malaria are age group (-0.2 at  $\alpha = 0.05$ ), level of education (0.175 at  $\alpha = 0.05$ ) and marital status (-0.197 at  $\alpha = 0.05$ ). In the Kisumu data the associations in the graph below are in all cases not significant when tested using t-statistics and the correlation coefficients are therefore chance events.

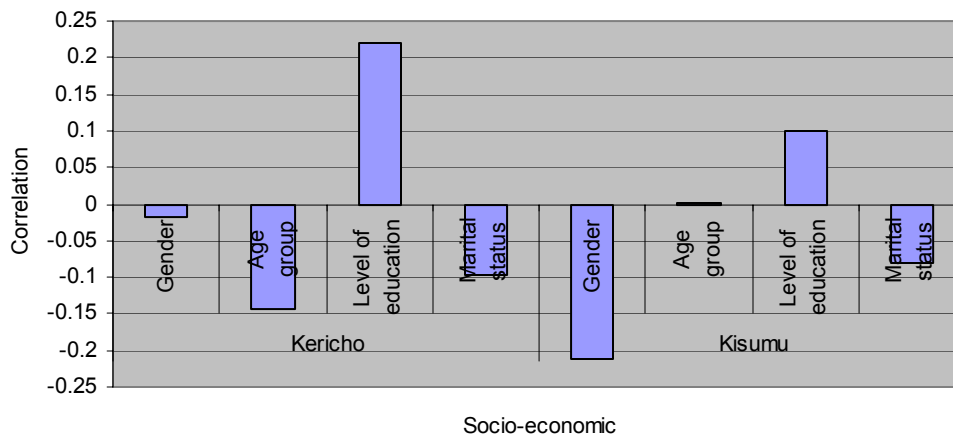
Correlation of socio-economic variables with opinion on who should pay for the treatment of malaria



#### Socio-economic variables by opinion on who should pay for prevention of malaria

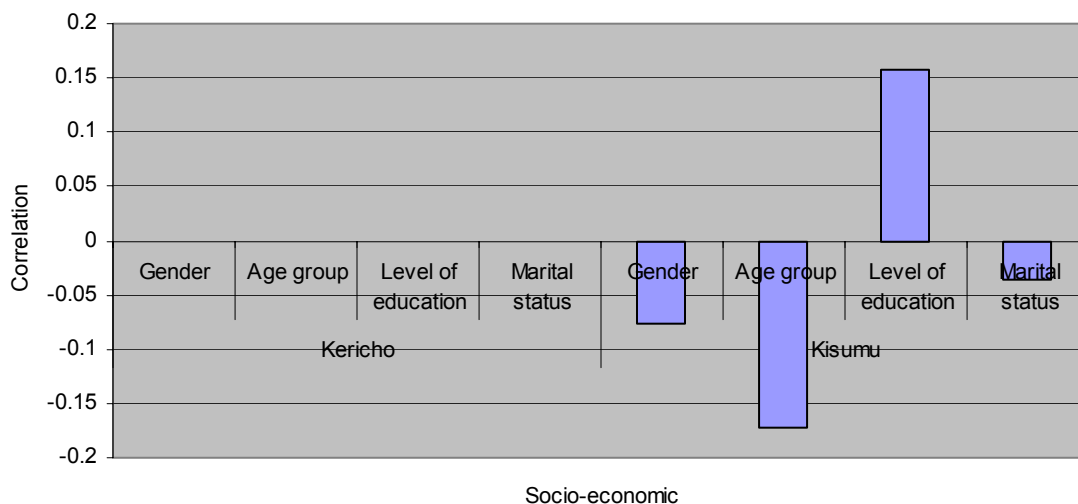
Socio-economic variables are seemingly not significantly associated with opinion on who should pay for prevention of malaria except for level of education in the Kericho data which has a weak positive but significant correlation (0.221 at  $\alpha = 0.01$ ). This means there are other factors, which affect opinion on who should pay for malaria other than, the socio-economic variables included in the correlation model and the observed correlations as in the graph below are chance events in the Kericho data. In case of level of education, even if the correlation is significant, the coefficient is weak and this indicates that there are other contributors to opinion on who should pay for the prevention of malaria.

Correlation of socio-economic variables with opinion on who should pay for the prevention of malaria



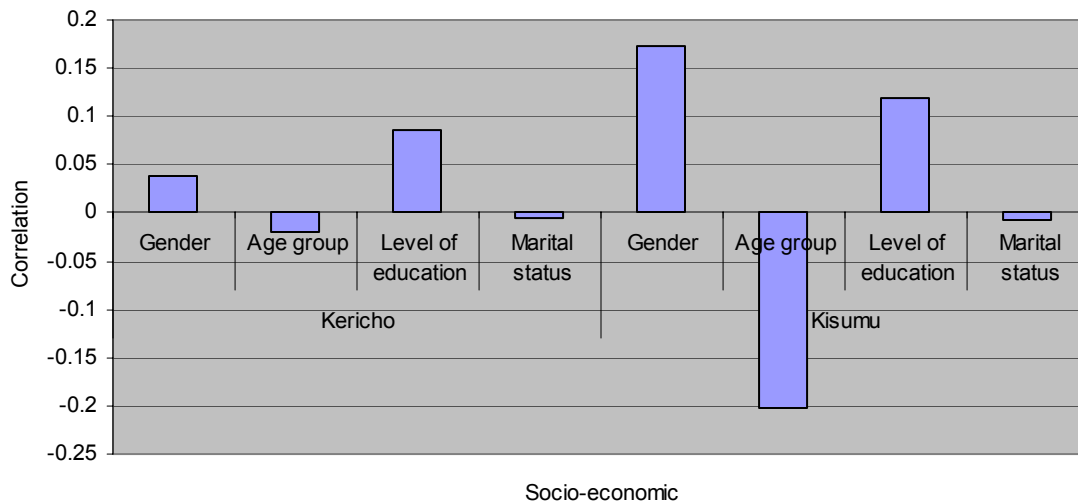
Socio-economic variables by need to go to health facility when malaria strikes in the household  
Correlations of socio-economic variables with opinion on need to go to health facility are not significant and are therefore chance events.

Correlation of socio-economic variables with need to go to a health facility for treatment



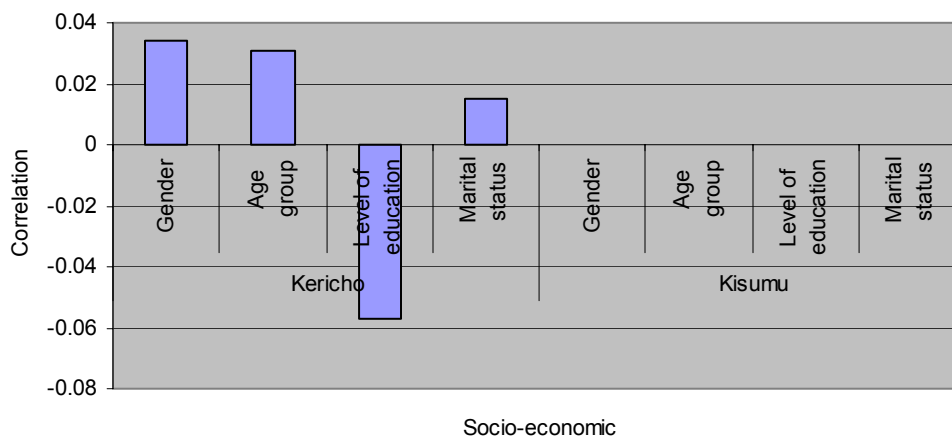
Socio-economic variables by opinion on ability of local herbalist to cure malaria  
There are no significant correlations between socio-economic variables with opinion on the ability of local herbalists to cure malaria and any correlation is purely a chance event.

Correlation of socio-economic variables with opinion on the local herbalist ability to cure malaria



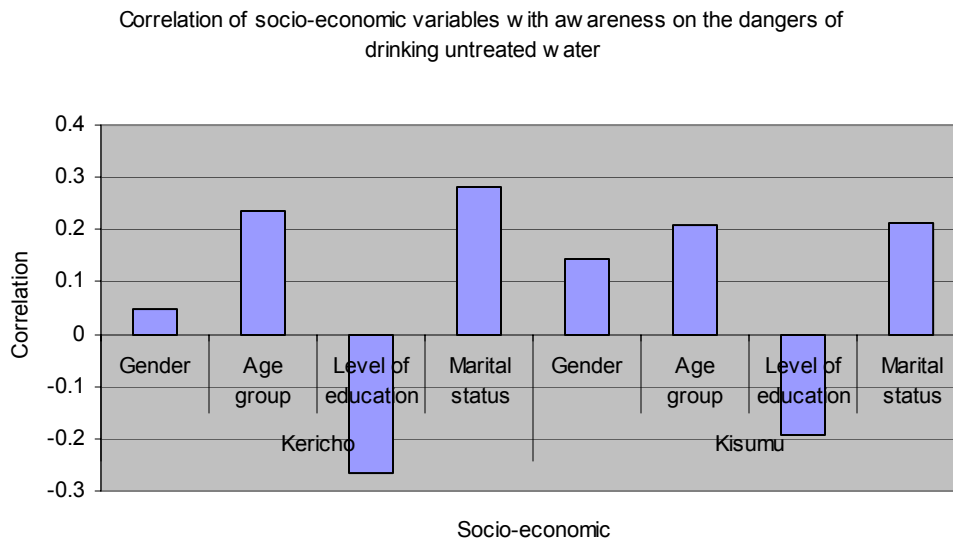
Socio-economic variables by opinion on the need to use bed nets during the night in the households  
Opinion on the need to use bed nets during the night in households has no significant correlation with socio-economic variables and this means that other important factors have not been included in the correlation model for opinion on use of bed nets.

Correlation of socio-economic variables with opinion on the need to use bed nets during the night in the households



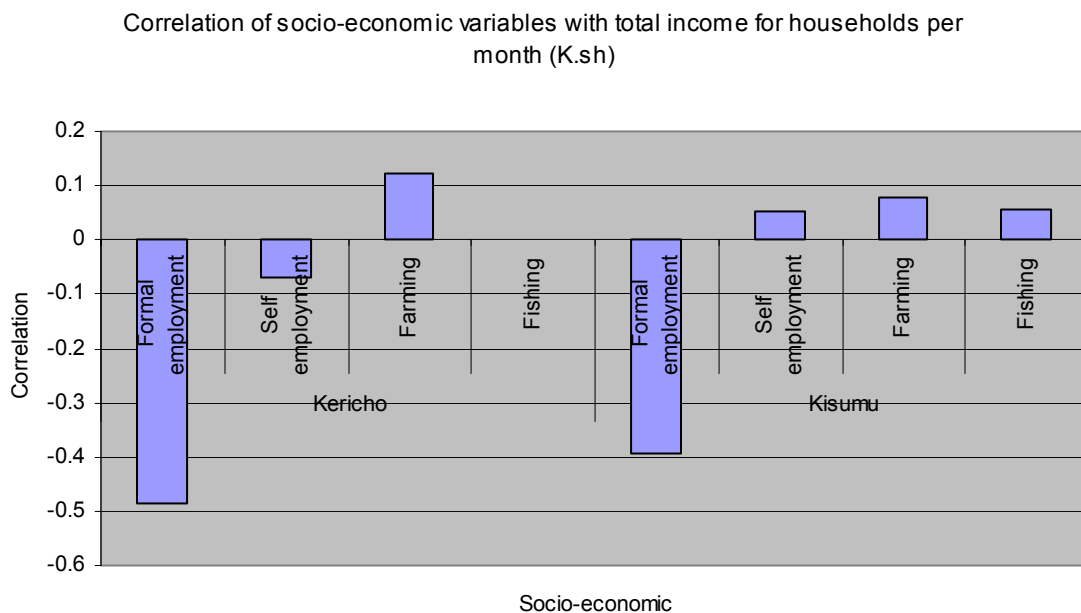
Socio-economic variables by awareness on the dangers of drinking untreated water

In both the Kericho and Kisumu survey data, age group, education level and marital status are the socio-economic variables, which have significant correlation with awareness on the dangers of drinking untreated water. In the Kericho data, age group has a weak but significant correlation (0.235 at  $\alpha = 0.01$ ), while education level has a weak negative but significant correlation (-0.266 at  $\alpha = 0.01$ ), and marital status has a weak but significant correlation (0.282 at  $\alpha = 0.01$ ) with awareness on dangers of drinking untreated water.



#### Source of income by total income of households per month

The correlation analysis in this case makes assumption that source of income of individuals in the survey affect total income of households per month. Results of spearman's correlation analysis of the Kericho data indicate that formal employment as source of income has a weak negative but significant correlation (-0.484 at  $\alpha = 0.01$ ) with total income of households per month while the rest of socio-economic variables correlations are not significant. In the Kisumu data, again it is the level of education that has a weak negative correlation (-0.396 at  $\alpha = 0.01$ ) that has significant correlation with total monthly household income.

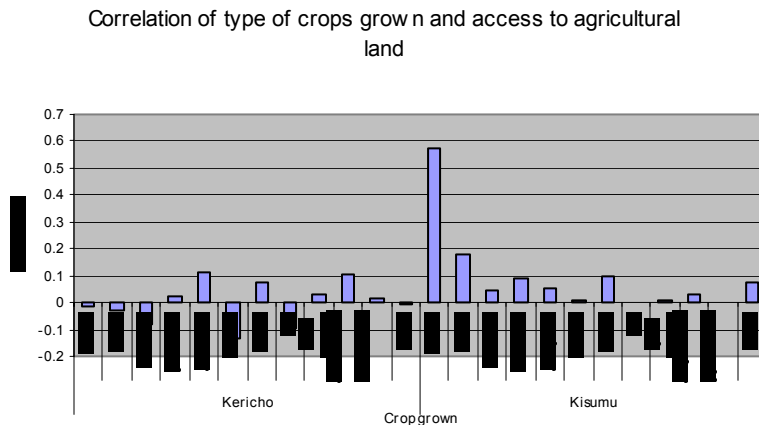


#### Type of crops grown on land by access to agricultural land

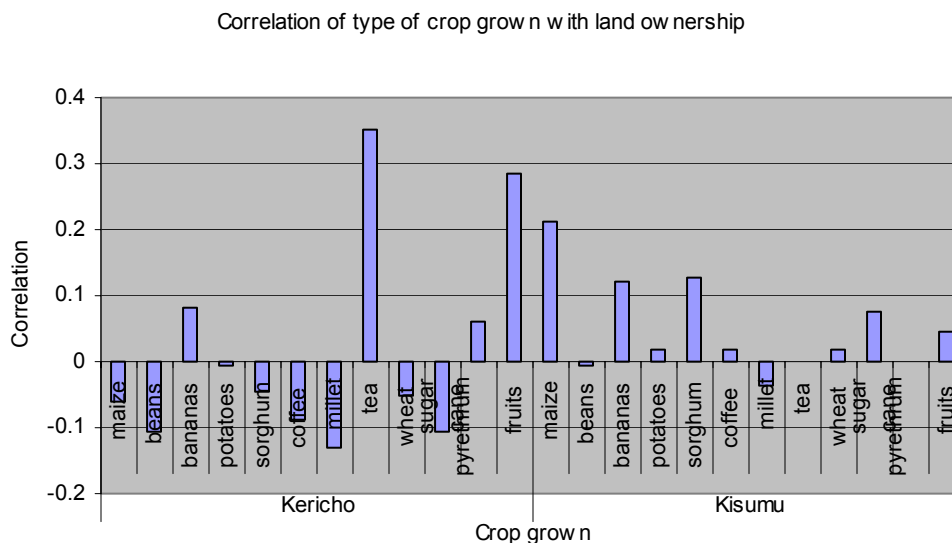
The assumption in this analysis is that the type of crops grown by an individual household is dependent on access to land and land ownership. It is only in the Kisumu data that there is indication of significant correlation between type of crop grown and access to land. Growing of maize has a relatively strong and significant correlation (0.573 at  $\alpha = 0.01$ ), and growing of beans also has a positive weak but significant

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correlation (0.182 at  $\alpha = 0.05$ ) with access to land in the Kisumu data. No significant correlation is indicated in the Kericho data.



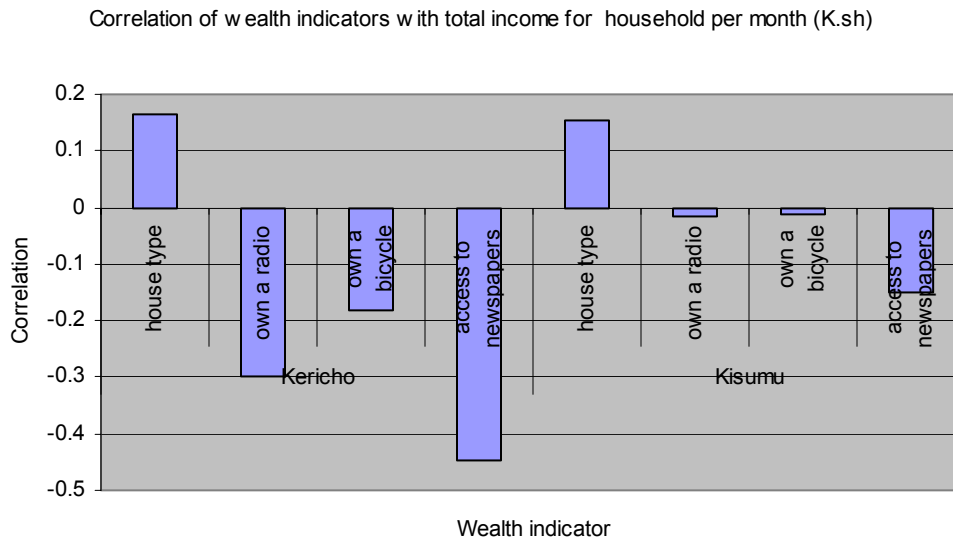
When type of crops grown on land is analysed further using land ownership, the Kericho data, growing of tree crops of tea (0.353 at  $\alpha = 0.01$ ) and fruits (0.286 at  $\alpha = 0.01$ ) has weak but significant correlation with land ownership and this can be explained by the fact that growing of tea is tied in with land ownership and to grow a perennial fruit crop on any land means the land belongs to the farmer. In the Kisumu data, it is the growing of maize that has a weak but significant correlation with land ownership, and this tends to suggest that growing of maize can be used as an indicator of land ownership as it has also significant correlation with access to land. The weak correlations even if significant means other variables not included in the land access and ownership models are also significant and should be sought.



## 'Wealth indicators' by total income for household per month

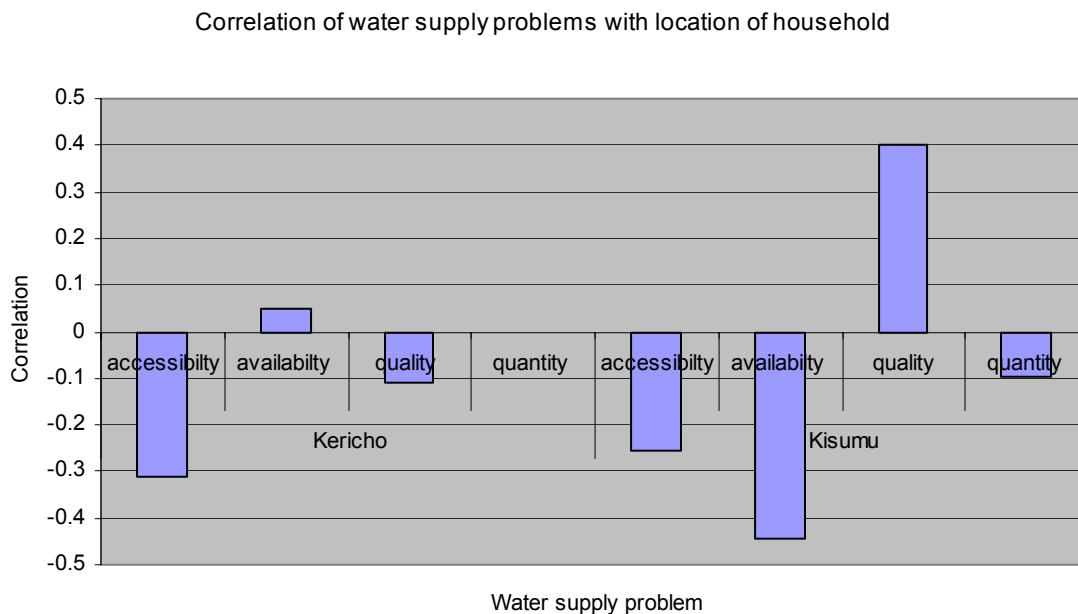
In the survey, a number of variables have been used as wealth indicators but house type, radio ownership, bicycle ownership and access to radio are used in this analysis as they also add social status to wealth indicator. In the Kericho data, house type (0.166 at  $\alpha = 0.05$ ), radio ownership (-0.300 at  $\alpha = 0.01$ ), bicycle (-0.182 at  $\alpha = 0.05$ ) and access to newspapers (-0.447 at  $\alpha = 0.01$ ), have weak significant correlation with total income of households per month. In the Kisumu data, wealth indicators have no significant correlation with total households income and any association is pure a chance event. This means that house type, owning a radio, owning a bicycle and having access to newspaper models can be explained

by other factors other than total income (could have been appropriate to include income repatriation or assistance from other sources?).



#### Water supply problems by location of households

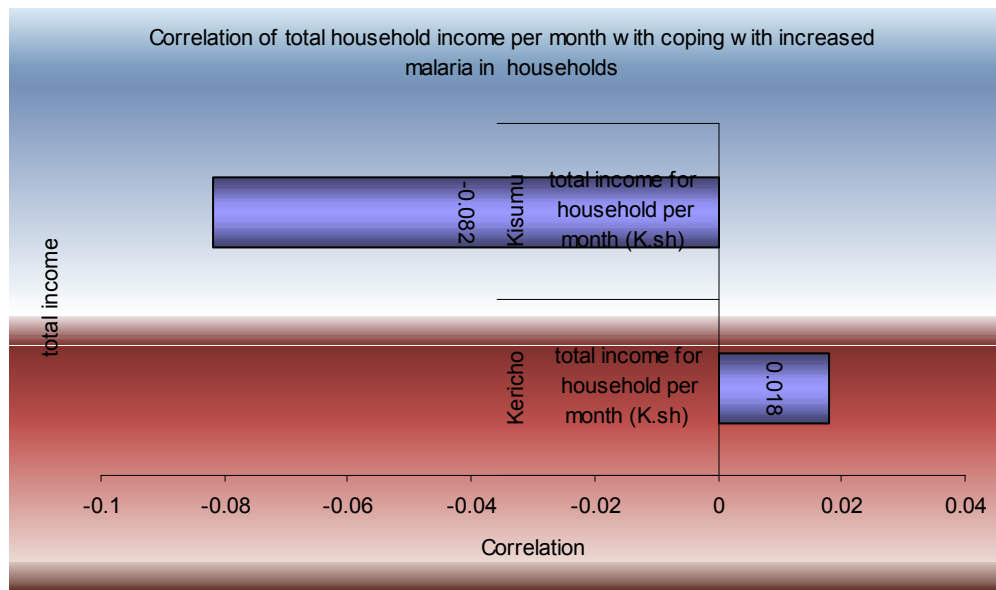
In this survey water supply problems are assumed to be related to location of households and spearman's correlation analysis results indicate that in the Kericho data, it is water accessibility as a water supply problem which has a weak negative but significant correlation (-.312 at  $\alpha = 0.01$ ) with location of households. The Kisumu data, accessibility (-0.255 at  $\alpha = 0.01$ ), availability (-0.443 at  $\alpha = 0.01$ ) and quality (0.402 at  $\alpha = 0.01$ ) have significant correlation with location of households. This seems to suggest more water supply problems in Kisumu than in Kericho.



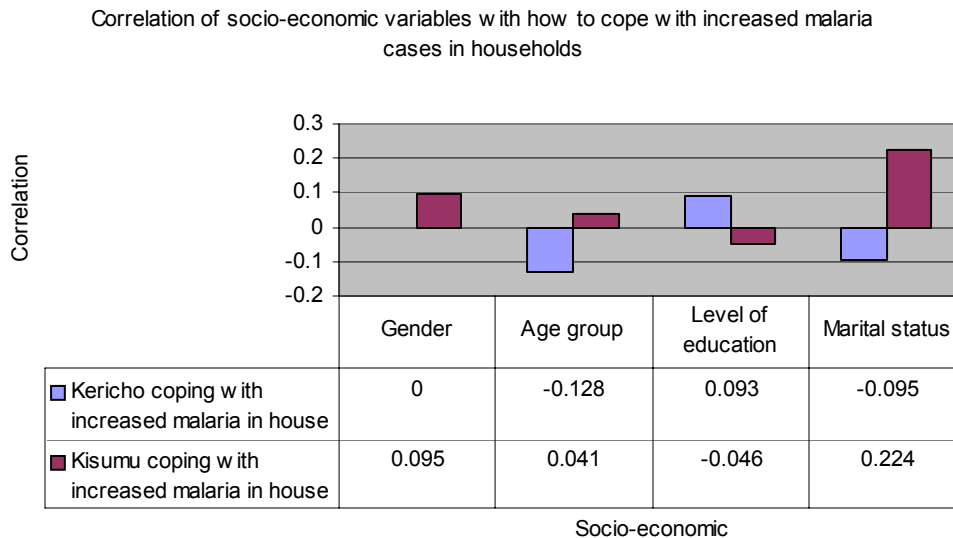
#### 'How to cope with increased malaria in households' by total income of households per month

It is hypothesised that means of coping with increased malaria in households is dependent on income of households. Spearman's correlation analysis is employed to measure and test the correlation between coping mechanisms and total income of households per month. Results in all cases indicate weak and

insignificant correlations and any association is pure a chance event. This means that coping with increased malaria cases need to be explained in terms of other variables not included in the model.



When socio-economic variables of gender, level of education, age and marital status are included in the correlation model, the correlation results indicate that there is a weak but significant correlation between gender and how to cope with increased malaria cases in the Kericho data.



Cases of hospitalisation due to malaria by exposure variables

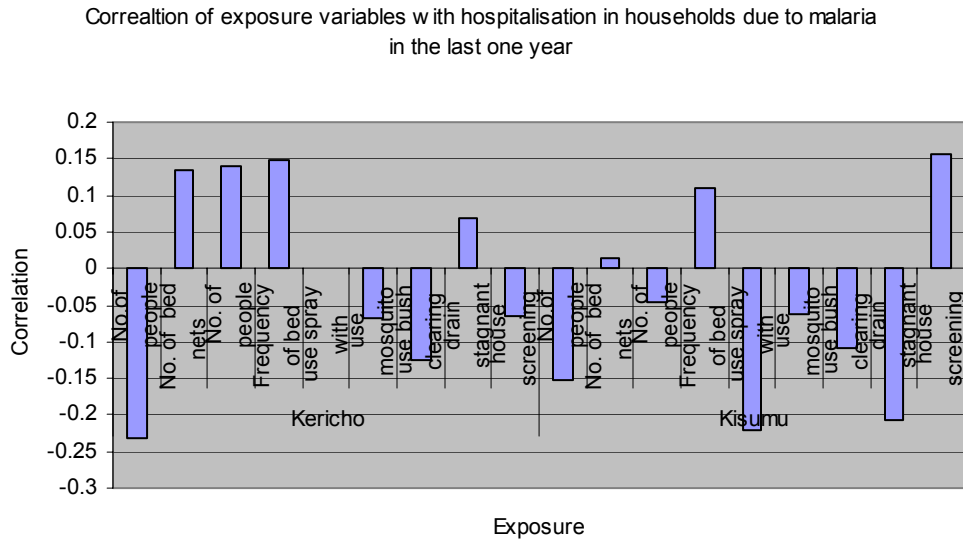
Hospitalisation cases due to malaria in households is assumed to be related to exposure to mosquito bites measured using the following variables:

- number of people who sleep in the household
- number of bed nets in the household
- number of people who sleep under bed nets
- frequency of treating bed nets with insecticide
- use of spray to control mosquitoes
- use of mosquito coils to control mosquitoes
- bush clearing to control mosquitoes
- draining of stagnant water to control mosquitoes, and



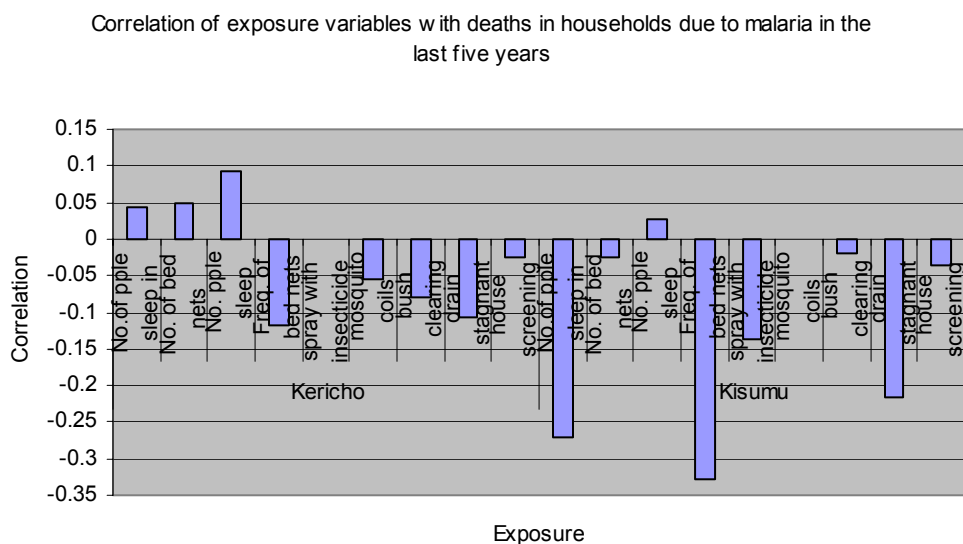
- house screening to control mosquitoes

When the above variables are included in the hospitalisation spearman's correlation model, the results indicate that in only the number of people sleeping in the household has a weak negative but significant correlation (-0.232 at  $\alpha = 0.01$ ) with cases of hospitalisation in the last one year, and in all other cases, no significant correlation can be implied.



#### Deaths in the last five years due to malaria by exposure variables

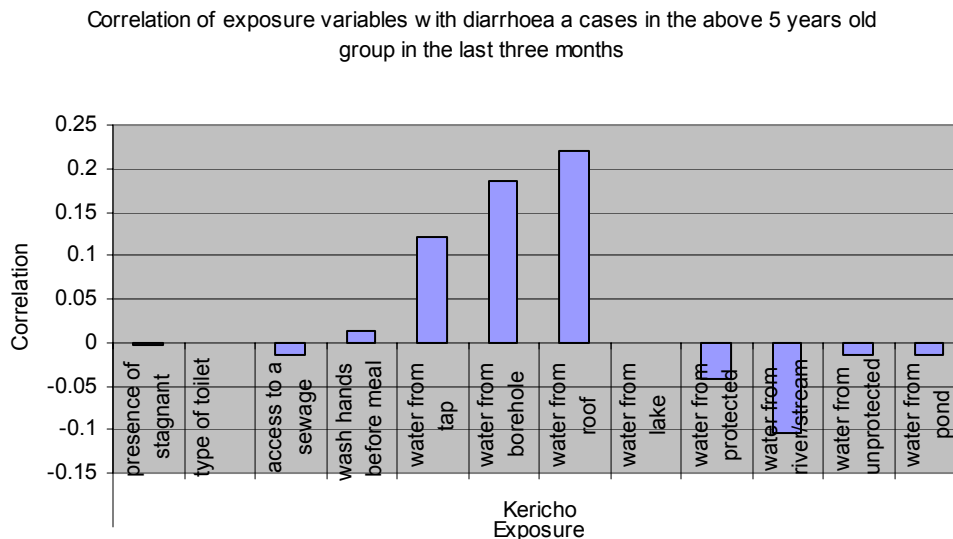
In cases where hospitalisation cases does not show significant correlation with exposure to malaria, then one can use the number of deaths due to malaria since not all can afford hospitalisation charges. It is only the use of mosquito coils in the households in the Kisumu data that has a weak negative but significant correlation (-0.294 at  $\alpha = 0.05$ ) with deaths in the last five years due to malaria. This indicates that deaths due to malaria have other factors of explanations other than the exposure variables included in the variables.



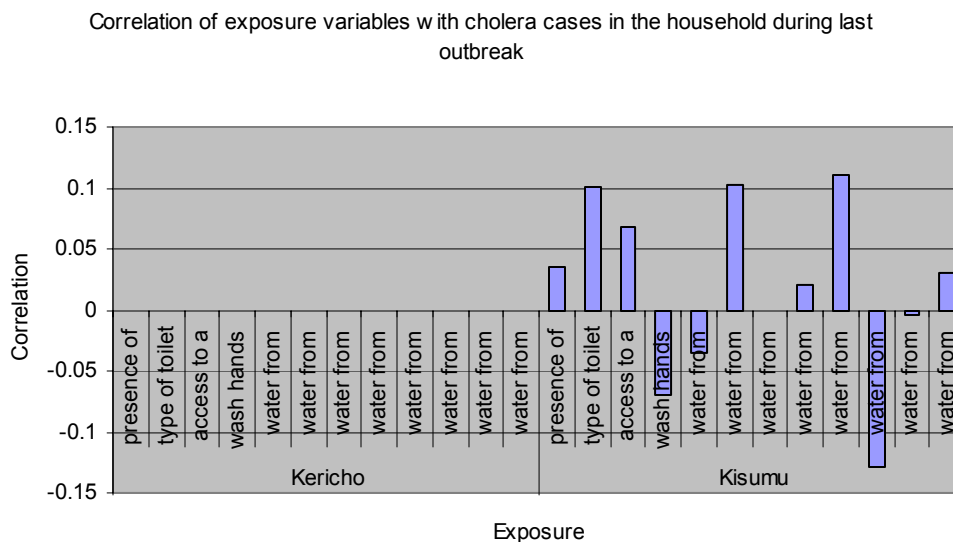
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Diarrhoea occurrence in household in the last 3 months by exposure variables

Diarrhoea cases are assumed, in this survey, to be related to certain environmental conditions. The environmental conditions used in this analysis are presence of stagnant water, type of toilet used, practice of washing hands before and after meals, and sources of water during the dry periods (borehole, roof catchments, lake, tap, protected well, river and unprotected well). Spearman's correlation results indicate weak and significant correlations between sourcing water during the dry season from borehole (0.186 at  $\alpha = 0.05$ ) and roof (0.219 at  $\alpha = 0.01$ ) in the Kericho data (see graph below).



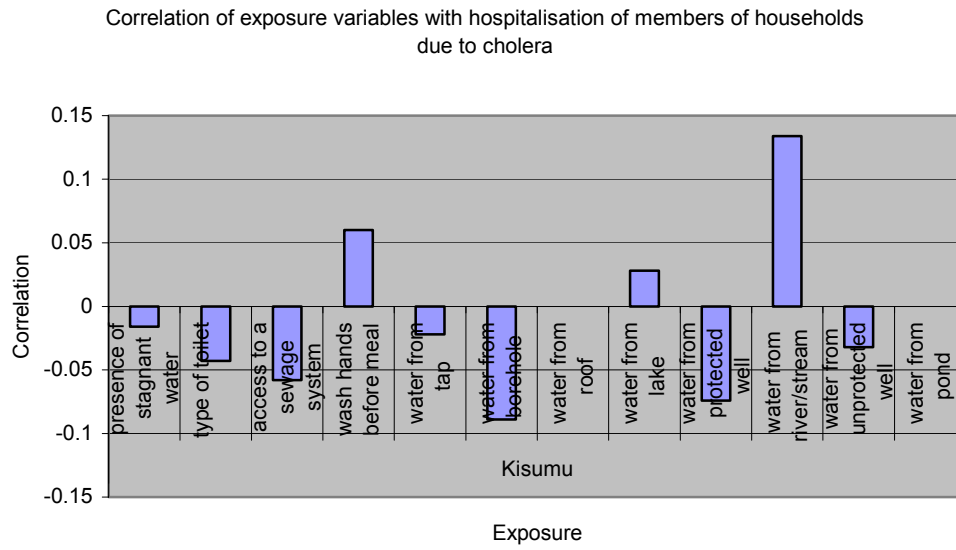
Diarrhoea cases may not be easy to talk about but serious events like cholera are most likely to be remembered by respondents. Cholera cases in households is analysed using spearman's correlation technique to identify possible main elements in the environment that may be responsible. The exposure variables above are used in the correlation model and results indicate no significant correlation in all cases.



The role of exposure variables in cholera episodes is further analysed using hospitalisation of members of households and the results conform to number of people having cholera above. Spearman's rank correlation analysis results indicate no significant correlation and no correlation can be computed for the

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Kericho data. Cases of hospitalisation in households then need to be explained using other factors (Note that cholera cases data are focused on Kisumu not Kericho).



## OUTPUT 2: SOCIO-ECONOMIC DATA ANALYSIS FOR UGANDA

### Uganda Baseline data

Administrative units covered in the Tanzania survey include one location Kabaale in Kabaale district and one location Ggaba in Kampala district. In Kabaale, 159 households are samples as compared to 131 households in Ggaba survey, indicating unequal representation in the database.

Administrative units in the Tanzania survey sample data

District	Location	Frequency	Percent
KABAALE	KABAALE	159	100.0
KAMPALA	GGABA	131	100.0

The households sampled tend to be located on two distinct relief surfaces in both Kabaale and Kampala survey areas and these relief surfaces are valley bottom and hillside. Most of the households are in the valley bottom (89.7% of households in Kabaale and 82.4% in Kampala (Ggaba).

There are no data on distance from the lake in the Kabaale data but in the Kampala data, households are located at distances ranging from 100 metres (just by the lake) to 1500 metres (1.5km), making Kampala data to be that representing the lake littoral data, but Kampala is to the north of the Lake and generally on higher grounds. Kampala is therefore on the lake margin than on the littoral.

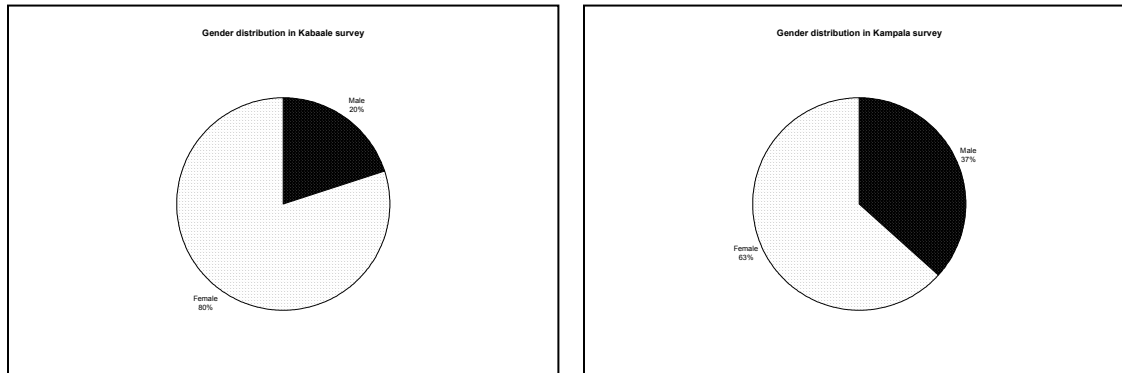
Elevation data indicate that the surface of Kabaale range from 1016 metres to 6808 metres above sea level, and this tend to suggest variations from the so called uplands to highlands conditions in the Kabaale survey. In Ggaba of Kampala district, elevation range from 1029 metres to 4128 metres above sea level, generally falling within the East African uplands or highland region. The two survey areas in the database are generally within the uplands or highlands zones of Eastern Africa but Kampala data seems to be that representing the lake shore data.

In terms of geographic location, the two survey areas are within the equatorial belt with Kampala closer to the equator to the north and Kabaale at the outer position to the south. Climatic conditions are likely to be influenced by the regional climatic forces such as the prevailing winds and the moderating effects of lake Victoria systems. Altitudinal position and aspects are likely to play major roles in daily weather conditions in the two survey areas.

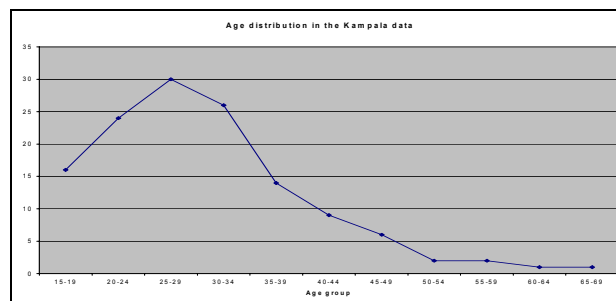
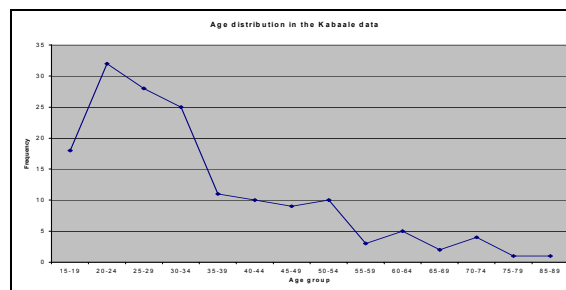
Presence of stagnant water bodies in the survey areas tend to be a major factor as 65.6% of the households respondents in Kabaale report stagnant water bodies nearby and 42.3% of the household respondents in Kampala also report presence of stagnant water bodies.

## Socio-Demographic Data

In the Uganda survey data, the females tend to dominate in both Kabaale (79.9%) and Kampala (63.4%). This condition tends to suggest the picture of homestead management responsibility in Uganda.

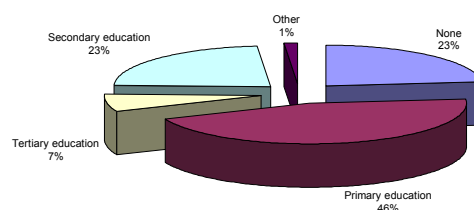


Age distribution in the survey data varies from 14 years to 89 years in the Kabaale data and from 14 years to 68 years in the Kampala data. In Kabaale survey, most respondents are in the age group 14 -40 years and in the Kampala survey, the respondents are mostly in the age group 14-35 years (see graphs below).

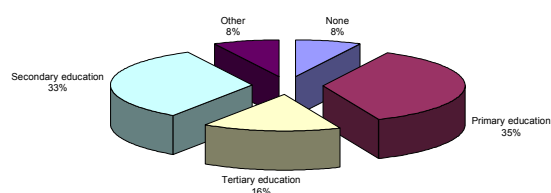


Education levels of the respondents in the survey data vary from none to secondary education with majority having primary education. In Kabaale data, 45.3% of the respondents have primary education, 23.3% no education, 23.3% secondary education, 6.9% tertiary education and 1.3% other forms of education. In the Kampala data, 35.9% have primary education, 7.6% no education, 32.8% secondary education, 16.0% tertiary education and 7.6% other forms of education, suggesting a relatively higher education levels in Kampala in Kabaale.

Levels of education in Kabaale survey



Levels of education in Kampala survey



Respondents are mostly in some form of marital union as 70.4% of respondents in Kabaale report are married, 8.8% are widowed and only 20.7 % are either divorced/separated or single. In the Kampala data, 64.1% are married, 2.3% widowed, and 33.5% either single or divorced/separated.

#### Marital status of respondents

District	Status	Frequency	Percent
KABAAL	Single	25	15.7
	Married	112	70.4
	Divorced/separated	8	5.0
	Widowed	14	8.8
	Total	159	100.0
KAMPALA	Single	37	28.2
	Married	84	64.1
	Divorced/separated	7	5.3
	Widowed	3	2.3
	Total	131	100.0

Household sizes vary from 1 to 32 people in Kabaale (check these figures) and from 1 to 20 people in Kampala indicating relatively large households. In Kabaale, most households are in the range of 2-7 persons while in Kampala the common household size range is, 2-5 persons per household.

### Income and expenditure

Income in the survey areas seemingly is dependent to a large extent on Self-employment, formal employment, and farming. Other sources of income mentioned include various forms of self-employment such cycle transport (Boda Boda), charcoal selling, petty trade. Fishing as a source of income seems to be a non-starter in the Uganda survey database. This picture can be linked to education level and gender distribution in the database. Most respondents in Kabaale data tend to be largely dependent on self-employment for income (62.0%) and the same is true of the situation in Kampala where self-employment accounts for 51.9% of respondents. Formal employment tends to be ranked higher in Kampala data (23.7%) as a source of income than in Kabaale data (12.0%). Farming accounts for 15.2% of the respondents' sources of income in Kabaale but the figure is only 4.6% in Kampala. Generally, the respondents in the survey areas tend to rely on self-employment as source of income.

### Sources of income

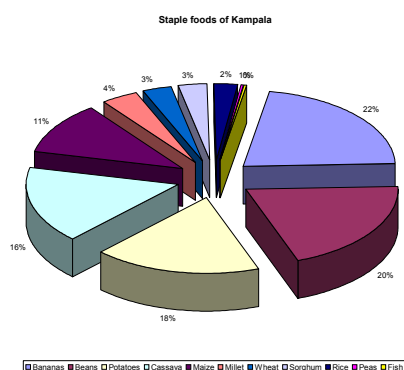
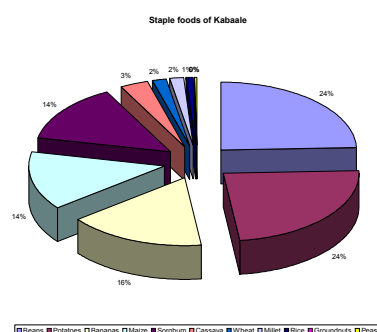
District	Source of income	Frequency	%
<b>Kabaale</b>	Self employment	98	62.0
	Farming	24	15.2
	Formal employment	19	12.0
	Builder	2	1.3
	Charcoal seller	1	0.6
	Cycle transporter (Boda Boda)	1	0.6
	Turn boy	1	0.6
	Fishing	1	0.6
	Spouse	1	0.7
<b>Kampala</b>	Self employment	68	51.9
	Formal employment	31	23.7
	Farming	6	4.6
	Fishing	2	1.5
	Cycle transporter (Boda Boda)	1	0.8
	Petty trader	1	0.8

Monthly total income varies from a low of Uganda shillings 3000 to a high of Uganda shillings 700,000 in Kabaale and from a low of Uganda shillings 5000 to 1,200,000 Uganda shillings in Kampala data. The Kabaale total monthly income is generally less than in the Kampala. Since in all cases it self-employment that is the main source of income, the difference in monthly total income could due to different market economies addressed, where the Kampala one is affected by urbanism and the Kabaale being largely rural.

The Kabaale staple foods, according to the respondents are beans (90.6%), potatoes (88.7%), bananas (61.0%), maize (51.6%) and sorghum (51.6%). Others foods are given as cassava (12.6%), wheat (6.3%), millet (5.7%), rice (3.1%), groundnuts (0.6%) and peas (0.6%). In the Kampala data, the staple foods, according to the respondents are bananas (96.9%), beans (89.3%), potatoes (80.0%), cassava (72.0%), and maize (49.6%). Other foods consumed are millet (17.6%), wheat (14.5%), sorghum (13.0%), rice (10.7%), peas (2.3%) and fish (0.8%). Definition of food shortage in Kabaale should use the scarcity of beans, potatoes, bananas, maize and sorghum and in the Kampala area, scarcity of Bananas, beans, potatoes and cassava are a benchmark in the definition of food shortage.

## Staple Foods of households

District	Foods consumed	Frequency	%
Kabaale	Beans	144	90.6
	Potatoes	141	88.7
	Bananas	97	61.0
	Maize	82	51.6
	Sorghum	82	51.6
	Cassava	20	12.6
	Wheat	10	6.3
	Millet	9	5.7
	Rice	5	3.1
	Groundnuts	1	.6
	Peas	1	.6
Kampala	Bananas	127	96.9
	Beans	117	89.3
	Potatoes	104	80.0
	Cassava	95	72.5
	Maize	65	49.6
	Millet	23	17.6
	Wheat	19	14.5
	Sorghum	17	13.0
	Rice	14	10.7
	Peas	3	2.3
	Fish	1	.8



Regularity of meals of the day tends to increase from a low score in breakfast to a high in dinner in both the survey areas. The three meals a day structure seems to be relatively well maintained in both Kabaale



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and Kampala data as shown in the table below. The figures in the table below give indication that dinner structure is fairly maintained in the survey areas and a major drop in its availability can be used as indicator to either food shortage in the areas or drop in purchasing power of the respondents

### Regularity of major meals of the day

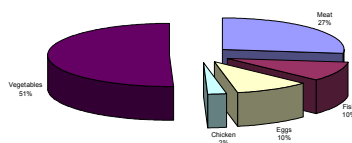
District	Meal normally taken	Frequency	%
Kabaale	Breakfast	114	71.7
	Lunch	153	96.2
	Dinner (supper)	156	98.1
Kampala	Breakfast	113	86.3
	Lunch	122	93.1
	Dinner (supper)	125	95.4

### Types of foods

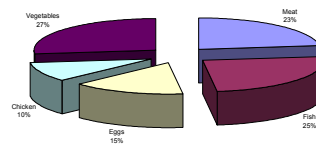
District	Type of Food taken at least once a week	Frequency	%of respondents
Kabaale	Meat	77	48.4
	Fish	29	18.2
	Eggs	29	18.2
	Chicken	7	4.4
	Vegetables	145	91.2
Kampala	Meat	108	82.4
	Fish	118	90.1
	Eggs	71	54.2
	Chicken	46	35.1
	Vegetables	127	96.9

From the table above and graphs below, it is obvious that even if meals of the day are normally taken, there are variations in the type by survey areas and these variations can be used to indirectly assess the poverty situation in the survey areas. Vegetables and meat consumption are both seemingly high in the two study areas but Kampala seems to be relatively better of in terms of fish meat, eggs and chicken consumption and this could be an indication of relatively better of income conditions in Kampala area. It would have been reasonable to inquire about reasons for not having the type of meal

Types of food taken at least once a week (Kabaale)

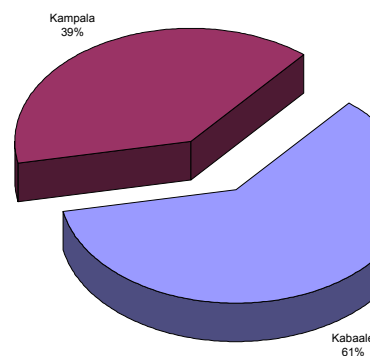


Types of food takes at least once a week (Kampala)



Checking on periods of food shortages in the households reinforces meals types question. In Kabaale, 54.5% of the households surveyed report days of not enough food while in Kampala, 34.4% of the households surveyed report days of not enough food. This can be interpreted as indicator of poverty level variation between the two regions or difference in food production and availability as Kabaale seems to be relatively poorer in terms of food scarcity.

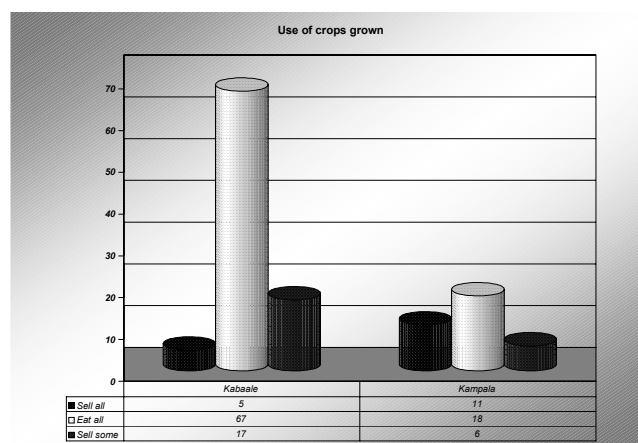
Periods of food scarcity



Access to agricultural land in Kabaale tends to medium (51.9%) while in Kampala, access to agricultural land is relatively low (23.7%). This relatively low access to land in the Uganda survey could be the explanation for low position of agriculture as source of income and high position of self-employment in the income generation sector. It is therefore logical to suggest that access to land does not define availability of food in the two study areas but it could be the question of land productivity and other forces. A look at the types of crops grown on household lands may explain the observed anomaly in food availability between Kabaale and Kampala survey areas.

What happens to the crop that is grown on land may also be used to indirectly measure poverty levels or reasons for food shortages in the survey areas. In Kabaale survey data, 65.7% of the respondents eat all the crops grown, 19.1% sell some crops and only 5.6 respondents indicate selling all crops grown. In the Kampala area, the percentage of respondents selling all (31.4%) crops is higher than in Kabaale, although a sizeable percentage still eat all (51.4%) the crops grown and only 17.1 sell some crops. It seems that there are more people selling crops grown in the Kampala survey data than in the Kabaale data (This should take into account the number interviewed). The explanation can be in the cash crops grown in the two areas.

Crops grown on land			
District	Crop	Frequency	%
Kabaale	Beans	76	92.7
	Potatoes	75	91.5
	Sorghum	65	79.3
	Maize	49	59.8
	Bananas	11	13.4
	Coffee	5	6.1
	Fruits	5	6.1
	Millet	3	3.7
	Sugarcane	3	3.7
	Tea	1	1.2
	Pyrethrum	1	1.2
	Wheat	1	1.2
Kampala	Potatoes	15	57.7
	Beans	14	53.8
	Bananas	13	50.0
	Maize	13	50.0
	Coffee	8	30.8
	Sorghum	7	26.9
	Sugarcane	7	29.9
	Fruits	4	15.4
	Millet	3	11.5
	Tea	2	7.7
	Wheat	2	7.7
	Pyrethrum	1	3.8



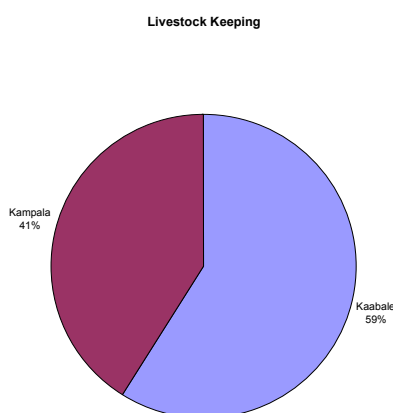
Checking on the households buying food from the markets further filters the use of crops grown on land. In both survey areas, nearly all buy food from markets (96.8% for Kabaale and 96.2 for Kampala). It is as if the food crops grown in both Kabaale and Kampala survey data do not meet households demand and this has to be supported by buying food from the market.

**Wealth indicators**

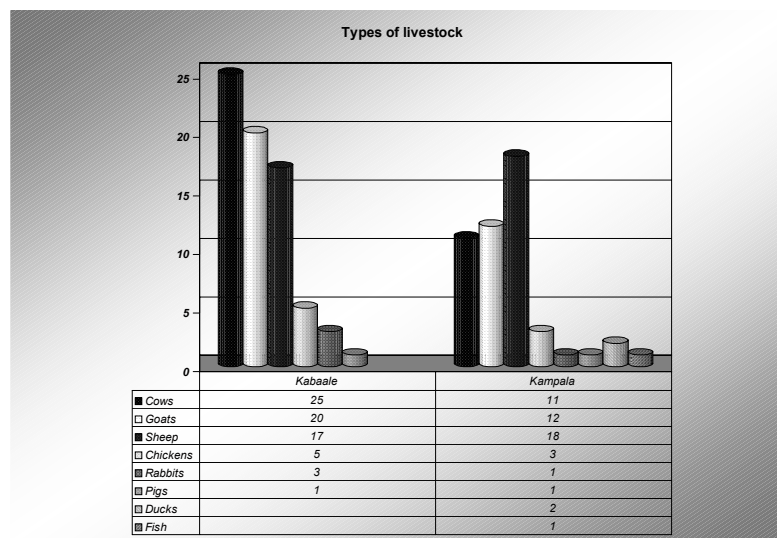
Wealth indicators in this baseline data are assessed using the following property ownership elements:

- Livestock keeping
- Land ownership
- Size of land
- House type
- Radio
- Bicycle
- Access to newspapers

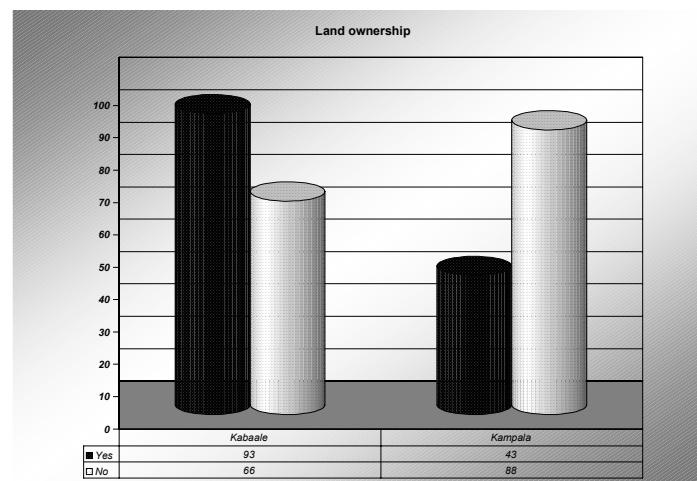
Livestock keeping seems not to be a common practice in nearly all the households surveyed and this can be due lack of space or environmental conditions. It would have been useful to get the number of livestock. Livestock keeping tends to be more common in Kabaale (31.4%) than in Kampala (22.0%).

**Types of livestock kept**

District	Livestock Types	Frequency	%
Kabaale	Cows	25	52.1
	Goats	20	41.7
	Sheep	17	35.4
	Chickens	5	10.4
	Rabbits	3	1.9
	Pigs	1	0.6
Kampala	Cows	11	39.3
	Goats	12	44.4
	Sheep	18	66.7
	Chickens	3	11.1
	Ducks	2	1.5
	Fish	1	0.8
	Rabbits	1	0.8
	Pigs	1	0.8



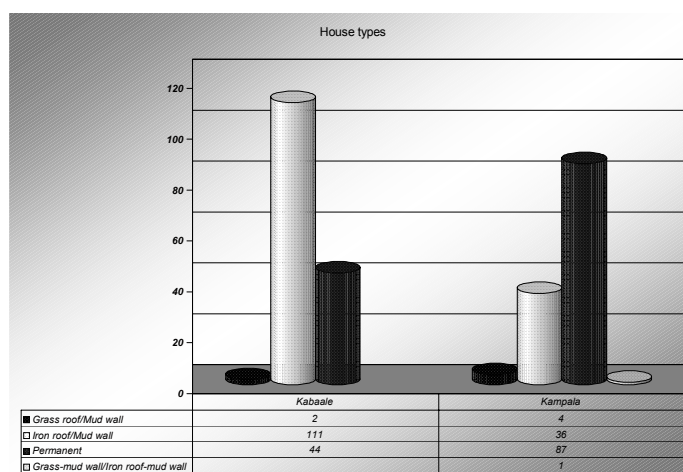
Access to land as already been noted is not high in the two survey areas and this could be explained by further looking who owns the land. A look at who owns the land in the survey data tend to reflect access to land results but there is a tendency in the two survey areas data to have slightly higher figures than in access to land. In Kabaale data, 58.5% of the respondents indicate owning land and the figure for Kampala is 32.8%. This difference between the access to land and land ownership data can either explained by sampling errors or in the concept of land ownership in different communities. If the differences are due to actual responses not sampling error, then there is need for a follow up to this problem.



Land sizes tend to vary in Kabaale from 0.25 acres to 5 acres with most of land parcels, ranging from 0.5 acre to 1 acre. In Kampala, land sizes vary widely from 0.25 acre to 80 acres, a condition that need to be viewed in terms of the history of land ownership in Baganda area of Uganda. Most land parcels in Kampala tend to be of size 0.25 acre to 1 acre.

The type of house in a given homestead can be used as an indicator of wealth or the owner's status in the society. Most houses in the Kabaale survey areas are of the 'semi-permanent' types (iron roof and mud wall, accounting for 70.7% with permanent houses reported by only 28% of the respondents but the grass roof/mud wall type is generally rare as reported by only 1.3% of the respondents. In the Kampala survey data, it is the permanent houses that tend to dominate as reported by 68.0% of the respondents with only 28.1% reporting iron roof/mud wall types of houses. This tends to suggest more affluence in the Kampala

survey data than in the Kabaale data or the difference could be due to the urban influence in Kampala area than in the more rural setting of Kabaale.



Owning a radio, a bicycle and having access to newspapers is sometimes considered a status symbol and some measure of wealth. Radio is considered basic feature of households and lack of it can be considered a measure of poverty. The bicycle tends to be of a higher status than a radio in the homestead, as it tends to cost more and used to be associated with those in formal employment. The presence of a bicycle can therefore be used to as an indicator of a relatively well to do household although of late it has lost its appeal as a status symbol. Access to newspaper can be used to imply relatively good literacy and this can also be used to infer wealth or higher social status. Ownership of radio, bicycle and access to newspapers in the survey data are summarised in the table below:

#### Ownership of radio, bicycle and access to newspapers

District	Item	Frequency	%
Kabaale	Radio	123	78.3
	Bicycle	80	50.6
	Access to newspaper	51	32.9
Kampala	Radio	120	92.3
	Bicycle	36	27.9
	Access to newspaper	79	60.3

If radio, bicycle and newspapers are used as a measure of wealth, then Kampala seems to be better off than Kabaale.

#### Health issues in the survey environments

Source of water used in the households can be a health hazard especially in terms of water borne diseases. In this survey, there is recognition that sources of water become a health hazard mainly during dry seasons when water is scarce.

Sources of water during dry seasons in the survey areas are summarised in the frequency table below. Tap water seems to be a major source of water in both Kabaale data (62.0%) and Kampala data (97.7%). In Kabaale data, the main sources of water during the dry season in order of percentage scores are tap, protected well, borehole, river/stream, unprotected well, lake, roof catchments and pond. In Kampala, sources of water during the dry period in terms of percentage scores are tap, unprotected well, lake, protected well, pond, roof catchments, and borehole. It is obvious that in both Kabaale and Kampala, water during the dry season is relatively safe as it is sourced mainly from relatively safe sources and in

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case of any major water borne disease outbreak, check should be carried out on tap water quality. Use of lake water is relatively more common in Kampala area than in Kabaale even though the use of tap water is also relatively higher in Kampala area.

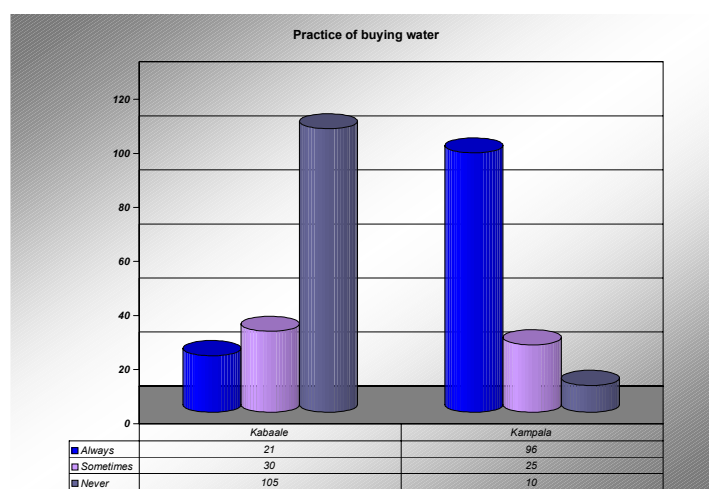
#### Sources of water in dry seasons

District	Source	Frequency	%
<b>Kabaale</b>	Tap	98	62.0
	Protected well	45	28.5
	Borehole	13	8.2
	River/stream	5	3.2
	Unprotected well	3	1.9
	Lake	3	1.9
	Roof catchments	1	.6
	Pond	1	.6
<b>Kampala</b>	Tap	128	97.7
	Unprotected well	11	8.4
	Lake	7	5.3
	Protected well	6	4.6
	Pond	6	4.6
	Roof catchments	5	3.8
	Borehole	1	.8

Buying of water in the Kabaale survey area is relatively very rare as 67.3% of the respondents have indicated that they never buy water but in Kampala, buying of water is a common practice as indicated by 73.3% of the respondents. This should be viewed in terms of sources of water and the way this question is administered. Buying of water can be viewed to be paying for water bills but this seems not to be the case in the Kabaale area. Kampala data on practice of buying water should be further investigated to establish the exact meaning of buying water and why.

#### Practice of buying water

District		Frequency	Percent
<b>KABAAL</b>	Never	105	67.3
	Sometimes	30	19.2
	Always	21	13.5
<b>KAMPALA</b>	Always	96	73.3
	Sometimes	25	19.1
	Never	10	7.6



How water is stored can be a health hazard as well as an indicator of water supply problems. In the survey areas, respondents use the following facilities to store water:

### Water storage units

Unit of storage	Kabaale		Kampala	
	Frequency	%	Frequency	%
Jerry cans	146	91.8	127	96.9
Pot	7	4.4	26	19.8
Drums	5	3.2	16	12.2
Large tanks	6	3.8	14	10.7
Pots				

The results in the table above indicate that Jerry cans and pots are the preferred water storage units in the survey areas. Note the use of large tanks and drums difference between the survey areas; indicator of wealth or abundance of water?

In both Kabaale and Kampala, majority of respondents indicate no problem with water accessibility and this may explain the use of jerry cans and pots to store water. Kabaale report 66.7% of the respondents having no problem with access to water and Kampala report 89.3% of the respondents having no problem with water accessibility. It is possible that most households surveyed are supplied with piped water as earlier indicated by tap water being the main source during dry periods. Respondents identified major water problems as follows:

### Water Problems

Water problem	Kabaale		Kampala	
	Frequency	%	Frequency	%
Accessibility	53	33.3	14	10.7
Availability	50	31.4	12	9.2
Quantity	22	13.8	39	29.8
Quality	9	5.7	23	17.6

It appears that there is relatively little water problem in the Kampala area than in Kabaale area. In Kabaale area, water accessibility is the main problem followed by availability, quantity and quality in that order. In the Kampala data, it is water quantity that is the main problem followed by water quality, accessibility and availability in that order. The fact that water quality is not the main problem in both the survey areas, Kabaale and Kampala, suggests that there is relatively safe water supply to the residence.



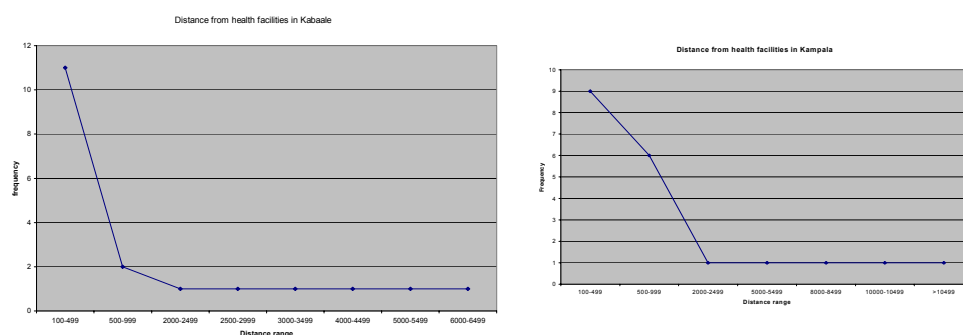
Provision of health services in the Kabaale survey area seems to be largely centred on government health facilities especially district hospital since 59.2 of respondents indicate using the district hospital. The role of private health institution is relatively major as private clinic and private hospitals account for 34.7% of the respondents. In the Kampala area, provision of health services is largely centred on private institutions especially private clinics. This could mean prevalence of private health provision facilities or that the residence of Kampala area can either afford to pay for private services or that the government institutions available do not offer the required services. Private institutions in the Kampala area are visited by 78% of the respondents. Other, other family treatment centres are given as Provincial hospital (8.7%), district hospital (7.1%), herbalist (3.1%), local dispensary (1.6%) and health centre (0.8%). This picture should be compared with the picture in Kenya and Tanzania databases as they seems to be the complete opposite.

### Family treatment centres

Centre	Kabaale		Kampala	
	Frequency	%	Frequency	%
Provincial hospital	1	0.6	11	8.7
District hospital	93	59.2	9	7.1
Health centre	4	2.5	1	0.8
Local dispensary	2	1.3	2	1.6
Herbalist	0	0.0	4	3.1
Private hospital	10	6.4	16	12.6
Private Clinic	45	28.3	83	65.4

When ownership of the health facilities is considered, the role of government in health services provision becomes apparent in the Kabaale area. In Kabaale, 60.4% of the respondents indicate the government owns health facilities and 37% indicate private individuals own the facilities and religious institutions seem to play minimal role in health provision. In the Kampala data, 74% of the respondents indicate individuals as owners of health facilities and only 5.8% indicating that government owns health facilities.

Health facilities in are located at distances ranging from 100 metres to 6000 metres (6 km) in Kabaale, majority of which are at the 100-500 metres range. In Kampala, health facilities are located at distances from 100 metres to 15000 metres (15 km) indicating a wider spread of households, with most households located within the 100-1000 metres range.



On reaching the health facilities on foot, majority of respondents (92.9%) in Kabaale indicate they can walk to the health facilities. This suggests that most health facilities in Kabaale are within reach of households in the survey as already indicated by distance from health facilities above. In Kampala survey data, the percentage of respondents that can walk to health facilities (69.8%) is lower than that of Kabaale but still constitute the majority, and this reinforces the idea of wider spread of households around health facilities as already suggested in the distance data results.

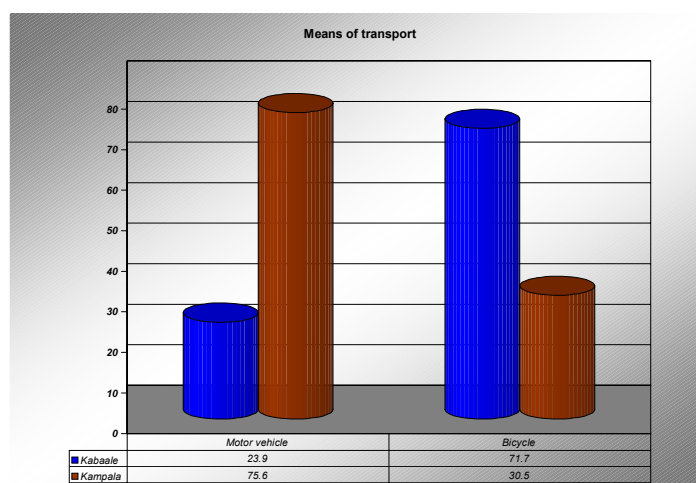
Means of transport in Kabaale survey area is largely by bicycle as indicated by 71.7% of the respondents with only 23.9% indicating use of motor vehicles. The opposite is true of the Kampala survey area where

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75.6% of the respondents use motor vehicles to reach health facilities and only 30.5% using bicycles. The difference in means of transport between Kabaale and Kampala could be due to distance from health facilities, urban influence or variation in income levels.

### Transport means to health facilities

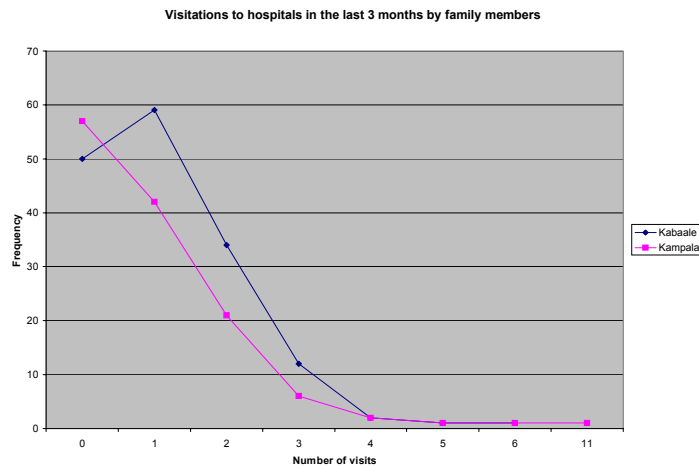
	Kabaale		Kampala	
Transport Means	Frequency	%	Frequency	%
Motor vehicle	38	23.9	99	75.6
Bicycle	114	71.7	40	30.5



Health centres visitations tend to be rare in both Kabaale and Kampala survey areas where number of visits are mostly in the range of 0-1 in the last three months.

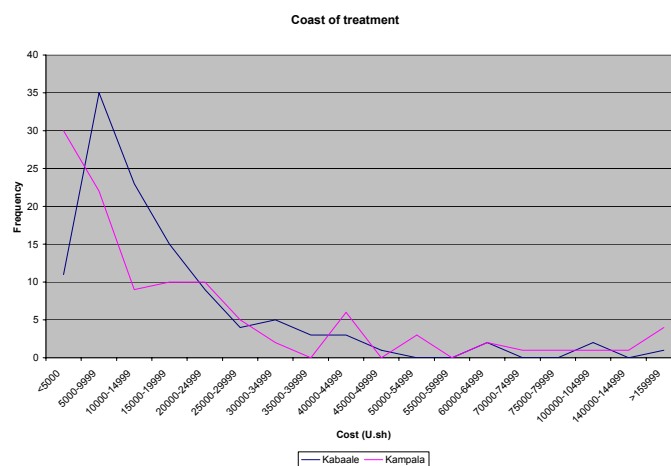
### Visits to hospitals in the last three months by household members

	Kabaale		Kampala	
	Frequency	%	Frequency	%
Number of visits				
0	50	31.4	57	43.5
1	59	37.1	42	32.1
2	34	21.4	21	16.0
3	12	7.5	6	4.6
4	2	1.3	2	1.5
5	1	0.6	1	0.8
6	1	0.6	1	0.8
11			1	0.8

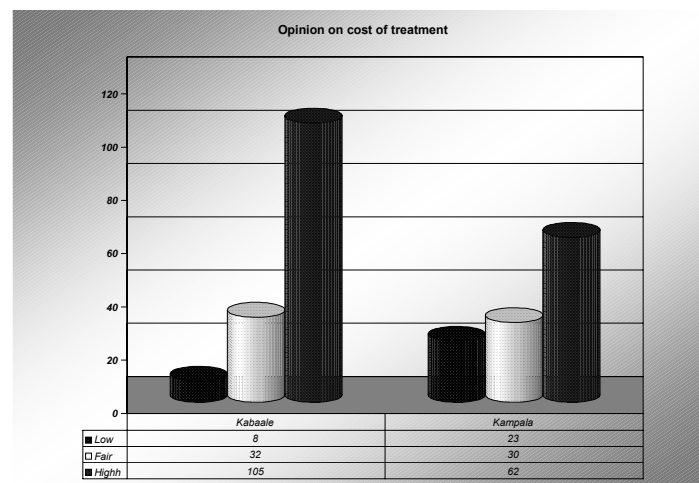


The health facilities visited by respondents tend to satisfy patients needs in terms of services as indicated by 87.9% of respondents in Kabaale data and 96.2% in Kampala data. This is further supported by indication that majority of family members always get well after treatment (91.7% of respondents in Kabaale and 96.2% in Kampala).

No data for the question on whether respondents pay for the treatment of cholera. On malaria treatment, majority of respondents in Kabaale (73.7%) indicate they have to pay and only 26.3 not paying. This suggests either the practice of cost sharing or use of private health facilities. In Kampala, 99.2% of the respondents pay for the treatment of malaria and only one respondent indicating not paying for the service. This support the earlier view that most respondents in the Kampala survey area use private health facilities, which always require payment for, services. The cost of treating malaria in Kabaale range from Uganda shillings 1000 to 200,000 while in Kampala, the cost varies from Uganda shillings 200 to 300,000. There is indication that the cost of treating malaria is averagely higher in Kabaale, where most people use government facilities than in Kampala where most people use private facilities and this seems to be a contradiction. The cost of treatment in the two survey areas is generally on the lower side (see graph below). Patients' admission to health facilities for treatment is generally low in both Kabaale and Kampala areas as only 16.7% of the respondents in Kabaale indicate admission of patients while the figure is 17.8% in Kampala.

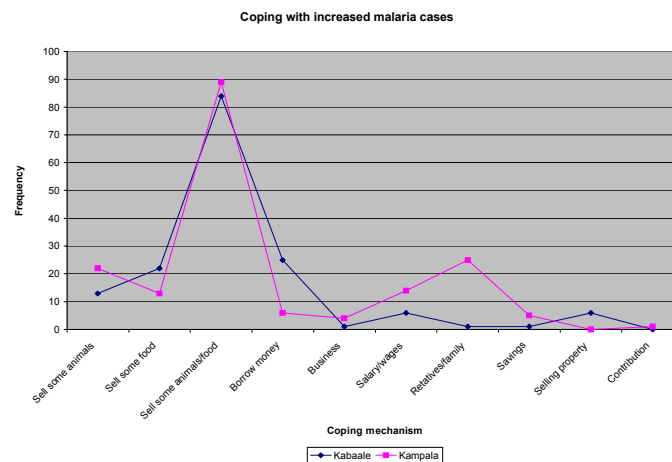


Even if the cost of treatment tends to be relatively low, the respondents generally feel they are high (Kabaale, 72.4% and Kampala, 53.9%). Note that most of the respondents have low monthly total income and tend to rely on self-employment.



\*\*\*\*There is no data on how people cope with increased cholera cases in households. There is need to collect this data\*\*\*\*

Mechanisms of coping with increased malaria cases in the survey areas include, selling some animals, selling some food, borrowing money, business, savings, relatives/family, selling property, wages/salary, and contributions (fund raising). In Kabaale, respondents tend to have to sell some animals and some food to cope with malaria and the same is true of Kampala survey area. Since in the earlier discussions, it has been noted that keeping of livestock is limited in the both Kabaale and Kampala, it therefore means increased malaria cases is usually a major strain on the limited resources especially livestock.



## Malaria and Cholera Data

Most of the respondents tend to think that health of family members is associated with weather conditions (see table below) and this belief is based on experience in the environments where the surveys have been conducted.

**Opinion on relation between health of household members and weather**

<i>District</i>		<i>Frequency</i>	<i>Percent</i>
KABAALE	Yes	124	83.2
	No	25	16.8
KAMPALA	Yes	88	67.2
	No	43	32.8

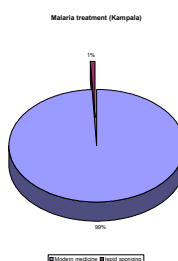
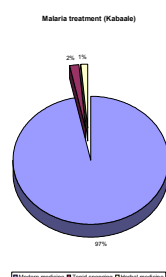
**Malaria data**

The respondents experience is tested further by seeking from them the characteristics or signs they use to identify malaria cases and the results is as follows:

**Opinion on signs of malaria**

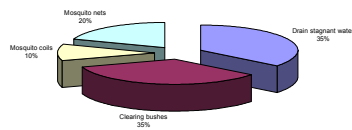
<i>Sign of malaria</i>	<i>Kabaale</i>		<i>Kampala</i>	
	<i>Frequency</i>	<i>%</i>	<i>Frequency</i>	<i>%</i>
Fever	100	69.2	103	78.6
Headache	123	78.8	74	56.5
Stomach ache	28	17.9	32	24.6
Joint ache	97	62.2	91	69.5
Vomiting	85	54.5	79	60.3
Lack of appetite	92	59.0	89	67.9
Convulsion	32	20.5	45	34.4

In the Kabaale data, majority of respondents tend to indicate that malaria is largely treated using modern medicine (96.6%) and the remaining indicating use of tepid sponging and herbal medicine. In the Kampala, nearly all respondents, 99.2, suggest use of modern medicine to treat malaria and the remaining 0.8% indicating use of tepid sponging.

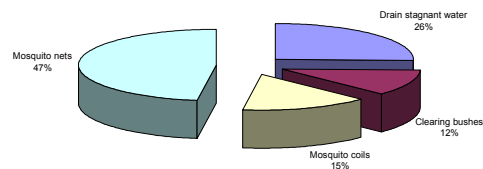


On malaria prevention, in Kabaale survey data respondents give the methods of draining stagnant water (64%), clearing bushes (62.7%), using mosquito nets (35.3%) and using mosquito coils (18.7%) thus suggesting stress on environmental conditions than using nets or coils. In the Kampala area, opinion is tilted towards use of mosquito nets (78.6%) followed by draining stagnant water (42.0%), using mosquito nets (24.4%) and clearing of bushes. This difference should be investigated further. In both Kabaale and Kampala data, the respondents are united in the opinion that malaria is caused by mosquitoes (97.5% in Kabaale and 93.1% in Kampala) and this tends to give an indication of high awareness on the dangers caused by mosquitoes to human health. Other possible cause of malaria mentioned in the Kabaale data is the use of unboiled water.

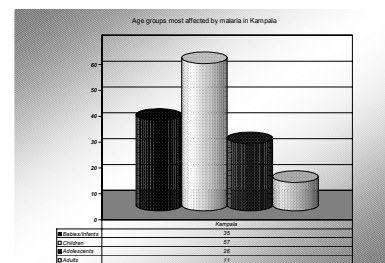
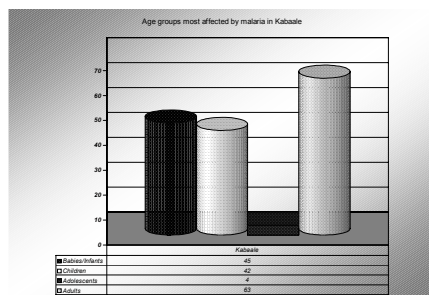
Malaria control in Kabaale



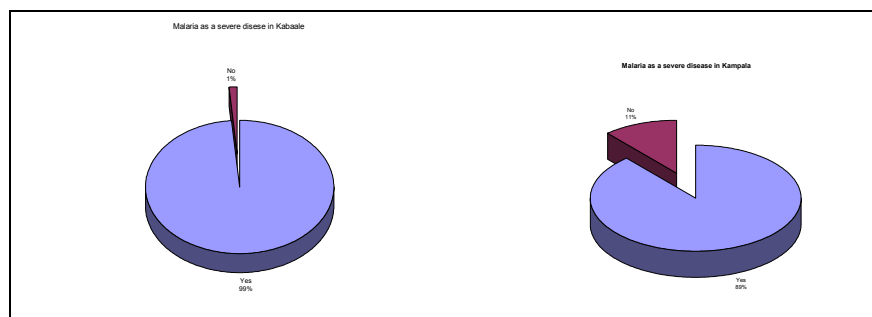
Malaria control in Kampala



In Kabaale data, 40.9% of the respondents indicate that adults are most affected by malaria, followed by babies/infants (29.2%), children (27.3%), and adolescents (2.6%). When babies and children are taken together, they are collectively recognised by 56.5% of the respondents as the most affected group. In the Kampala data, children (44.2% of the respondents) are indicated as the most vulnerable group followed by babies (27.1%), adolescents (20.2%) and adults (8.5%) in that order. It seems that respondents in the Kampala data are of the opinion that adults are less affected by malaria than the young and this could affect preventive measures employed in households.



Malaria peak periods in the calendar year are indicated in the Kabaale data as wet periods (82.9% of respondents), dry and wet periods (12.7%) and dry periods (3.2%). In the Kampala data, the malaria peak periods are indicated by the respondents as, wet season (62.6%), dry period and wet period (27.5%) and dry periods (5.3%). It is obvious that in both Kabaale and Kampala, wet periods of the year are recognised by the respondents as the malaria peak periods. In the Kabaale data, the general view on malaria is that of a severe disease as indicated by 98.7% of the respondents and only 1.3% saying no and in the Kampala data, 88.5% of the respondents indicate recognising malaria as a severe disease with only 11.5% indicating malaria is not a severe disease.



It seems to be the general view of respondents in Kabaale data that the government should pay for the treatment of malaria as indicated by 89.2% of the respondents. In the Kampala data, majority of respondents tend to indicate that the family (48.1%) should pay for the treatment of malaria followed the government (35.1%) and this seems to suggest recognition by the respondents that the family has to pay for treatment of malaria. On prevention of malaria, the government is seemingly the party considered as responsible (Kabaale, 46.2% and Kampala, 48.9%) even if some still think it is the responsibility of the family (Kabaale, 31% and Kampala, 26.7%).

In case of a member of the family having malaria, it is generally the opinion of the respondents in Kabaale (99.4%) that the person should go to the health facility for treatment and in Kampala the view is seemingly the same as 98.5% of the respondents indicate the person should go to health facility. This is further supported by opinion on local herbalists ability to treat malaria where only 22.2% of the respondents in Kabaale are in favour and 77.8% having no faith on the herbalists ability. There is increased faith in the ability of local herbalists to treat malaria in the Kampala data where 34.9% of the respondents believe the herbalist can treat malaria but still the majority (65.1%) do not have faith in the ability of herbalists to treat malaria.

In general, most respondents tend to have a strong opinion on using bed nets when sleeping as indicated by 92.4% of respondents in Kabaale and 94.7% of respondents in Kampala.

Action to be taken when one has malaria are clear in the data and no action is clearly not a popular option as expressed in the frequency scores below:

#### Action to be taken in case of malaria

Action	Kabaale		Kampala	
	Frequency	%	Frequency	%
Go to health facility	150	95.5	121	92.4
Treat at home	3	1.9	11	8.4
Visit herbalist	4	2.5	5	3.8
Do nothing	1	0.6	0	0.0

Action taken when children have malaria also does not include not doing anything and are as follows:

#### Action to be taken when a child has malaria

Action	Kabaale		Kampala	
	Frequency	%	Frequency	%
Go to health facility	154	98.1	124	94.7
Treat at home	2	1.3	4	3.1
Visit herbalist	1	0.6	3	2.3
Do nothing	1	0.6	0	0.0

When a child has malaria or an individual has malaria, the action on top of priority list is to go the health centre and this action has already been expressed early in the report.

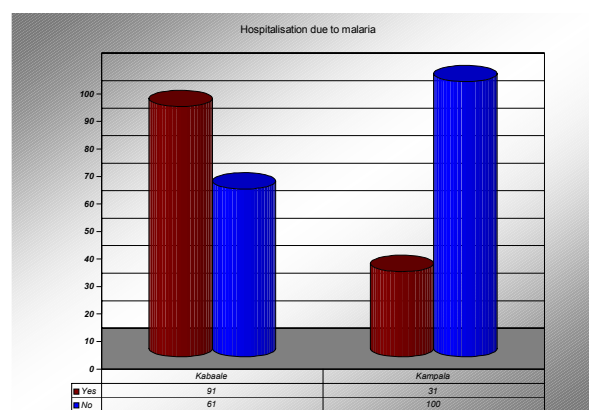
In medicine used to treat malaria, opinions vary in names of drugs but there is a tendency to have a combination of 'on counter' pain killer drugs and known prescription anti-malaria drugs such as Fansidar, Metakelfin, Comaquine, chloroquine, Septrine, Malaquine, Sugarquine, malaraquine, and quinine although some indicate use of herbs.

Effectiveness of control measures against malaria may be affected by household size. In the Kabaale data, households' sizes range from 1 to 12 persons and the range in Kampala data are 1 to 20 persons. Use of bed nets is used to measure exposure to mosquito bites, which is the main cause of malaria according the respondents. Measure of bed nets use is in the form of number of bed nets in the households as compared to number of people spending the night. In The Kabaale data, number of bed nets range from 1 to 6 nets per household and this does not compare well with the number of persons spending nights in the households (1-12). In Kampala data, number of bed nets range from 1 to 15 nets, comparatively better than in Kabaale. It seems that bed nets use is more common in Kampala than in Kabaale. In both Kabaale and Kampala data, no respondent indicate not bed net in the household and this suggests high awareness in the use of bed nets against malaria.

Those using bed nets tend not to treat the nets with insecticides as 71.9% of the respondents indicate in the Kabaale data, while 60.8% of respondents in Kampala data indicate that treatment of nets does not even arise since they do not use them. Where there are treatments of nets, it is likely to be once to twice a year. Treatment of nets with insecticides is clearly not a common practice in both the Kabaale and Kampala data.

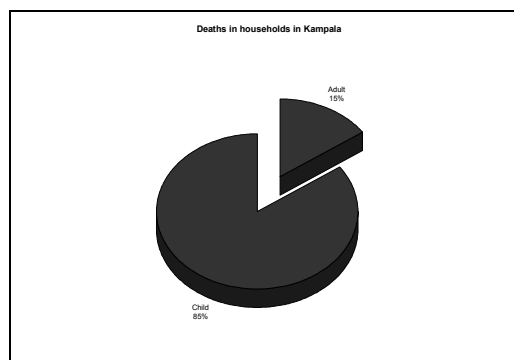
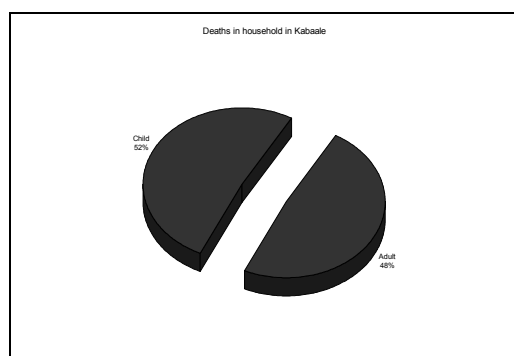
Mosquito control measures in households in the Kabaale data include bush clearing (54.9%), draining stagnant water (49.3%), spraying insecticides (41.7%), using mosquito coils (21.5%) and house screening (5.6%). In Kampala survey data, the control measures are; spraying with insecticides (50.8%), draining stagnant water (35.5%), using mosquito coils (18.5%), house screening (17.7%), and bush clearing (16.1%).

Hospitalisation due to malaria tends not to be common in Kampala data as only 23.7% indicate hospitalisation as compared to 59.9% of the respondents in Kabaale data, although Kabaale data also indicate a relatively high no hospitalisation (40.1%).



Deaths in households due to malaria cases tend to be rare events in both Kabaale (15.1%) and Kampala (8.4.0%) data although it seems as if there are more deaths due to malaria in Kabaale than in Kampala. In cases where deaths due to malaria in the last five years are reported, the deaths tend to be children although Kabaale data show little difference.





### Diarrhoea and Cholera data

Diarrhoea and cholera issues are not indicated as focused on one particular survey area but from the data results seem to be focused on Kampala survey although the discussions are general since earlier indications have not shown report of cholera cases in both Kabaale and Kampala data.

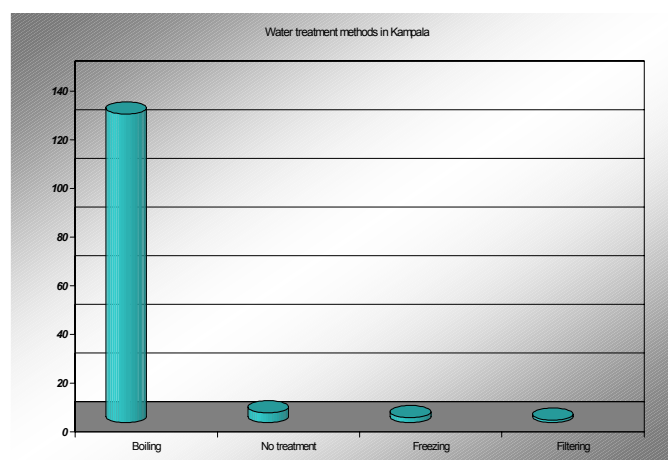
Good sanitation is one the major measures against diarrhoea and cholera and type of toilet used is crucial in the sector. Types of toilets used tend to be pit latrines in most cases as is indicated by 86.3% of respondents in Kampala survey. Pit latrines if not located and constructed properly may pollute sub-surface water storage or nearby surface water systems, thus a danger to the health of the people. Use of bush as a toilet is one of the major health hazards especially in terms of infectious diseases such as cholera and diarrhoea and this practice seems to be also present in Kampala survey area. Not that majority of respondents use pit latrines and only 12.2% use flush toilets but 73.1% indicate access to sewage system. This contradiction should be checked.

Sanitation issues within an area are usually addressed through institutions and presence of such institutions are generally common in Kampala data as indicated by 60.8% of the respondents although a sizeable percentage (39.2%) say there are no such institutions.

Water is an essential element to the survival of living beings but can also be a source of diseases if not treated properly. There are many ways of treating water so as to make it safe for use and the respondents in the survey data for Kampala have given the following treatment preferences, where it is apparent that boiling of water is the preferred method of treatment:

### Water treatment methods

Treatment	Kampala	
	Frequency	%
Boiling	127	96.9
No treatment	4	3.1
Freezing	2	1.5
Filtering	1	0.8



Individuals in the Kampala survey give the following reasons for not treating drinking water as lack of money to buy fuel (2.4%) and lack of time (2.4%). It seems that those not treating water either lack money or time and it is not the attitude as has been noted in both Tanzania and Kenya data.

Awareness on the consequences of using untreated water is seemingly very high In the Kampala data as indicated by 98.5% of the respondents. This is filtered further by considering respondents knowledge on the type of consequences as indicated in the table below:

#### Consequences of drinking untreated water

Consequences	Kampala	
	Frequency	%
Disease	129	98.5
None	2	1.5

Information on consequences of using untreated water tends to be received mainly through media (53.4%), formal sources (44.3%), community awareness programmes (42.7%), health service providers (28.2%) and informal network (18.3%) in Kampala (see table below).

#### Means of receiving information on consequences of drinking untreated water

Means	Kampala	
	Frequency	%
Media	70	53.4
Formal sources	58	44.3
Community awareness programmes	56	42.7
Health service providers	37	28.2
Informal networks	24	18.3

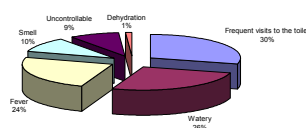
Washing of hands before meals is one of the main hygienic practices basic to protection against infectious diseases such as cholera and diarrhoea, and in the survey data 97.7% of the Kampala respondents do practice it but there is need to filter this further by focusing on the quality of washing hands.

Prevalence of a disease is usually measured within a time period and in this survey, the last five-year period is used to measure prevalence of diarrhoea in Kampala survey area. In the data analysis results, 35.1% of the respondents report diarrhoea occurrence in households while 64.9% report no diarrhoea cases in the last 5 years. This tends to suggest generally low prevalence of diarrhoea in Kampala area. For respondents to recognise a diarrhoea case, there are certain characteristics of the disease that can be used to describe it. In the survey data, the diarrhoea cases reported in the Kampala data have the following characteristic scores:

**Nature of Diarrhoea cases**

Nature	Frequency	%
Frequent visits to the toilet	29	63.0
Watery	26	56.5
Fever	24	52.2
Smell	10	21.7
Uncontrollable	9	19.6
Dehydration	1	2.2

Nature of diarrhoea (Kampala)



Diarrhoea as a communicable disease is transmitted through various interaction levels and how it is transmitted in the Kampala survey data are in terms of drinking water from lake (12.5%), drinking water from stream (25.0%), eating food (40.6%), drinking piped water (12.5%), drinking pond water (6.3%), and attending funeral (3.1%). There seems to be many possible sources of diarrhoea in the Kampala survey area especially water and food. These possible causes of diarrhoea can be summarised into two groups; use of untreated water and poor eating habits. A respondent indicate that measles can also cause diarrhoea, and this is most likely if the person is a child.

Where diarrhoea cases are reported in Kampala data, 56.5% of the respondents indicates the disease is life threatening and 43.5% indicating the diseases as not a threat to life.

Awareness on cholera is seemingly very high in the Kampala survey area as 99.2% of the respondents indicate they know of the disease cholera. High awareness of a disease usually is an indicator of the disease having been experienced in a geographical area over duration of time. Awareness may also indicate a deliberate information campaign through official channels or through non-governmental organizations.

How cholera is transmitted according to the respondents is given in the table below:

**Causes of Cholera**

How one gets cholera	Frequency	%
Drinking untreated water	109	83.2
Eating contaminated food	112	85.5
Greeting sick people	1	.8*
Having no toilet	1	.8*
Touching dead bodies	1	.8*
Touching sick people	3	2.3*

\*Additional information provided by respondents in Kampala survey.

When cholera strikes, there is need for urgent action and in the Survey data, most respondents are of the opinion that when one gets cholera, the right action is to take the person to the health facility as indicated by 100% of respondents in Kampala survey. No any other action is recommended. In case of treatment at

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home, majority of respondents in Kampala data (44.6%) indicate not knowing what to do. Oral rehydration salts or giving fluids such as porridge seems to be the known method of treatment at home in case of Kampala data. These measures can be classified as first aid or emergency measures before proper treatment at health facilities. This seems to suggest that even treatment at home indicated in the Kampala data can be just a stopgap measure before taking to health facility. A respondent has indicated that in case of cholera, one should take charcoal mix!

The weather conditions, which might promote cholera, are used as a measure of relation between weather conditions and cholera outbreak. Most respondents seem to suggest that cholera occurs mostly during wet weather conditions in Kampala area as indicated by 98.4% of the respondents. The opinion on weather condition promoting cholera occurrence seems to be at variance with the idea that cholera is most like to occur during period of low water supply usually associated with dry conditions.

To prevent the disease, respondents in Kampala survey have suggested use of treated/boiled water (93.9%), washing of hands before eating/after toilet (77.1%) and covering food (48.9%) as the most important measures. What seems to be emerging from the question of how to prevent cholera is the recognition of using safe water and good hygienic practices especially washing hands.

A cholera episode requires immediate action to be taken and in the survey data, Kampala, the overall preferred action is to take the person to a health facility (98.5% of the respondents) and only 2 individual suggesting treatment at home. The respondents in all cases seemingly have no alternative to taking the affected person to hospital and treating at home. This indicates awareness on the serious nature of cholera that is better handled at a health facility.

### Action to be taken if cholera strikes

District	Action	Frequency	Valid Percent
KAMPALA	Treat at home	2	1.5
	Treat in a health facility	129	98.5
	Total	131	100.0

The number of people affected by cholera in last outbreak can be used as a measure of the magnitude of the cholera problem last time round. The Kampala results indicate only one person with cholera in the last outbreak indicating rare occurrence, yet people seem to be very aware of the dangers of cholera (why?). The low number of reported cholera cases above is further reinforced by few cases of visitation to health facility for cholera treatment where only four respondents in Kampala data indicate members of household going to health facilities for treatment of cholera.

Cholera treatment at health facilities is considered further by analysing cases of hospitalisation (admission) of household members to health facility for cholera treatment. The Kampala data still indicate low hospitalisation cases since only 3.2% of respondents report hospitalisation due to cholera. This links to few visitation cases reported above. The cost of treating cholera, where there is occurrence, ranges from Uganda shillings 120,000 to 150,000. Kampala survey data report only one respondent where death due to cholera occurred. The reported death is that of an adult in the Kampala data.

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# Daily schedules for categories of household members

Normal daily schedule of female adult (4.am to 12 midnight)

Time	Kabaale	Kampala
4 a.m – 6 a.m	Wake up Sleep Prepare breakfast House chores Go to work At work	Wake up Sleep Prepare for work Prayer House chores
6 a.m – 8 a.m	Weave Wake up Sleep Prepare for breakfast and lunch Prepare breakfast Prayer Listen to news House chores Go to Market Fetch water Farm work Clean house Business Breakfast Bathing At work At home	Wash Wake up Take children to school Prepare for business work Prepare children for school Prepare breakfast House chores Farm work Clean house Church Breakfast Bathe At work At home
8 a.m – 10 a.m	Wash Wake up Rest Prepare lunch Prepare breakfast Labour work House chores Home cleaning Home chores Herd animals Farm work Cooking Clean house Business Breakfast At work At school At home	Wash Rest Prepare lunch Prepare breakfast Play with kids House chores Farm work Cooking Clean house Church Business Breakfast Bathe Baby care At work At work

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10 a.m – 12.00 noon

Weave  
Rest  
Prepare lunch  
Prepare breakfast  
Lunch  
House chores  
Home chores  
Herd animals  
Farm work  
Clean home  
Business  
Breakfast  
At work  
At school  
At home

Wash  
Visit  
Tea break  
Rest  
Prepare supper  
Prepare lunch  
Market  
Listen to music  
House chores  
Clean house  
Chatting  
Business  
Breakfast  
At work

12.00 – 2 p.m

Weave  
Tea break  
Sleep  
Rest  
Prepare lunch  
Lunch  
House chores  
Farm work  
Cooking  
Clean house  
Business  
At work  
At school

Sleep  
Rest  
Prepare lunch  
Prepare for work  
Pick children from school  
Lunch  
Cooking  
Clean house  
Child care  
Business  
At work  
At school

2 p.m – 4 p.m

Weave  
Wash  
Sleep  
Rest  
Prayer  
Market  
Lunch  
House chores  
Fetch water  
Farm work  
Cooking  
Business  
At work  
At school  
At home

Weave  
Visit  
Sleep  
Rest  
Prepare supper  
Lunch  
House chores  
Cooking  
Chatting  
Business  
At work

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4 p.m -6 p.m

Weave  
Tea  
Rest  
Prepare supper  
House chores  
Farm work  
Cooking  
Clean compound  
Child care  
Chatting  
Business  
Bathe  
Back home  
At school  
At home

Weave  
Supper  
Sleep  
Rest  
Prepare supper  
Prayer  
Pick children from school  
Market  
Make tea  
Listen to radio  
House chores  
Farm work  
Cooking  
Church  
Child care  
Chatting  
Business  
Bathe  
Back home  
At work  
At home

6 p.m - 8 p.m

Supper  
Sleep  
Rest  
Prepare supper  
Prepare lunch  
House chores  
Cooking  
Business  
Bathe  
Back home  
At home

Watch T.V  
Watch movie  
Take tea  
Supper  
Sleep  
Rest  
Read newspapers  
Prepare supper  
Prayer  
Listen to radio  
Listen to music  
Home chores  
Cooking  
Business  
Bathe children  
Bathe  
Back home  
At work  
At home

8 p.m - 10 p.m

Tea  
Supper  
Sleep  
Rest  
Prayer  
House chores  
Cooking  
Business  
Bathe  
Back home  
At work

Supper  
Sleep  
Rest  
Prepare supper  
Listen to news  
Listen to music  
House chores  
Cooking  
Chatting  
Bathe  
Back home  
At work

AF91

10 p.m – 12 midnight

Supper  
Sleep  
Back home

Supper  
Sleep  
Back home  
At work

Normal daily schedule of male adult (4.am to 12 midnight)

Time	Kabaale	Kampala
4 a.m – 6 a.m	Wake up Sleep Prepare for school Go to work Business At work	Wake up Sleep Prayer Listen to radio Jog Go to work Fetch water for animals
6 a.m – 8 a.m	Wake up Take children to school Sleep Prepare for work Prayer Milk Go to work Fetch water Farm work Cut grass for cows Clean house Clean compound Business Breakfast Bathe Back home Away from home At work At school	Wash Wake up Wake up Prepare for work Prepare children for school Prepare breakfast Listen to radio Jog Go to work Farm work Breakfast Bathe At work
8 a.m – 10 a.m	Wake up Tea break Sleep Prepare for work Nothing House chores Farm work Cut grass for cows Clean house Business Breakfast Bathe At work At school At home	Wash Wake up Take children to school Idling at home Breakfast Bathe At work



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10 a.m – 12.00 noon

Wake up  
Sleep  
Rest  
Nothing  
Farm work  
Cut grass for cows  
Business  
At work  
At school  
At home

Tea break  
Play games  
Idling at home  
At work

12.00 – 2 p.m

Lunch  
House chores  
Farm work  
Clean house  
At work  
At home

Rest  
Lunch  
At work

2 p.m – 4 p.m

Sleep  
Rest  
Prayer  
Lunch  
House chores  
Farm work  
Business  
Bathe  
At work  
At school

Watch movies  
Take care of animals  
Rest  
Lunch  
Lunch  
Chatting  
Back home  
At work

4 p.m –6 p.m

Tea  
Sleep  
Rest  
Listen to radio  
House chores  
Herd animals  
Fetch water  
Farm work  
Clean compound  
Chatting  
Business  
Bathe  
Back home  
Back home  
At work  
At home

Watch movies  
Wake up  
Visit  
Tea  
Take care of animals  
Supper  
Sleep  
Rest  
Read newspapers  
Prepare supper  
Prayers  
Listen to radio  
Drink  
Community meeting  
Chatting  
Bathe  
Back home  
At work

AF91

6 p.m – 8 p.m

Wait for supper  
Visit  
Supper  
Sleep  
Rest  
Prepare supper  
Prepare for work  
Look for supper  
Listen to radio  
Leisure  
House chores  
Herd animals  
Go to work  
Drink  
Chatting  
Bathe  
Back home  
At work  
At home

Watch T.V  
Wait for supper  
Take tea  
Supper  
Sleep  
Rest  
Read newspapers  
Prepare supper  
Out with friends  
Listen to radio  
House chores  
Drink  
Chatting  
Bathe  
Back home  
At work  
At home

8 p.m – 10 p.m

Supper  
Sleep  
Rest  
Prayer  
Not yet home  
Leisure  
Bathe  
Back home  
At work  
At home

Watch T.V  
Watch movie  
Supper  
Sleep  
Rest  
Read newspapers  
Listen to radio  
Back home

10 p.m – 12 midnight

Supper  
Sleep  
Back home  
At work

Supper  
Sleep  
Bathe  
Back home  
At work

**Normal daily schedule of female child (4.am to 12 midnight)**

Time	Kabaale	Kampala
4 a.m – 6 a.m	Sleep At school	Sleep Prepare for school Prayer Breakfast

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6 a.m – 8 a.m

Wake up  
Sleep  
Prepare for school  
Prepare breakfast  
Prayer  
Play  
Nothing  
House chores  
Go to school  
Clean house  
Breakfast  
Bathe  
At work  
At school

Wake up  
Sleep  
Prepare for school  
Prepare breakfast  
Play  
House chores  
Go to work  
Go to school  
Farm work  
Clean house  
Breakfast  
Bathe  
At school

8 a.m – 10 a.m

Sleep  
Rest  
Prepare for school  
Play  
House chores  
Go to school  
Farm work  
Breakfast  
Bathe  
At work  
At school  
At home  
At home

Wash  
Wake up  
Sleep  
Play  
House chores  
Go to school  
Breakfast  
At work  
At school  
At home

10 a.m – 12.00 noon

Tea break  
Prepare lunch  
Play  
Farm work  
At work  
At school  
At home

Tea break  
Sleep  
Rest  
Play  
House chores  
Go to school  
Bathe  
At work  
At school  
At home

12.00 – 2 p.m

At home  
At school  
Lunch  
At work  
Play  
Back home

Sleep  
Rest  
Play  
Lunch  
Back home  
At school  
At home

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2 p.m – 4 p.m	Rest	Wake up
	Play	Sleep
	Lunch	Rest
	House chores	Play
	Back home	Lunch
	At work	House chores
	At school	Home work
	At home	Back home
4 p.m –6 p.m		At work
		At school
	Visit	Watch T.V
	Tea	Supper
	Rest	Rest
	Prepare supper	Play
	Play	Farm work
	House chores	Bathe
	Home work	Back home
	Fetch water	At work
	Back home	At school
	At school	At home
	At home	
6 p.m – 8 p.m	Assist mother	
	Supper	Watch T.V
	Sleep	Watch movie
	Rest	Supper
	Play	Sleep
	Home work	Prayer
	Fetch water	Play
	Cooking	House chores
	Bathe	Home work
	Back home	Bathe
	At school	Back home
	At home	At school
8 p.m – 10 p.m		At home
	Supper	Watch T.V
	Sleep	Supper
	Prayer	Sleep
	Nothing	Rest
	Home work	Home work
	Back home	Cooking
	At home	Bathe
		Supper
		Sleep
10 p.m – 12 midnight	Sleep	

**Normal daily schedule of male child (4.am to 12 midnight)**

Time	Kabaale	Kampala
4 a.m – 6 a.m	At school	Sleep
	Sleep	Prepare for school
	Wake up	Prayer
	Prepare breakfast	Breakfast
	Breakfast	

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**6 a.m – 8 a.m**

Wash  
Wake up  
Still young  
Sleep  
Prepare for school  
Prayer  
Play  
Nothing  
Go to school  
Breakfast  
Bathe  
At school

Wake up  
Sleep  
Prepare for school  
Prepare breakfast  
Play  
Look after poultry on farm  
House chores  
Go to work  
Go to school  
Fetch water  
Fetch firewood  
Car washing  
Breakfast  
Bathe  
At school

**8 a.m – 10 a.m**

Wake up  
Sleep  
Rest  
Play  
Go to school  
Farm work  
Breakfast  
Bathe  
At school  
At home

Wake up  
Play  
House chores  
Breakfast  
At work  
At school  
At home

**10 a.m – 12.00 noon**

Tea break  
Play  
Farm work  
Breakfast  
At work  
At school  
At home

Wake up  
Sleep  
Play  
Lunch  
House chores  
Breakfast  
At work  
At school  
At home

**12.00 – 2 p.m**

Play  
Lunch  
House chores  
Back home  
At school  
At home

Sleep  
Rest  
Play  
Lunch  
Back home  
At work  
At school

**2 p.m – 4 p.m**

Rest  
Play  
Lunch  
House chores  
Home work  
Fetch water  
Back home  
At school  
At home

Wake up  
Rest  
Play  
Play  
Lunch  
House chores  
Home work  
Back home  
At work  
At school

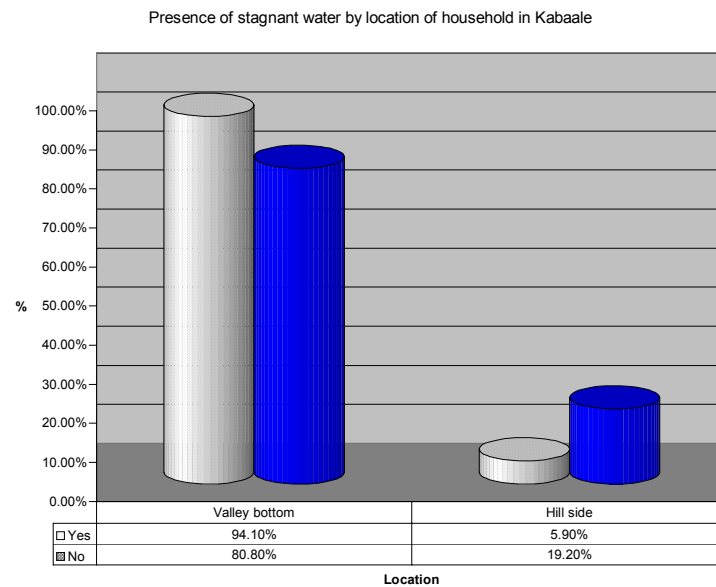
<b>4 p.m – 6 p.m</b>	Tea	Watch T.V
	Rest	Tea
	Play	Supper
	House chores	Sleep
	Home work	Rest
	Herd animals	Play
	Fetch water	Out with friends
	Back home	House chores
	At school	Home work
	At home	Farm work
		Church
		Bathe
		Back home
		At work
<b>6 p.m – 8 p.m</b>		At work
		At school
		At home
	Wait for supper	Watch T.V
	Supper	Wait for supper
	Sleep	Supper
	Rest	Sleep
	Play	Prayer
	House chores	Play
	Home work	Out with friends
	Fetch water	House chores
	Bathe	Home work
	Back home	Help in house chores
	At work	Bathe
<b>8 p.m – 10 p.m</b>	At home	Back home
		At school
		At home
	Supper	Supper
	Sleep	Sleep
	Prayer	Home work
	Home work	Bathe
	Bathe	Back home
<b>10 p.m – 12 midnight</b>	Sleep	Supper
	Rest	Sleep
		At school

### Measures Associations

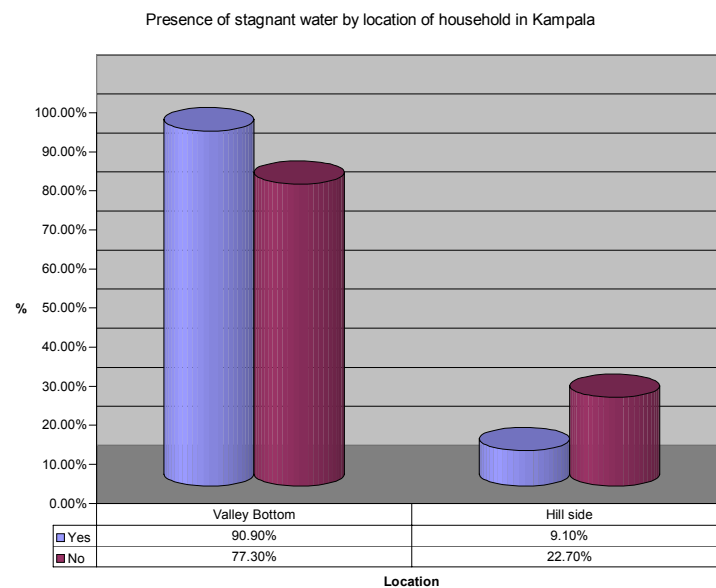
The location of a household in a given environment affects exposure or contact with conditions that may promote the occurrence of certain diseases. In this analysis attempt is made to associate the sitting of a household to the presence of stagnant water.

### Presence of stagnant water by location of households

The figure below shows a cross-tabulation relationship between presence of stagnant water and location of households on the Kabaale surface area. Indication from the figure below is that stagnant water bodies are likely to be near households located at the valley bottom in Kabaale. It is the stagnant water bodies that provide breeding ground for mosquitoes and therefore exposure to malaria. It is also important to note that the figure also indicate that most households in the survey are located in the valley bottom.



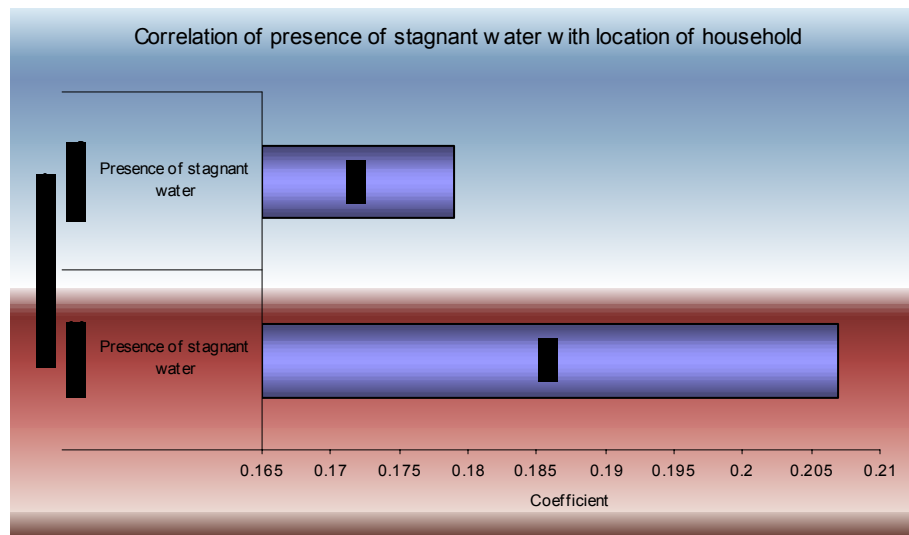
The picture in Kabaale is repeated in the Kampala environment, but it seems that most of the households in the survey are located in the valley bottom (see figure below).



A rank correlation statistics,  $r_s$ , (distribution free measure suitable for ordinal data association measure) is used to measure the strength of association between presence of stagnant water bodies and location of households. The results for both Kabaale and Kampala both indicate that there is a weak but significant correlation between presence of stagnant water body and location of households (see table below).

**Correlation (Spearman's) of presence of stagnant water by location of household**

District				Location of household
KABAAL	Spearman's rho	Presence of stagnant water?	Correlation Coefficient	.207(**)
			Sig. (1-tailed)	.005
			N	154
KAMPALA	Spearman's rho	Presence of stagnant water?	Correlation Coefficient	.179(*)
			Sig. (1-tailed)	.021
			N	130
** Correlation is significant at the .01 level (1-tailed).				
* Correlation is significant at the .05 level (1-tailed).				

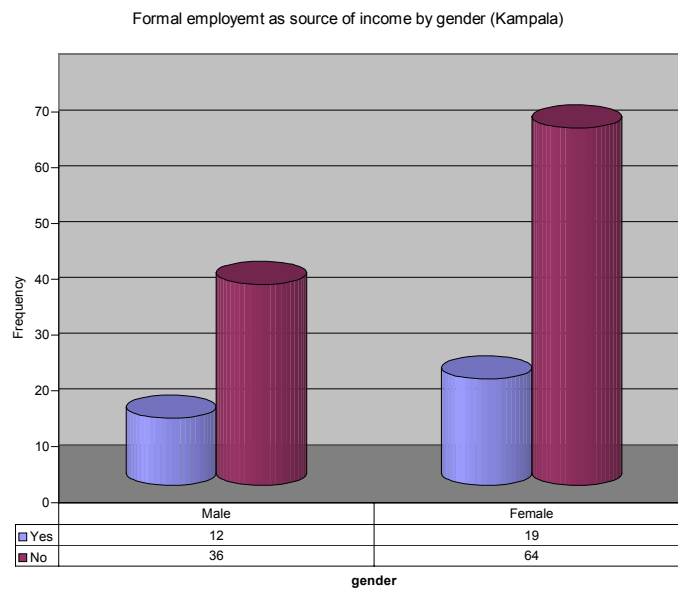
**Source of income by socio-economic variables**

Assumption is made that socio-economic variables do affect opportunities in economic well being. In this study, the socio economic variables used to test this assumption are gender, education level, marital status and age as they relate to source of income, which is a factor in level of income. In Kabaale, gender seems not to be a factor in formal employment as source of income since most of those included in the study are females and in all gender cases, formal employment as source of income is lowly ranked as indicated in the figure below.

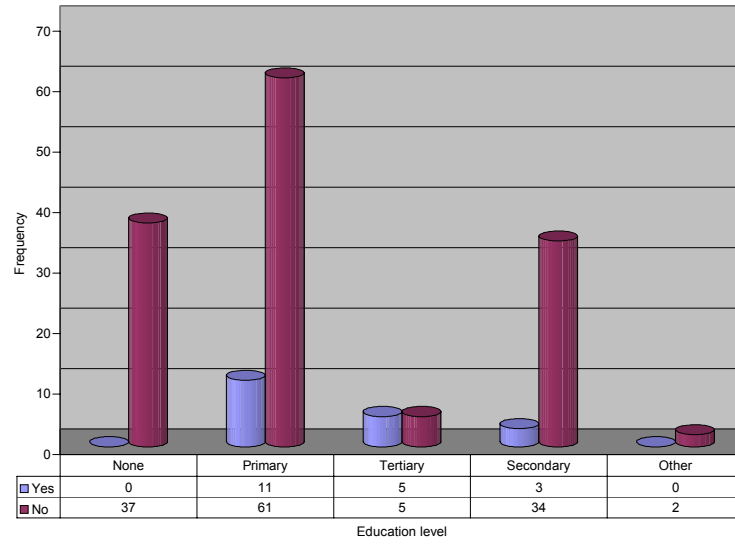




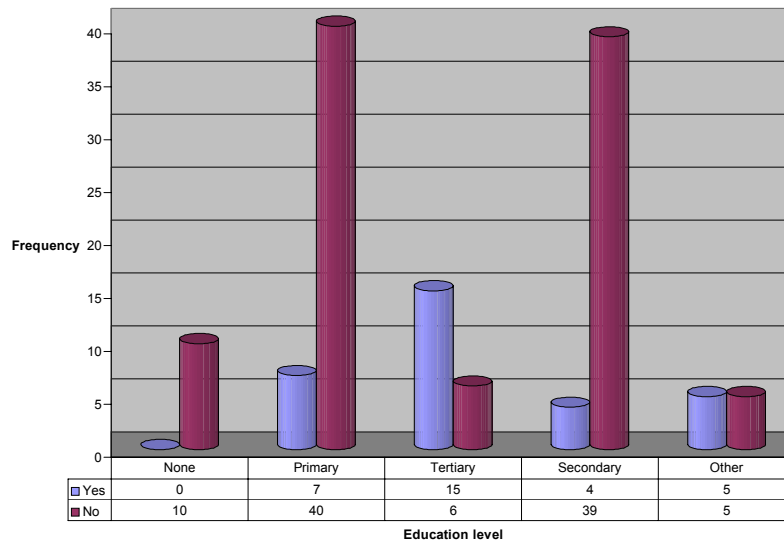
In the Kampala survey data, there is improvement in formal employment position as source of income but indications are that females are the majority in the data as is the case in Kabaale data (see figure below).



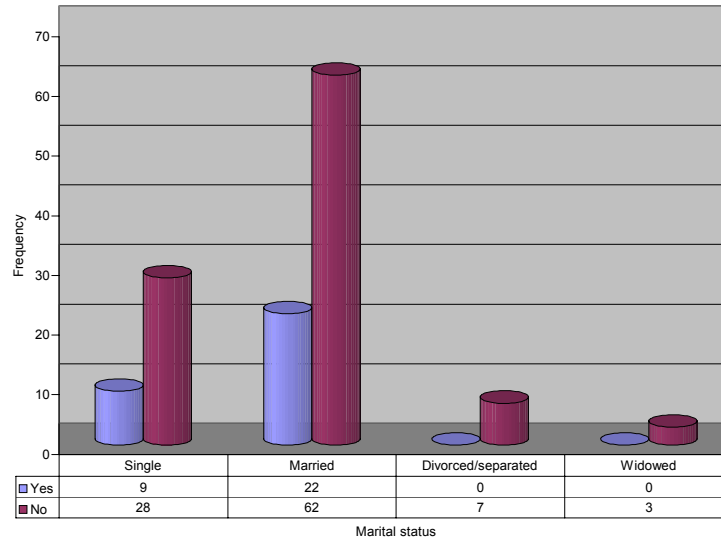
Formal employment as source of income by education level (Kabaale)



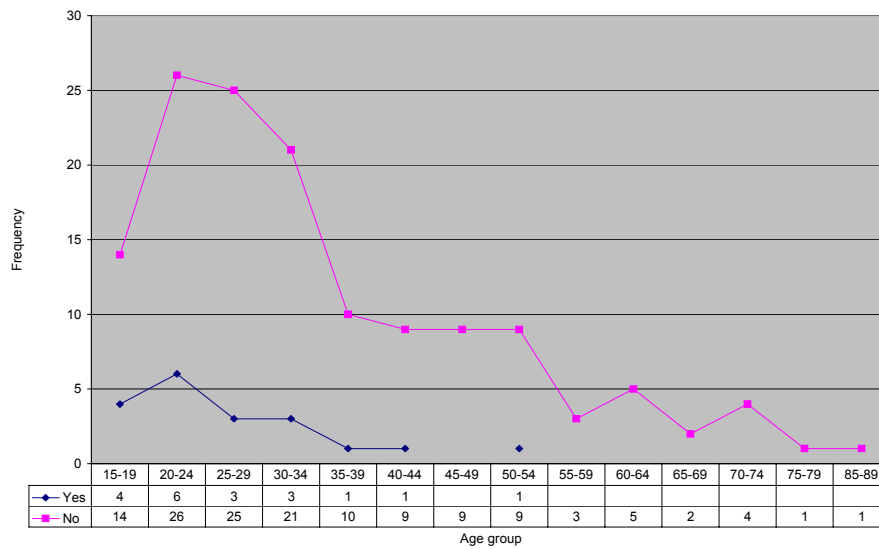
Formal employment as source of income by education level (Kampala)

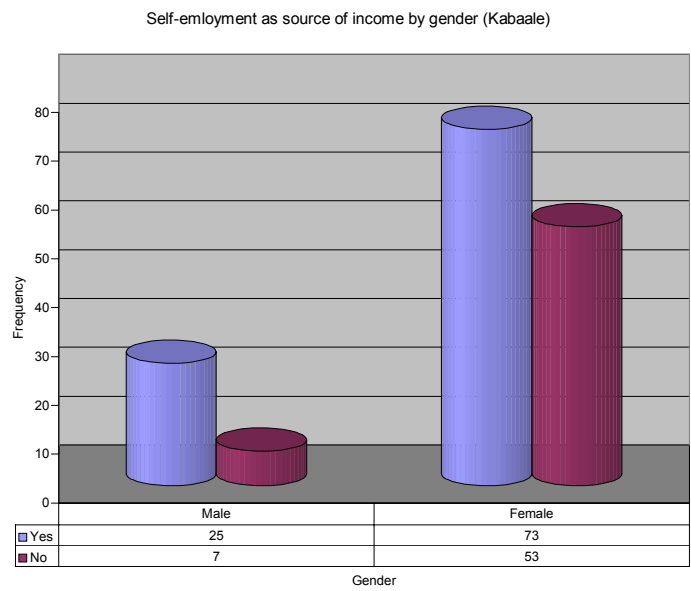
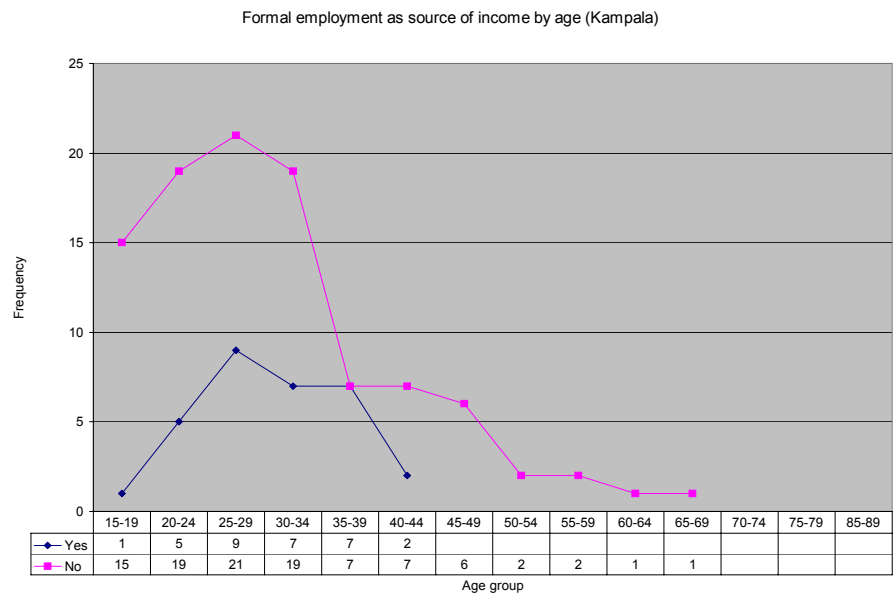


Formal employment as source of income by marital status (Kampala)

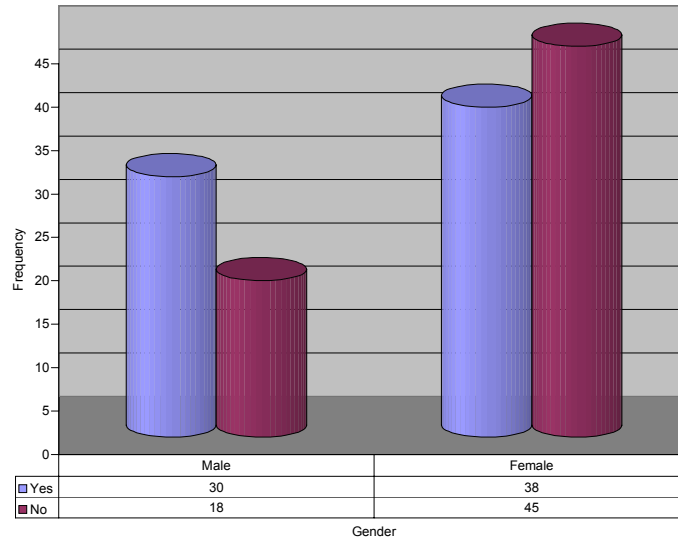


Formal employment as source of income by age (Kabaale)

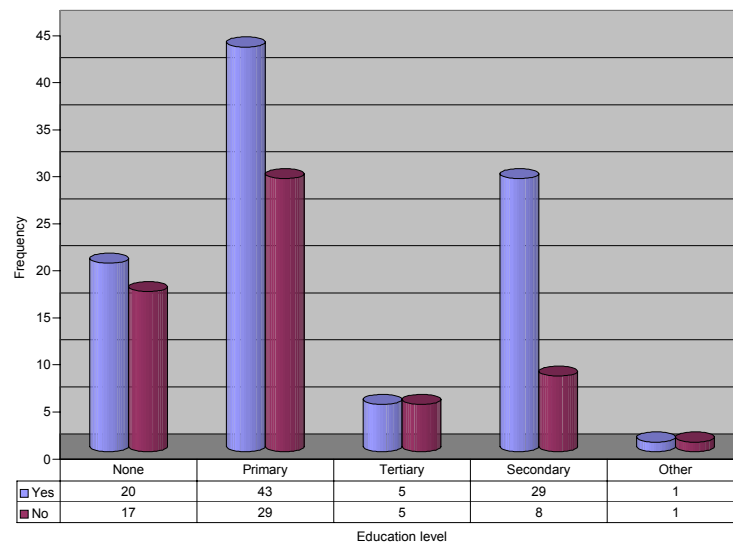




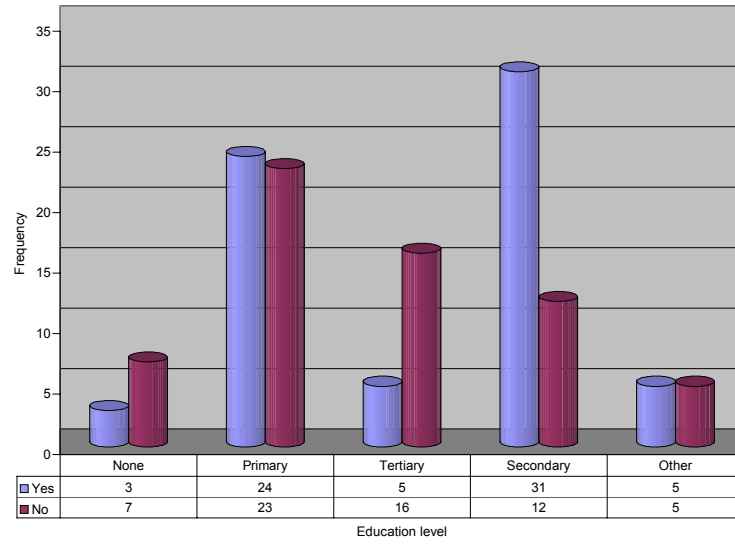
Self-employment as source of income by gender (Kampala)



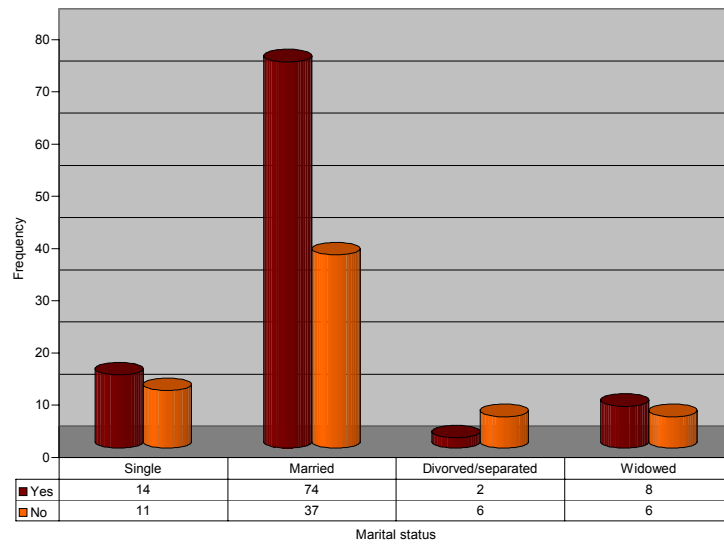
Self-employment as source of income by education level (Kabaale)



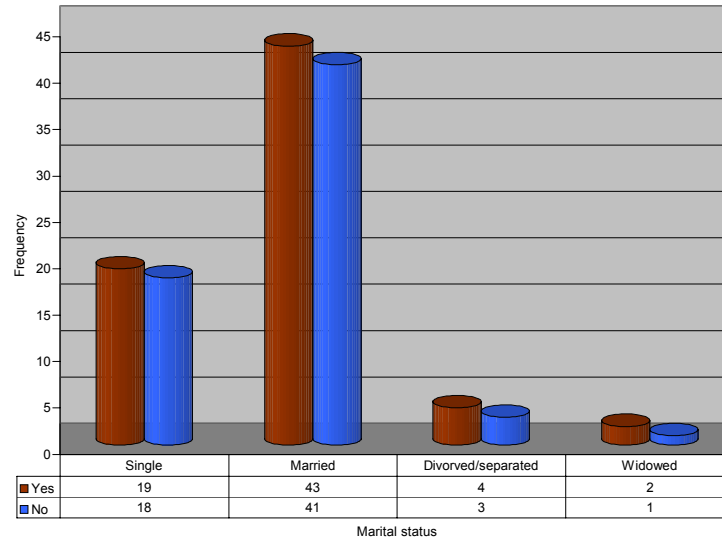
Self-employment as source of income by education level (Kampala)



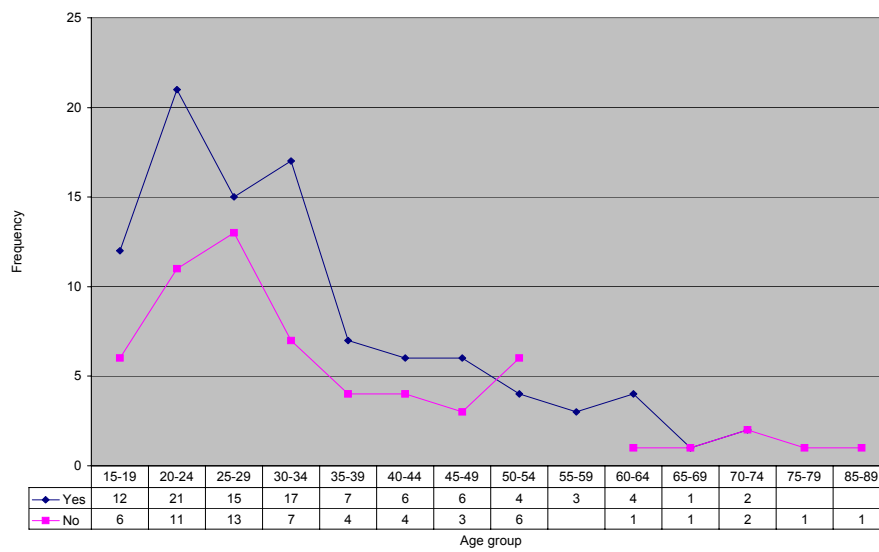
Self-employment as source of income by marital status (Kabaale)



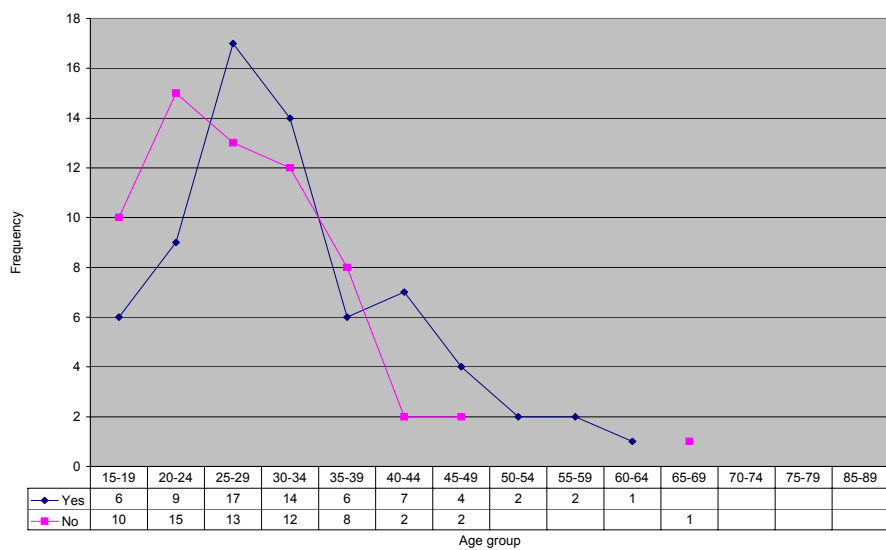
Self-employment as source of income by marital status (Kampala)



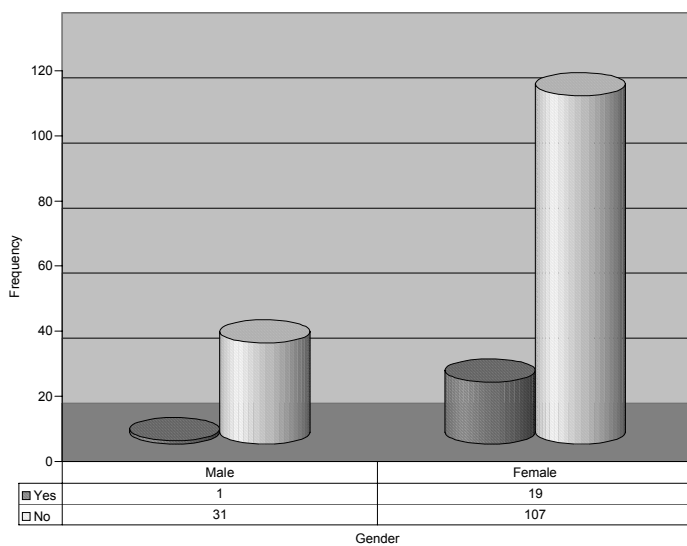
Self-employment as source of income by age (Kabaale)



Self-employment as source of income by age (Kampala)

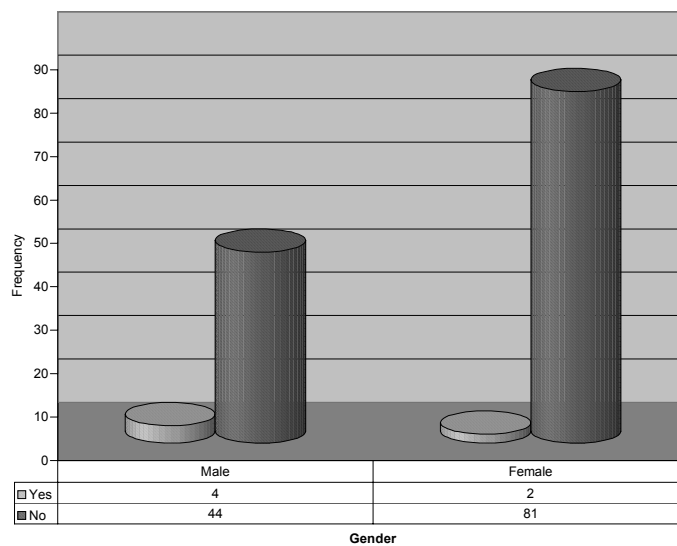


Farming as source of income by gender (Kabaale)

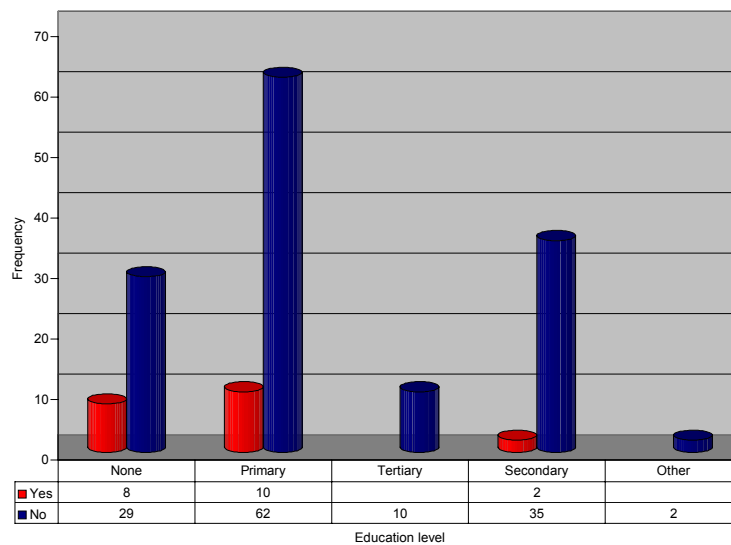




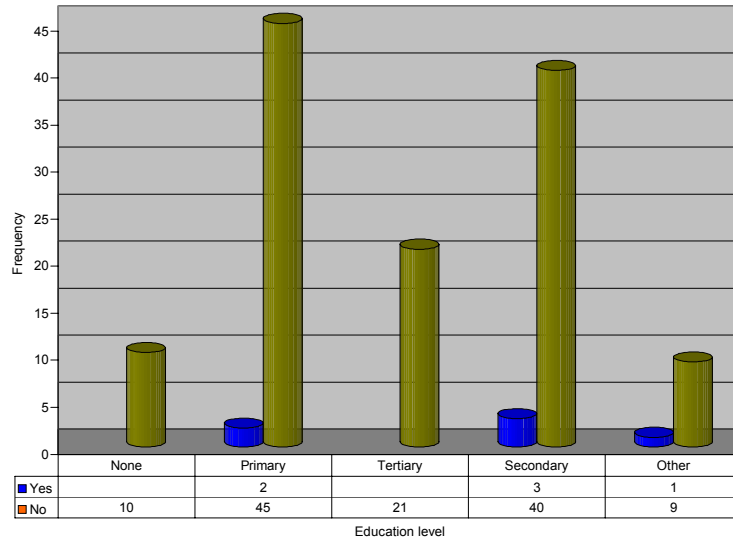
Farming as source of income by gender (Kampala)



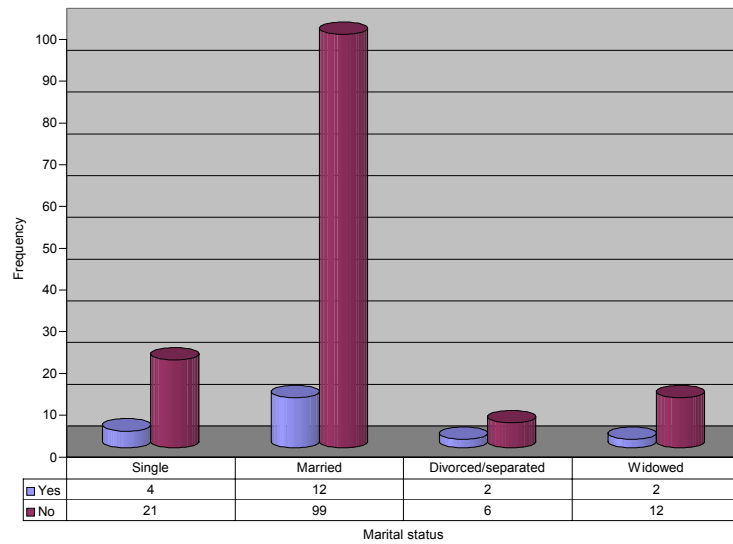
Farming as source of income by education level (Kabaale)

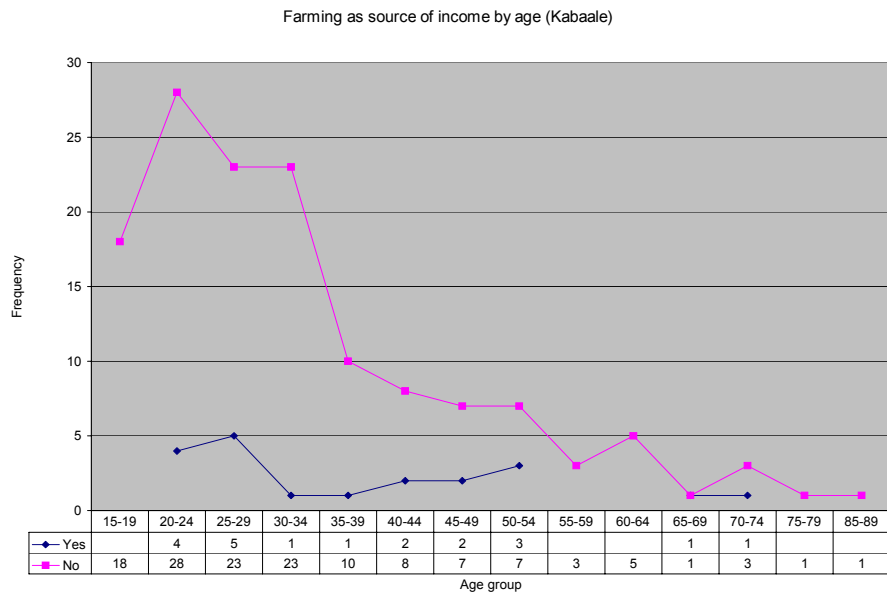
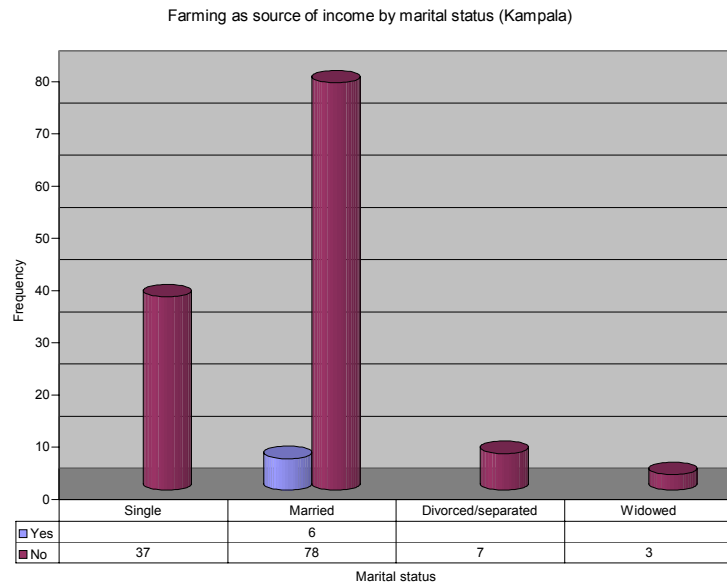


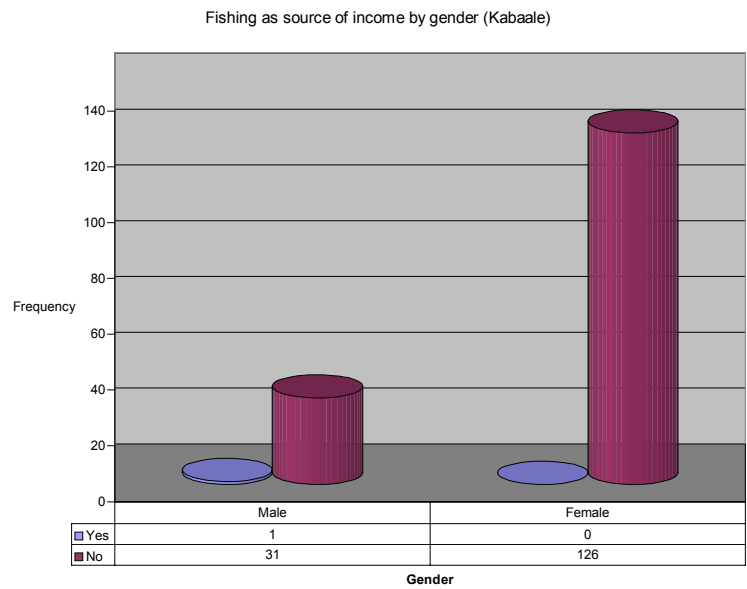
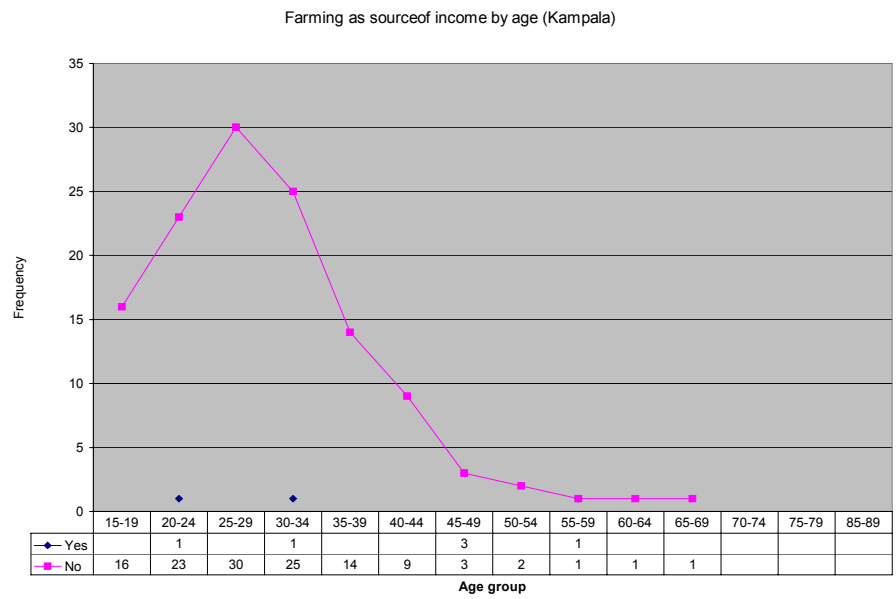
Farming as source of income by education level (Kampala)

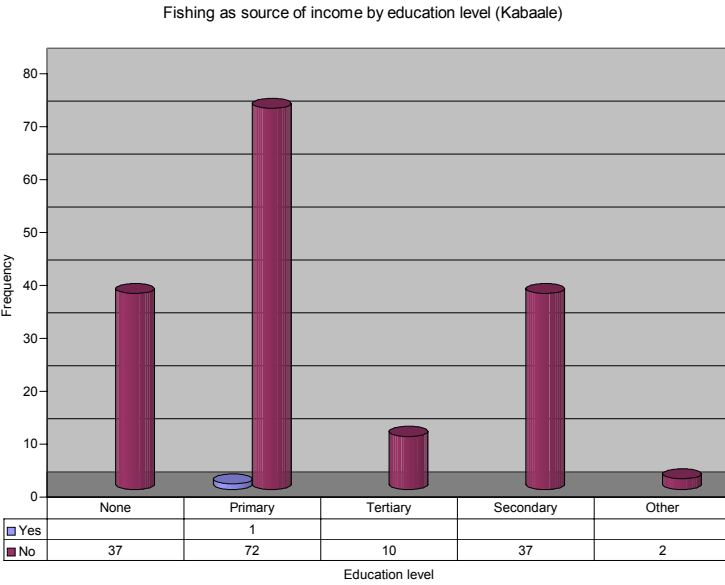
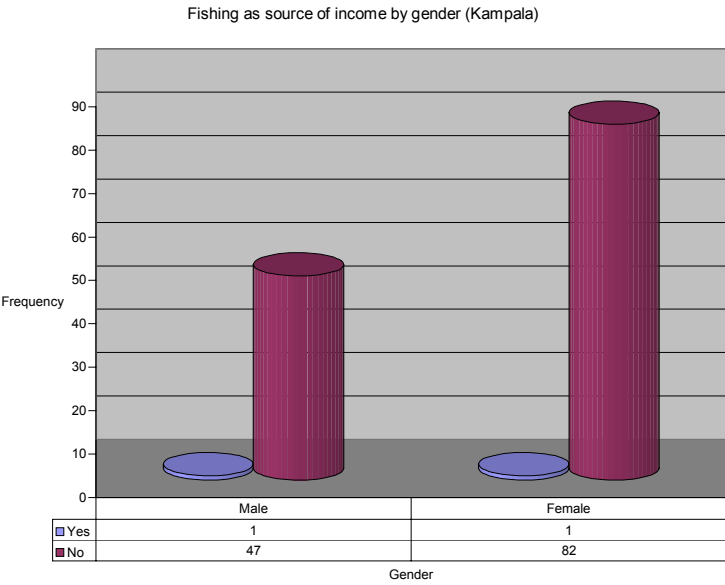


Farming as source of income by marital status (Kabaale)

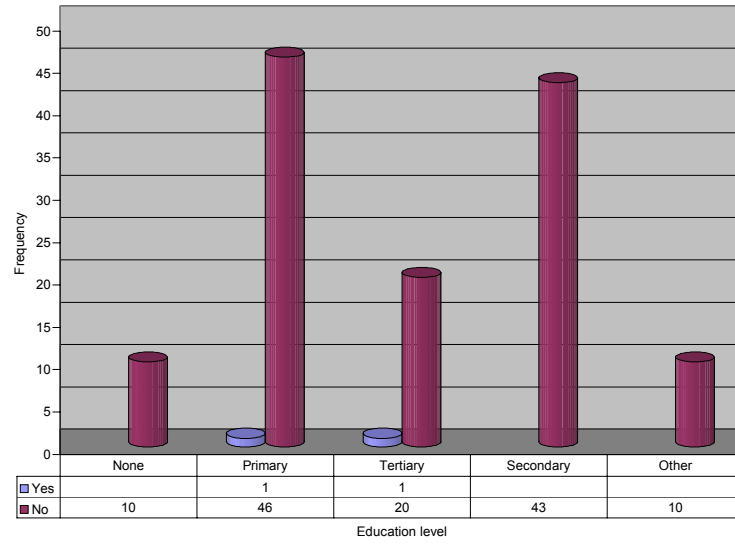




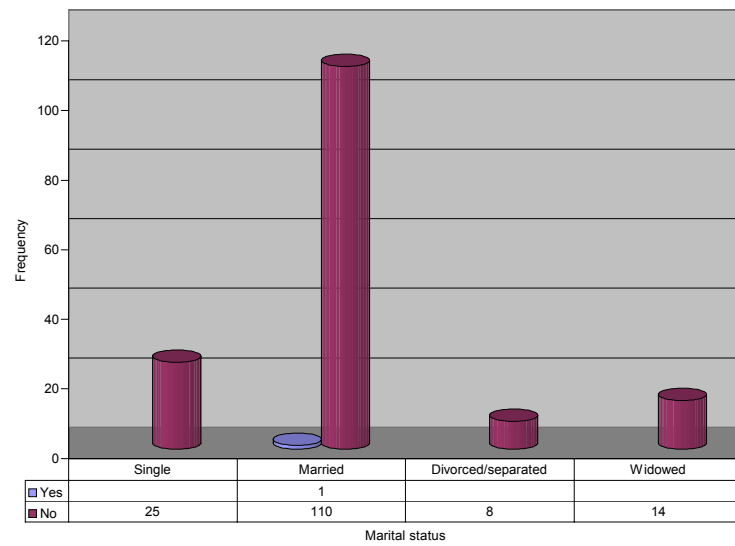




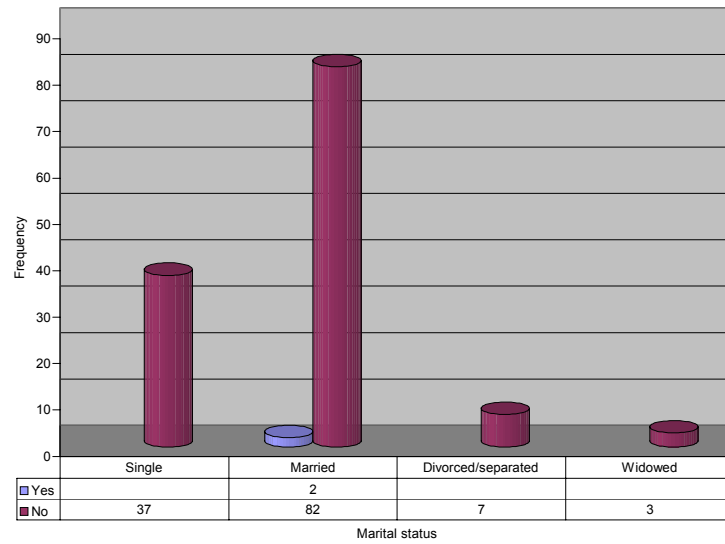
Fishing as source of income by education level (Kampala)



Fishing as source of income by marital status (Kabaale)

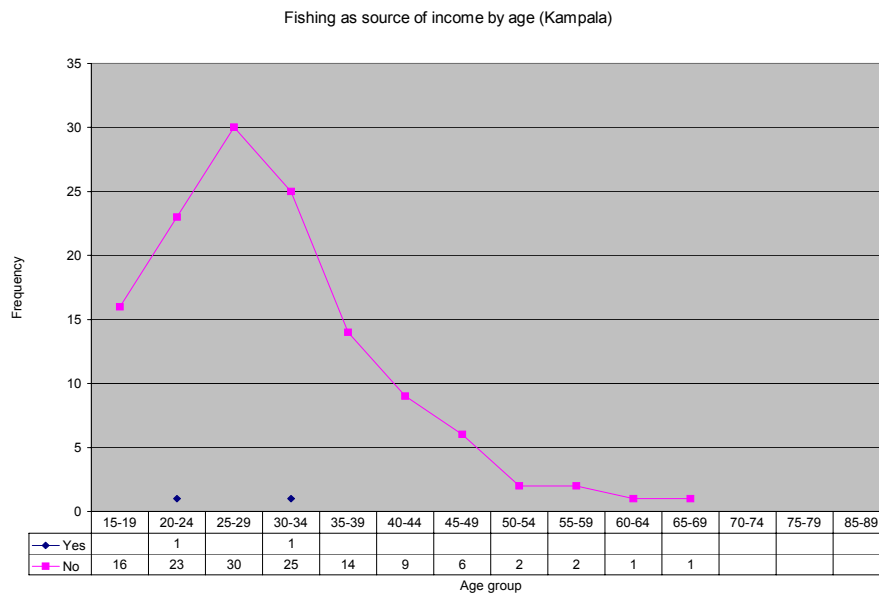


Fishing as source of income by marital status (Kampala)



Fishing as source of income by age (Kabaale)





Statistical measures of association give indication to the strength of association and significance of the observed association. Where data measurements are not at the interval or ratio scale levels, it is advisable to use non-parametric inferential statistics. In this survey data analysis, a powerful measure of association that has been selected is the Spearman's rank correlation,  $r_s$ , which has 91% efficiency of the power of Pearson's product moment correlation.

### Socio-economic variables by sources of income

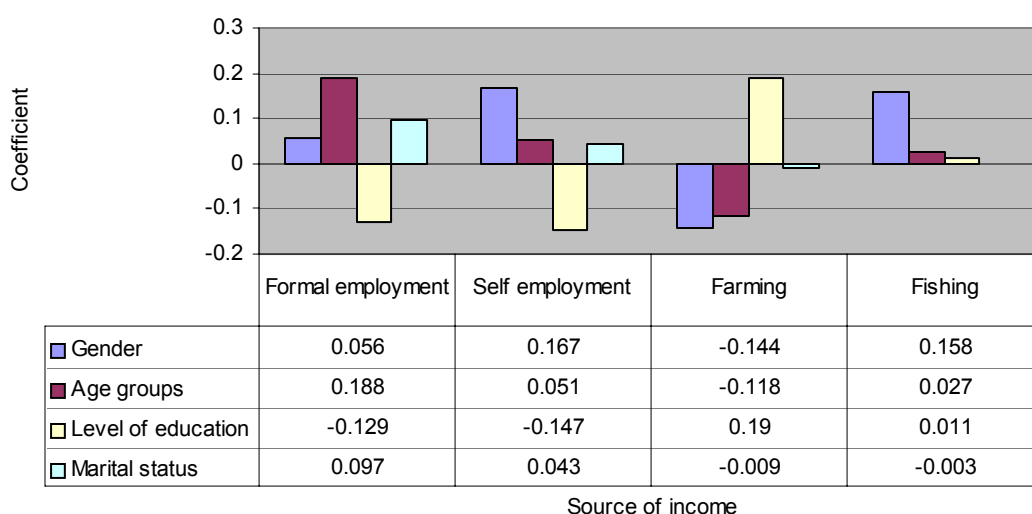
In this survey data, socio-economic variables are gender, level of education, age and marital status. These variables are hypothetically taken to affect the type of economic activities individuals in the societies included in the survey (Kabaale and Kampala). The economic activities used in the survey are the sources of income, which include formal employment, self-employment, farming and fishing, primarily. In the Kabaale survey data, the Spearman's rank correlation results indicate socio-economic variables of gender and levels of education as the ones with significant correlation with sources of income self-employment, farming and fishing. Gender has a weak positive but significant correlation with self-employment, coefficients with self-employment as source of income (0.167 at  $\alpha = 0.05$ , 2-tailed) and fishing as source of income (0.158 at  $\alpha = 0.05$ , 2-tailed) but a weak negative but correlation with farming (-0.144 at  $\alpha = 0.05$ , 2-tailed). Level of education has a weak negative but significant correlation (-0.147 at  $\alpha = 0.05$ , 2-tailed) and a weak positive significant correlation (0.190 at  $\alpha = 0.01$ , 2-tailed) with farming (see graph below).

In the Kampala data, socio-economic variables that have weak but significant correlation with sources of income are gender, age and levels of education. Gender in the Kampala data has a weak positive but significant correlation (0.161 at  $\alpha = 0.05$ , 2-tailed) with

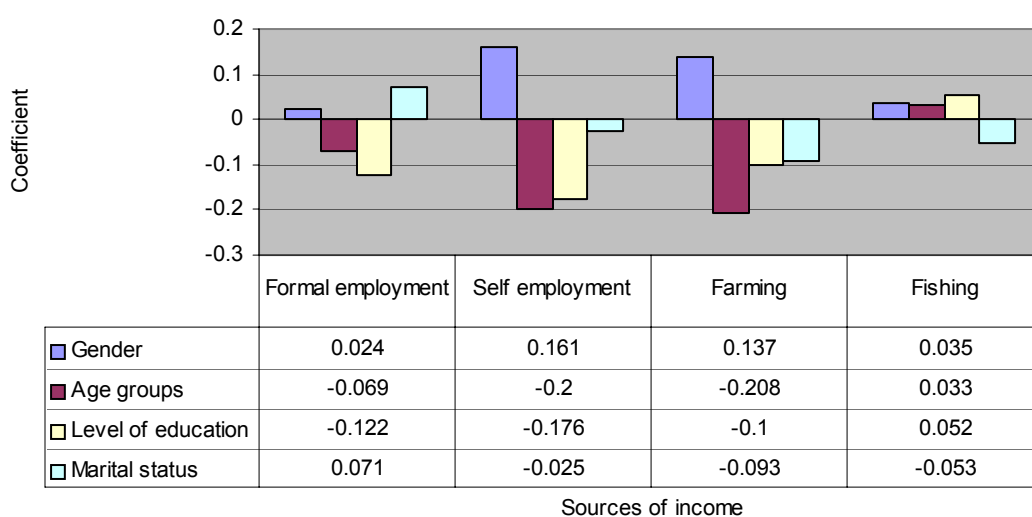
Self-employment, whereas age has weak but significant correlation with self-employment (-0.218 at  $\alpha = 0.01$ , 2-tailed) and farming (-0.206 at  $\alpha = 0.01$ , 2-tailed). Level of education has a weak but negative correlation (-0.176 at  $\alpha = 0.05$ , 2-tailed) with self-employment. In all cases, the correlations are weak meaning other factors need to be included in the sources of income model (see graph below).



Correlation of socio-economic variables with source of income (Kabaale)

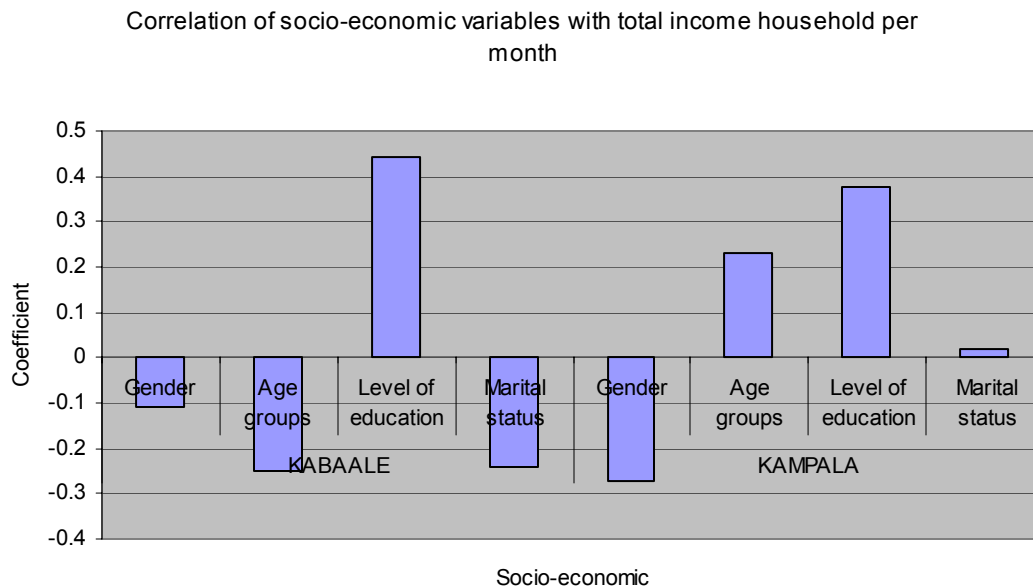


Correlation of socio-economic variables with sources of income (Kampala)



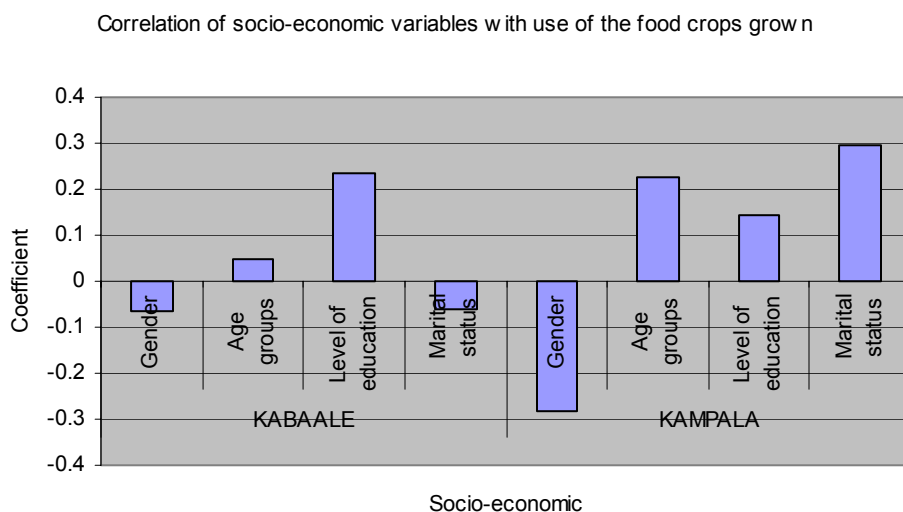
### Socio-economic variable by total income of the household

The assumption that socio-economic variables affect sources of income is by extension used to make assumption on the effects on total monthly incomes of households. In Kabaale survey data, the socio economic variable with significant correlation to total income of households is age (-0.252 at  $\alpha = 0.01$ , 2-tailed), level of education (0.441 at  $\alpha = 0.01$ , 2-tailed) and marital status (-0.241 at  $\alpha = 0.01$ , 2-tailed). In all cases the correlations are relatively weak indicating the existing of some factors not included in the model but with major contribution to total household incomes in Kabaale. In the Kampala survey data, gender, age and level of education have significant but weak correlation with total income, where gender has  $r_s = -0.271$  but significant at  $\alpha = 0.01$ , 2-tailed, age having  $r_s = 0.233$  but significant at  $\alpha = 0.05$ , 2-tailed and level of education having  $r_s = 0.377$  but significant at  $\alpha = 0.01$ , 2-tailed.



### Socio-economic variable by use of food crops grown

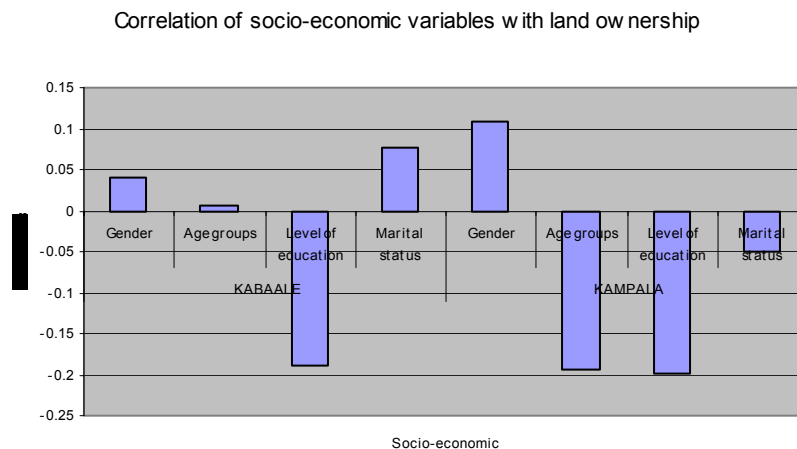
Since some socio-economic variables affect sources of income and by extension total income of households, they can be assumed to affect the use of food crops grown. Spearman's correlation analysis indicate that in general there are weak correlations although in Kabaale data, level of education has a weak correlation (0.235) but significant at  $\alpha = 0.05$ , 2-tailed). The overall results are presented in the figure below.



### Socio-economic variable by land ownership

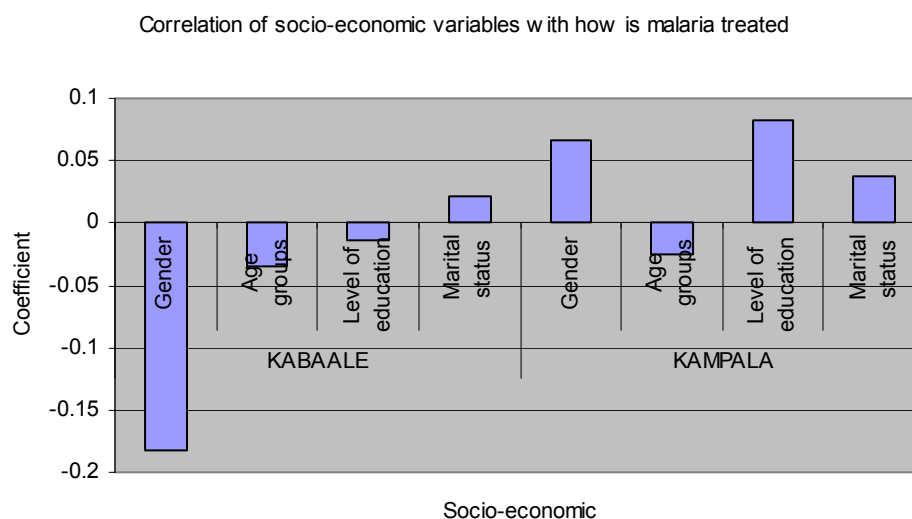
One of the main sources of income in the survey data as a whole is farming. The analysis of data has taken into consideration the assumption that socio-economic variables affect land ownership in the study area. In the Kabaale data correlation analysis, all the socio-economic variables have a weak association with land ownership with only level of education having a weak negative correlation (-0.190) but significant at 0.05, 2-tailed. This means that the observed associations are mainly due to chance except for

level of education. Land ownership should therefore be viewed in terms of other variables that have not been included in the land ownership correlation model, such as community land ownership controls. In the Kampala data, age and level of education are the socio-economic variables with significant but weak correlations with land ownership (-0.194 and -0.199 respectively at 0.05, 2-tailed).



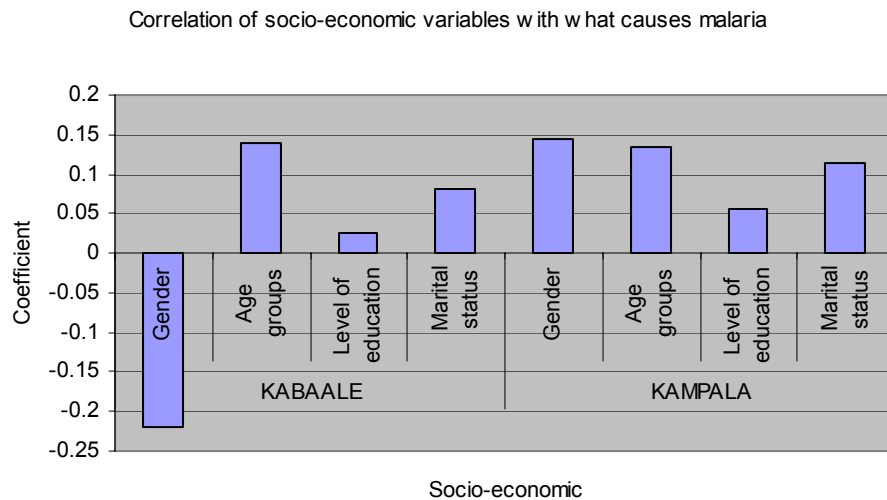
### Socio-economic variables by opinion on how malaria is treated

Socio-economic variables tend not to have significant effect or association with opinion on how malaria is treated except for gender in the Kabaale data where a weak negative but significant correlation (-0.183 at  $\alpha = 0.05$ , 2-tailed) is recorded (see graph below).



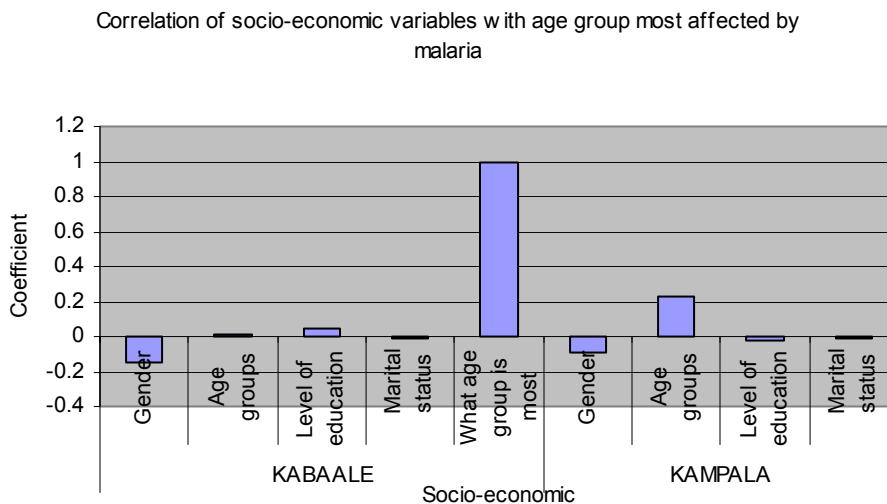
### Socio-economic variables by opinion on cause of malaria

On causes of malaria, it is only gender among the socio-economic variables in the Kabaale data that weak negative but significant correlation (-0.219 at  $\alpha = 0.01$ , 2-tailed). Kampala data show no significant correlation between socio-economic variables with opinion on causes of malaria (see graph below). The Causes of malaria correlation model therefore require other variables to be included.



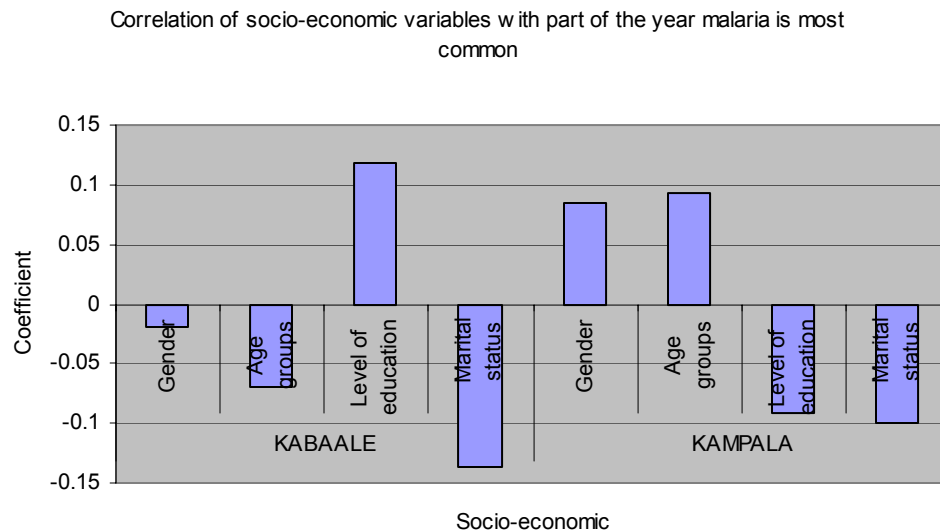
### Socio-economic variables by opinion on age group most affected by malaria

Opinion on age group most affected by malaria seems to have no significant correlation with socio-economic variables in the Kabaale data and any association observed is due to chance (random event). In the Kampala data, the age of individuals included in the survey has a weak positive but significant correlation (0.225) at  $\alpha = 0.05$ , 2-tailed (see graph).



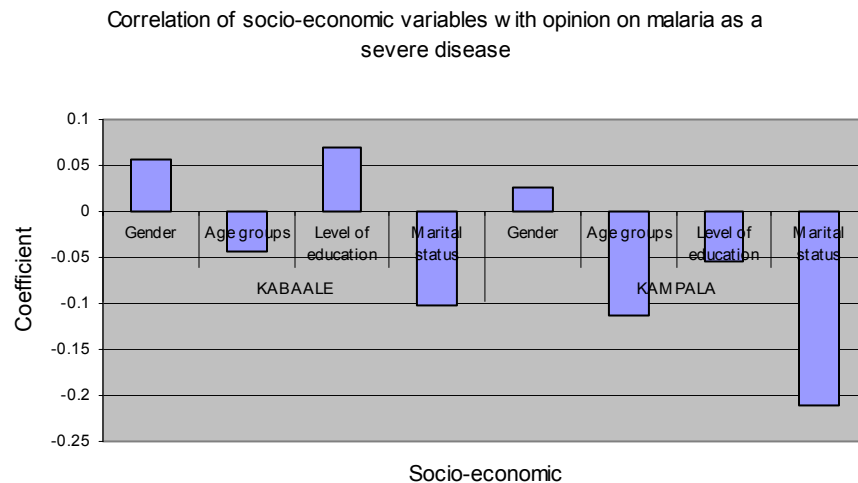
### Socio-economic variables by opinion on part of the year malaria is most common

Depending on sources of income and therefore activities an individual is involved as factors in exposure to malaria, socio-economic variables is assumed to impact on an individual's opinion on part of the year malaria is most common. Spearman's correlation analysis results indicate no significant association. This means that the hypothesis or assumption that socio-economic variable significantly affect opinion on part of the year malaria is most common does not hold and any observed association is a chance event.



### Socio-economic variables by opinion on malaria as a severe disease

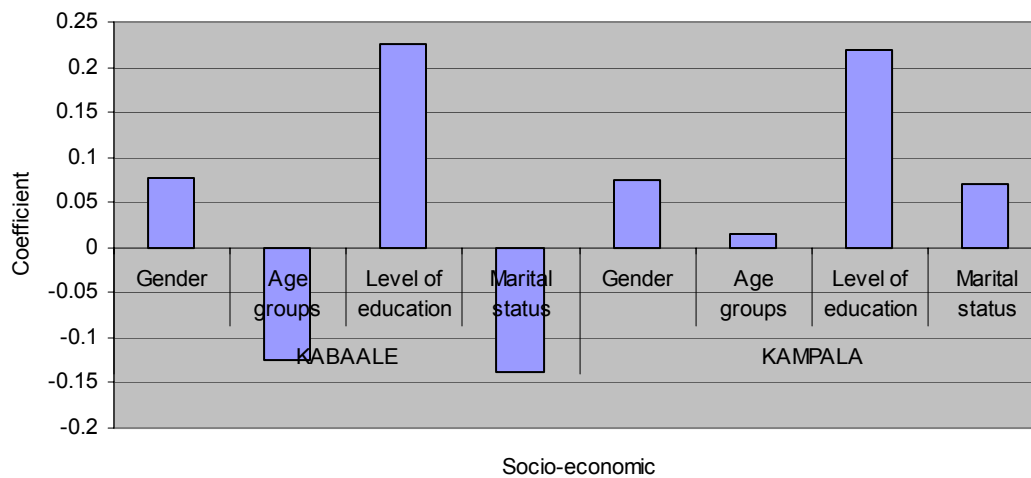
Socio-economic variables are seemingly not significantly correlated with opinion on malaria as a severe disease except in the Kampala data where marital status has a weak negative but significant correlation of -0.211 at 0.05, 2-tailed (see graph below).



### Socio-economic variables by opinion on who should pay for malaria treatment

The socio-economic variable identified in both Kabaale and Kampala data is level of education, which has a weak positive but significant correlation with opinion on who should pay for the treatment of malaria (Kabaale, 0.226 at  $\alpha = 0.01$ , and Kampala, 0.218 at  $\alpha = 0.05$ , 2-tailed) as seen in the graph below. The rest of socio-economic variables in all cases have chance associations with opinion on who to pay for malaria treatment.

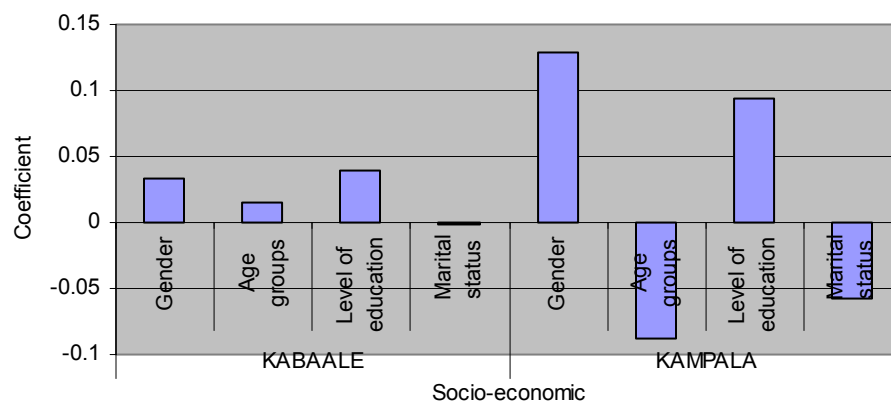
Correlation of socio-economic variables with who to pay for the treatment of malaria



### Socio-economic variables by opinion on who should pay for prevention of malaria

Socio-economic variables are seemingly not significantly associated with opinion on who should pay for prevention of malaria. This means there are other factors, which affect opinion on who should pay for malaria other than, the socio-economic variables included in the correlation model and the observed correlations as in the graph below are chance events.

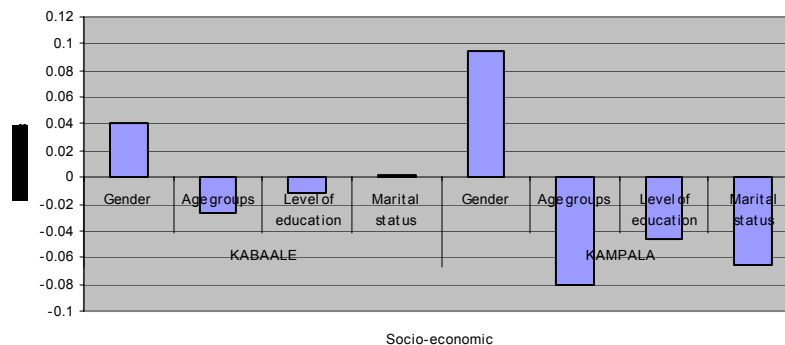
Correlation of socio-economic variables with who to pay for the prevention of malaria



### Socio-economic variables by need to go to health facility when malaria strikes in the household

Correlations of socio-economic variables with opinion on need to go to health facility are not significant and are therefore chance events.

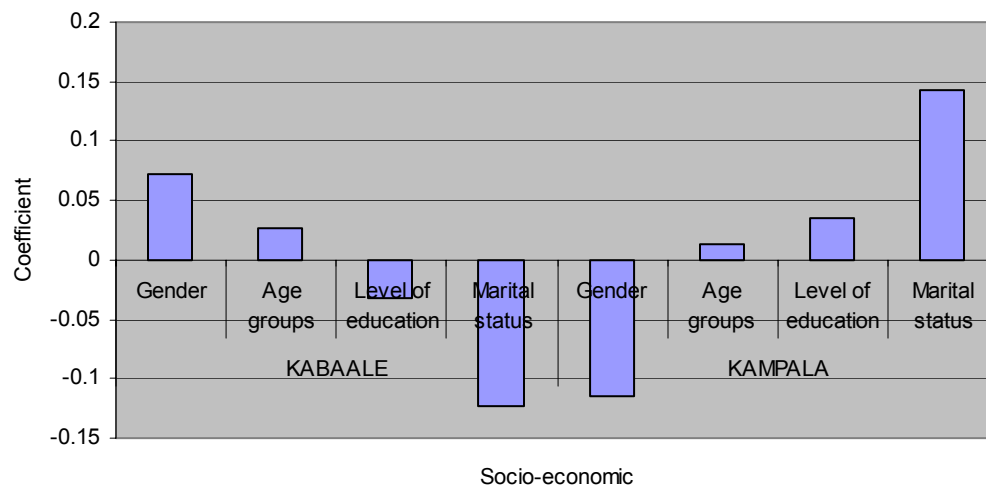
Correlation of socio-economic variables with need to go to health facility when malaria strikes in households



### Socio-economic variables by opinion on ability of local herbalist to cure malaria

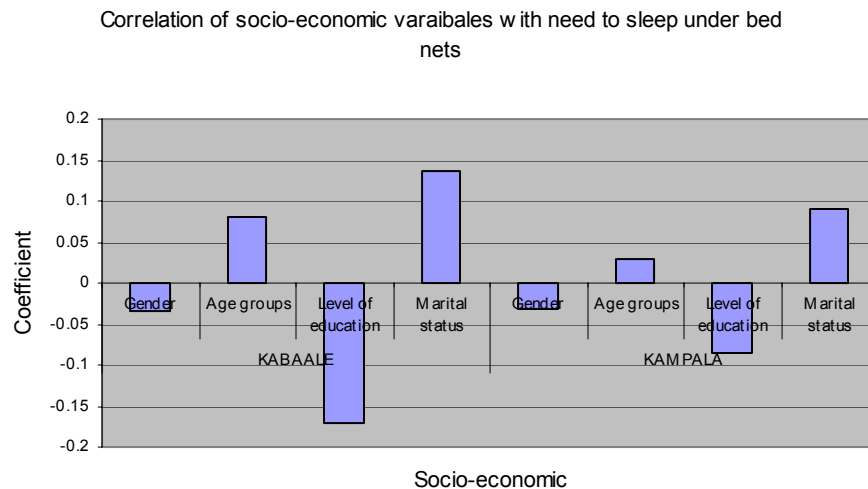
There are no significant correlations between socio-economic variables with opinion on the ability of local herbalists to cure malaria and any correlation is purely a chance event.

Correlation of socio-economic variables with ability of local herbalist to cure malaria



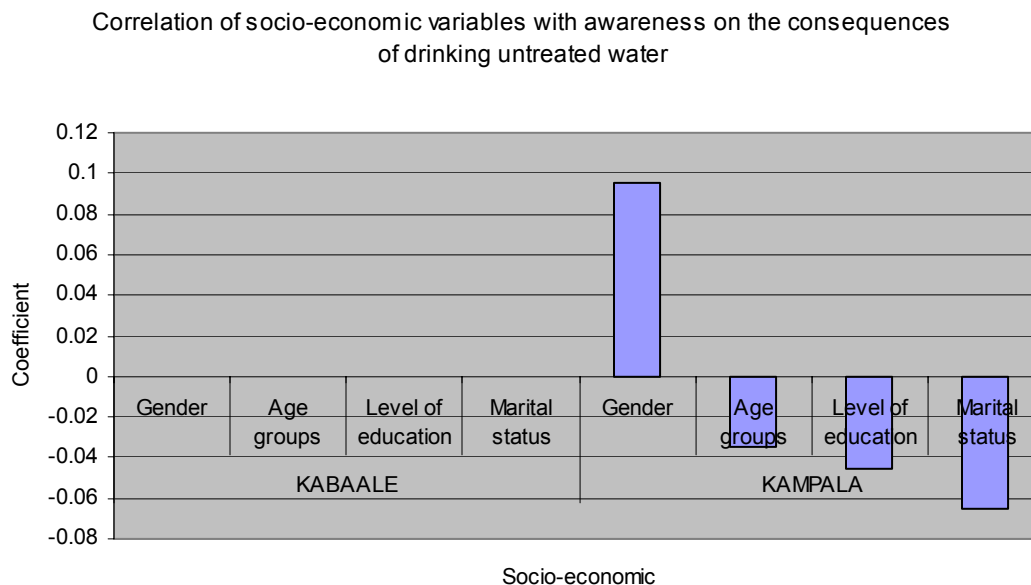
### Socio-economic variables by opinion on the need to use bed nets during the night in the households

In the Kabaale survey data, level of education in the survey have weak negative correlation (-0.171) significant at  $\alpha = 0.05$ , 2-tailed test. The rest of socio-economic variables in both Kabaale and Kampala data are not significantly correlated with opinion on the need to use bed nets, and where there is correlation, the association is purely a chance event. This means that other important factors have not been included in the correlation model.



### Socio-economic variables by awareness on the dangers of drinking untreated water

In the Kabaale survey data, no correlation is computed and this means that no association can be implied between socio-economic variables and awareness on the dangers of drinking untreated water. In the Kampala data, even if correlation coefficients are computed, they are in all cases not significant and are therefore chance events. This means that in both Kabaale and Kampala data, the correlation model cannot rely on the socio-economic variables and other variables must be included.



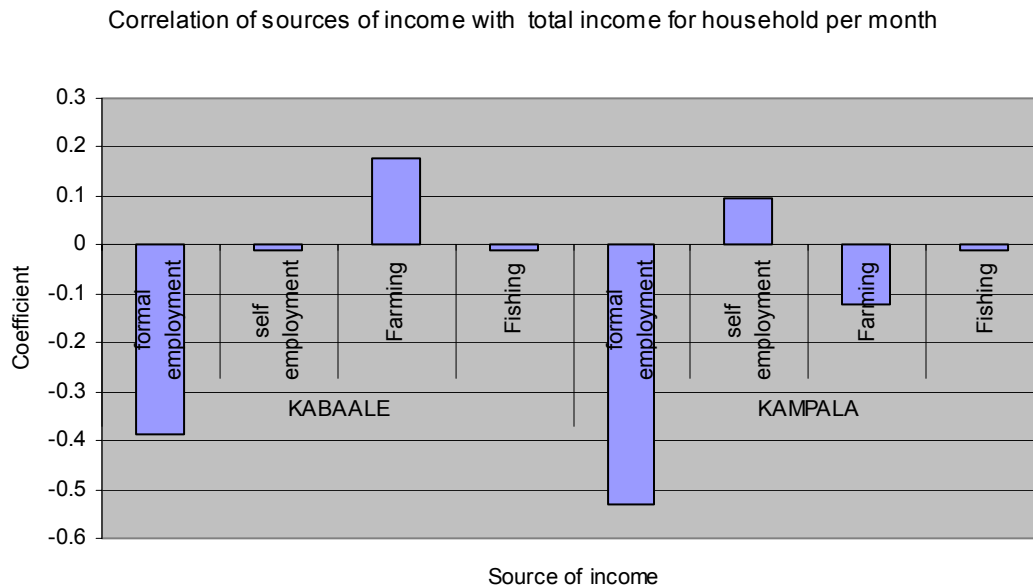
### Source of income by total income of households per month

The correlation analysis in this case makes assumption that source of income of individuals in the survey affect total income of households per month. In the Kabaale data, formal employment (-0.388 at  $\alpha = 0.01$ , 2-tailed) and farming (0.176 at  $\alpha = 0.05$ , 2-tailed) have significant but weak correlation with total income. In the Kampala data, it is only formal employment that has a strong negative significant correlation (-



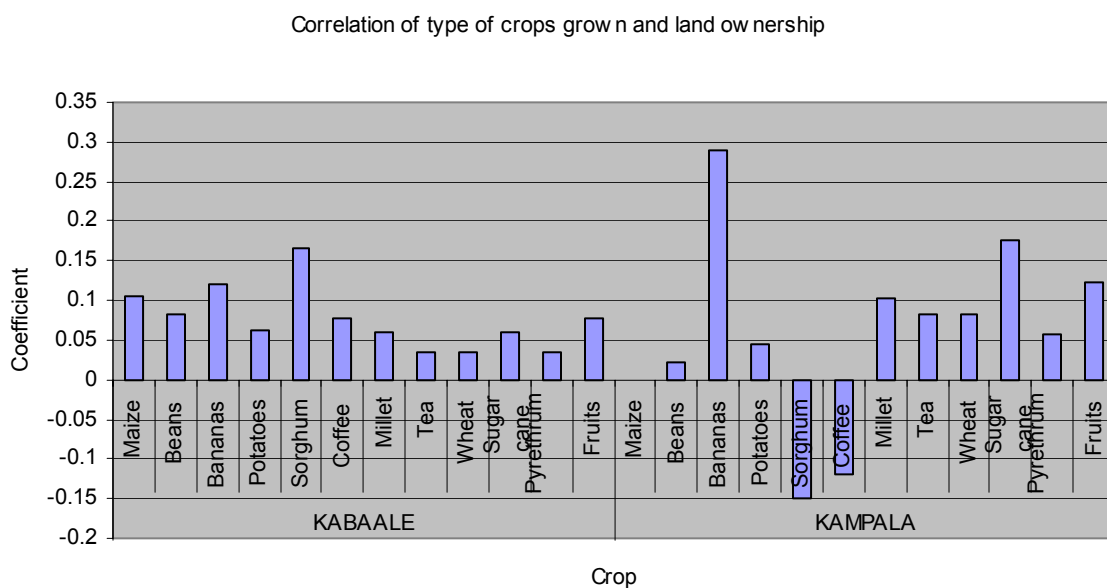
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0.531 at  $\alpha = 0.01$ , 2-tailed) with total income, and this may be related to urban influence. The rest of sources of income are of no consequence in the correlation model and any association is a chance event.



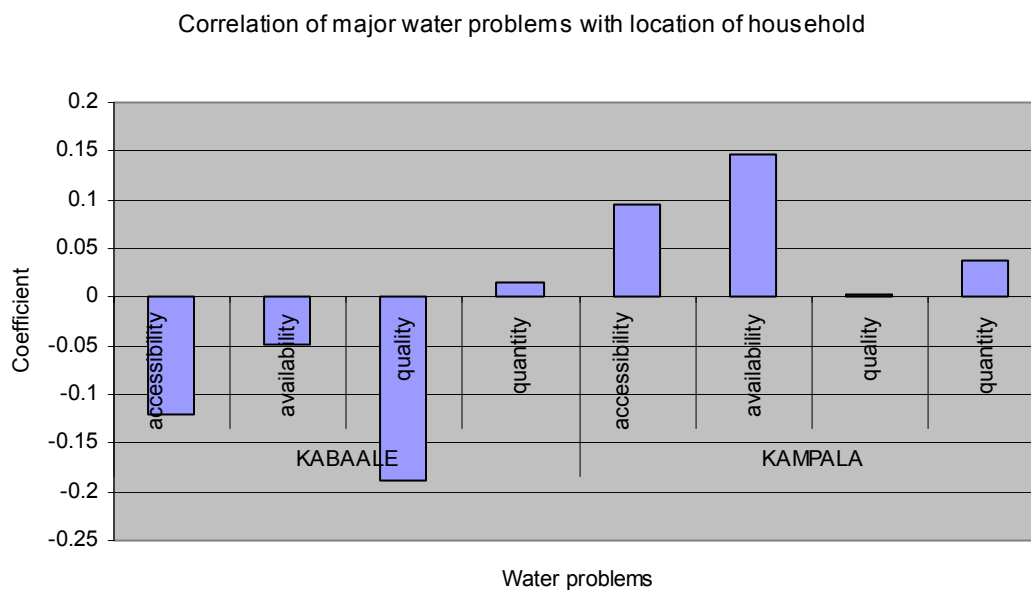
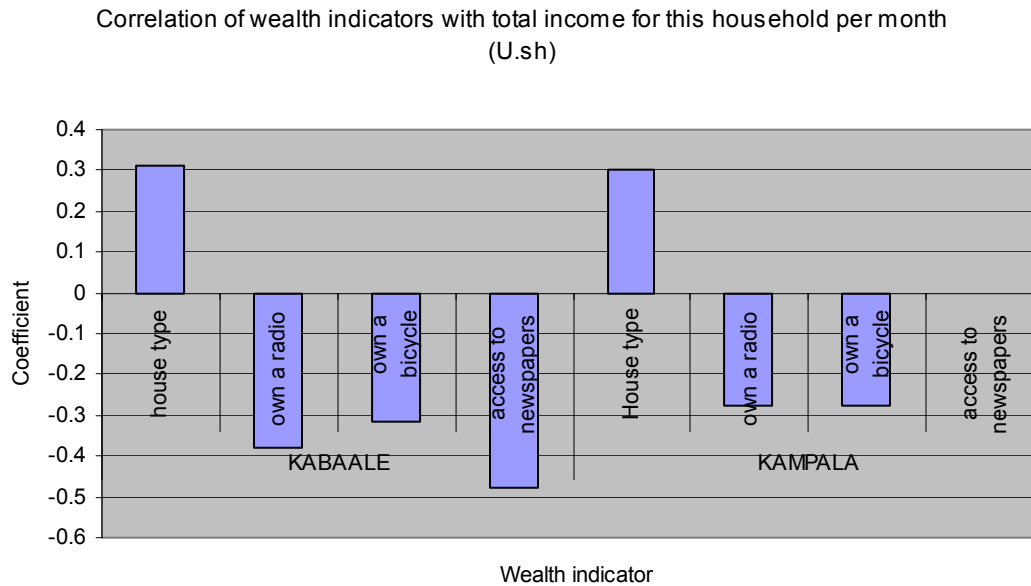
### Type of crops grown on land by access to agricultural land

The assumption in this analysis is that the type of crops grown by an individual household is dependent on access to land and land ownership. The spearman's correlation result cannot be computed in all cases and this indicate that access to land has no relation with type of crop grown in the survey data. When land ownership is taken into account in the type of crop-grown model, the correlation coefficients are not significant and this means that any association between land ownership and type of crop is a chance event.



### Wealth indicators' by total income for household per month

In the survey, a number of variables have been used as wealth indicators but house type, radio ownership, bicycle ownership and access to radio are used in this analysis as they also add social status to wealth indicator. All the wealth indicators included in the model are significantly related to total income of households in the Uganda survey data. In Kabaale data, all wealth indicators except for house type have negative correlation but all are significant at  $\alpha = 0.01$ , 2-tailed. This means that the wealth indicators need to be considered jointly as indicator of income or income as it jointly affect of wealth indicators. The same picture is true of Kampala data (see graph below). Correlation between wealth indicators and total income is therefore not due to chance but significant.



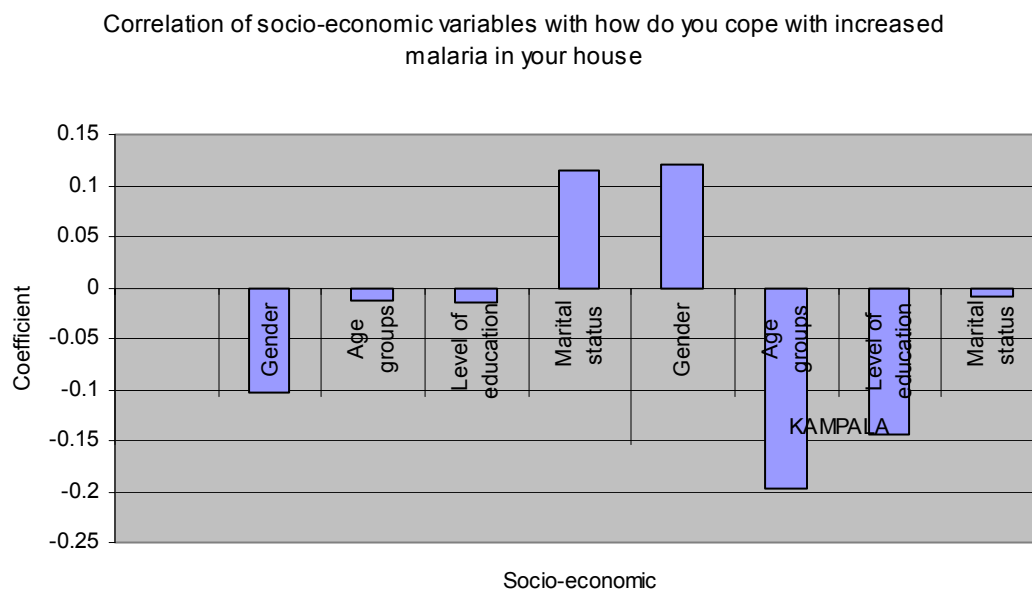
### Water supply problems by location of households

In this survey water supply problems are assumed to be related to location of households and spearman's correlation analysis results indicate only in the Kabaale survey data that water quality has a weak but significant correlation (-0.188 at  $\alpha = 0.05$ , 2-tailed) with location of households. Other water problems correlation with location of households are insignificant meaning any association is a chance event.

### 'How to cope with increased malaria in households' by total income of households per month

It is hypothesised that means of coping with increased malaria in households is dependent on income of households. Spearman's correlation analysis is employed to measure and test the correlation between coping mechanisms and total income of households per month. Results in all cases indicate weak and insignificant correlations and any association is pure a chance event. This means that coping with increased malaria cases need to be explained in terms of other variables not included in the model.

When socio-economic variables of gender, level of education, age and marital status are included in the correlation model, the correlation results indicate that there are weak and insignificant association with how individual households cope with increased malaria cases in Kabaale data. In Kampala data, one socio economic variable, age, has a weak negative but significant correlation (-0.198 at  $\alpha = 0.05$ , 2-tailed), while the rest of the variables are insignificantly correlated with mechanisms of coping with increased malaria cases.



### Cases of hospitalisation due to malaria by exposure variables

Hospitalisation cases due to malaria in households is assumed to be related to exposure to mosquito bites measured using the following variables:

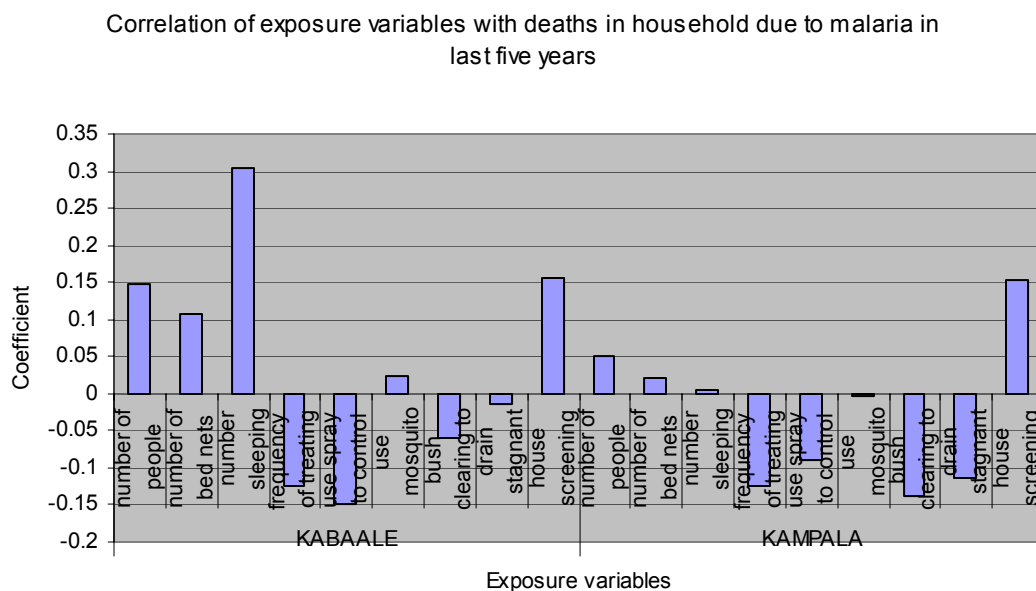
- number of people who sleep in the household
- number of bed nets in the household
- number of people who sleep under bed nets
- frequency of treating bed nets with insecticide
- use of spray to control mosquitoes
- use of mosquito coils to control mosquitoes
- bush clearing to control mosquitoes

- draining of stagnant water to control mosquitoes, and
- house screening to control mosquitoes

When the above variables are included in the hospitalisation spearman's correlation model, the results indicate that in all cases, the correlation are insignificant and are purely chance events (see graph below).

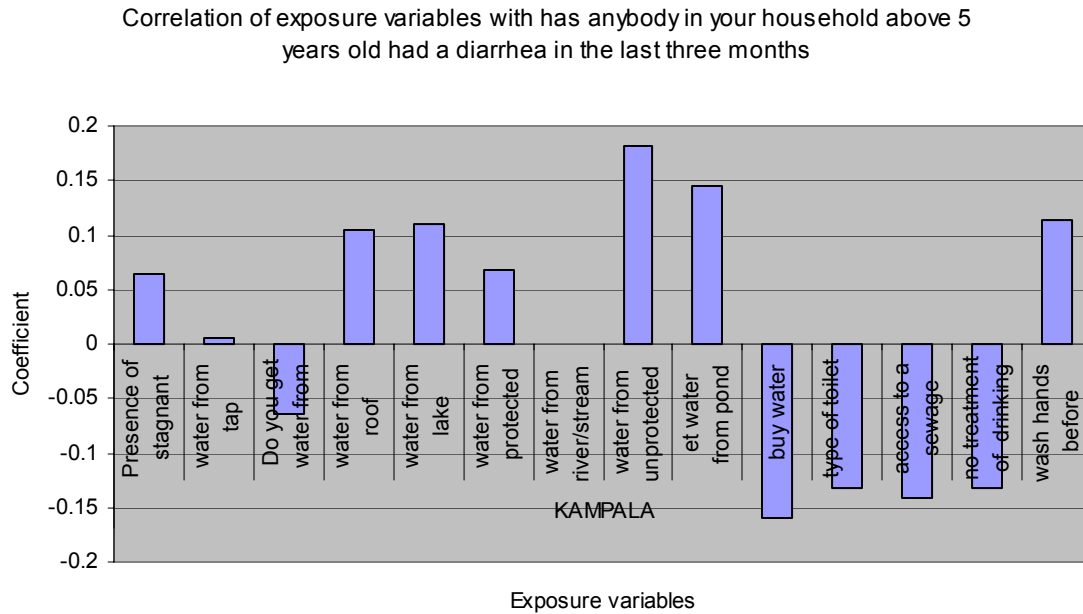
### Deaths in the last five years due to malaria by exposure variables

In cases where hospitalisation cases does not show significant correlation with exposure to malaria, then one can use the number of deaths due to malaria since not all can afford hospitalisation charges. A spearman's correlation analysis results in number of people sleeping under bed nets in the Kabaale survey data being identified as the one with weak positive but significant correlation with deaths in the households due to malaria. Other exposure variables association with deaths due to malaria are chance events.



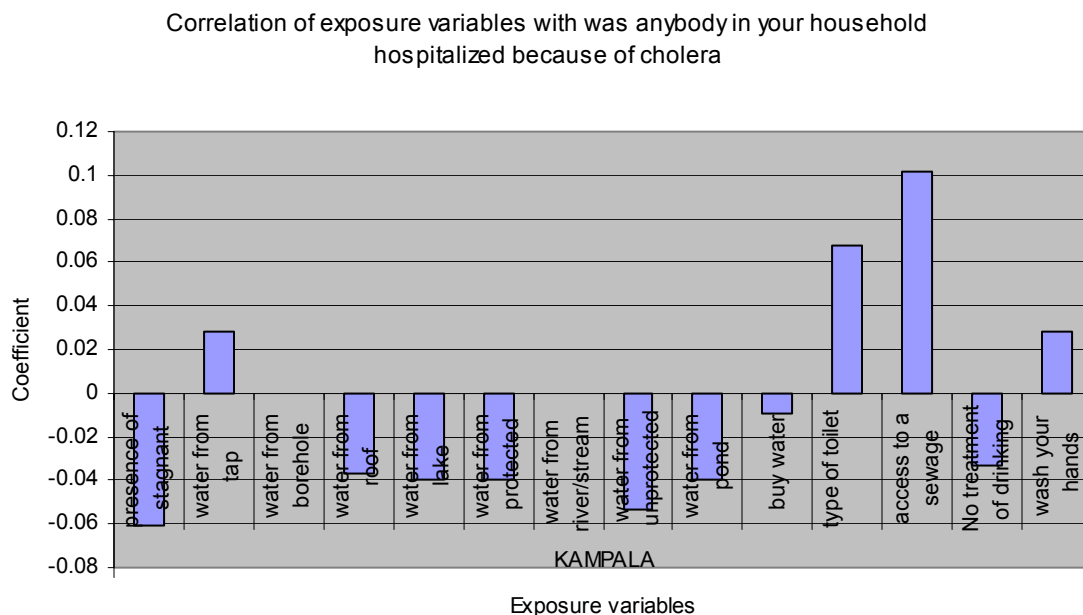
### Diarrhoea occurrence in household in the last 3 months by exposure variables

Diarrhoea cases are assumed, in this survey, to be related to certain environmental conditions. The environmental conditions used in this analysis are presence of stagnant water, type of toilet used, practice of washing hands before and after meals, and sources of water during the dry periods (borehole, roof catchments, lake, tap, protected well, river and unprotected well). Spearman's correlation results indicate no correlations in all cases of the Kabaale data (see graph below). In Kampala data, using water from unprotected well during dry seasons is identified as having a weak positive but significant correlation (0.181 at  $\alpha = 0.05$ , 2-tailed) with diarrhoea cases in the last 3 months. Other exposure variables have random association with diarrhoea cases in the survey data.



Diarrhoea cases may not be easy to talk about but serious events like cholera are most likely to be remembered by respondents. Cholera cases in households is analysed using spearman's correlation technique to identify possible main elements in the environment that may be responsible. The exposure variables above are used in the correlation model and results indicate no correlation between cases of cholera and exposure variables. No significant correlation can be implied in the between cholera cases and exposure variables. This means that there are other factors affecting cholera outbreaks or no cholera cases as already noted in the descriptive analysis section.

The role of exposure variables in cholera episodes is further analysed using hospitalisation of members of households and the results conform to number of people having cholera above in the Kabaale data. In the Kampala data, use of water from borehole during the dry seasons has a relatively strong significant correlation with hospitalisation due to cholera but the rest of the exposure variables are not significant.



### OUTPUT 3: SOCIO-ECONOMIC DATA ANALYSIS FOR TANZANIA

#### The Database

Administrative units covered in the Tanzania survey include one location (Chato) in Biharamulo district and one location (Bugarama) in Muleba district. In both the Biharamulo and Muleba surveys, 150 households are sampled per district indicating equal representation in the database.

Administrative units in the Tanzania survey sample data

District	Location	Frequency	Percent
Biharamulo	Chato	150	100.0
Muleba	Bugarama	150	100.0

The households sampled tend to be located on one distinct relief surface, lakeshore or flat terrain in Biharamulo district, indicating location in the so called lake littoral. In the Muleba survey, households are located on three distinct relief surfaces, which are: valley bottom (0.7%), hillside (75.3%) and hilltop (24%), reflecting the relief characteristics of the district.

No distance from the lake values are given in the Tanzania survey data although Biharamulo district seems to be in the lake littoral region of East Africa.

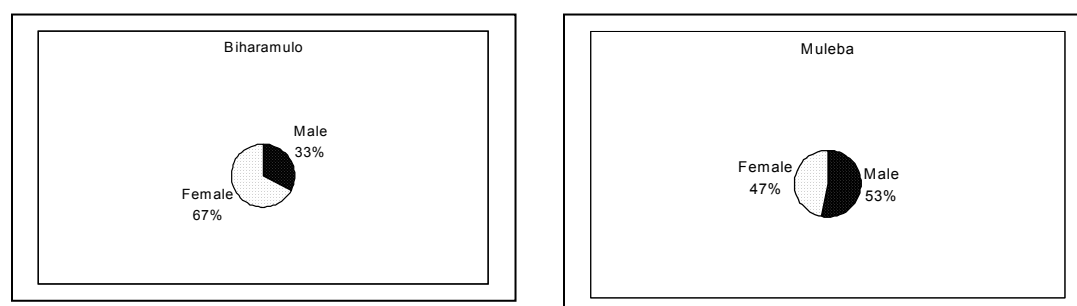
Elevation data indicate that the surface of Biharamulo range from 1154 metres to 1588 metres above sea level, of which only one household is located at above 1182 metres at 1588 metres (a hill top). In Muleba district, elevation range from 1534 metres to 5146 metres above sea level, generally falling within the East African uplands or highland region. Most of the households in Muleba district are within the 1500s (66.1%) metres level, the uplands region although a significant proportion, 33.9%, are in the highlands region.

The Biharamulo and Muleba surfaces are generally within the equatorial belt but whose climatic conditions are modified by the influence of Lake Victoria and relief plus the regional circulations

Presence of stagnant water bodies in the survey areas tend not to be a major factor as 81.3% of the households respondents in Biharamulo report no stagnant water bodies (note that lake Victoria is nearby!) and 94.7% of the household respondents in Muleba also report no presence of stagnant water bodies.

#### Socio-Demographic Data

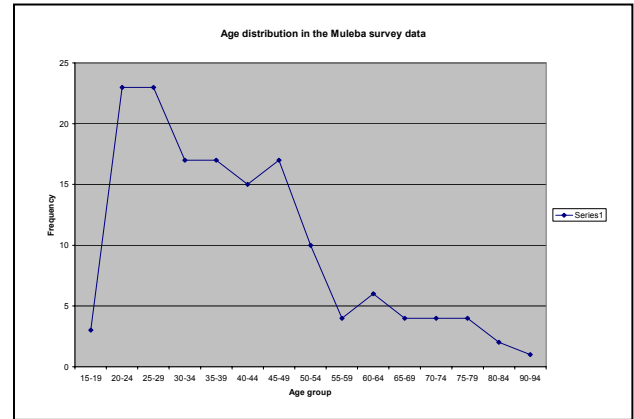
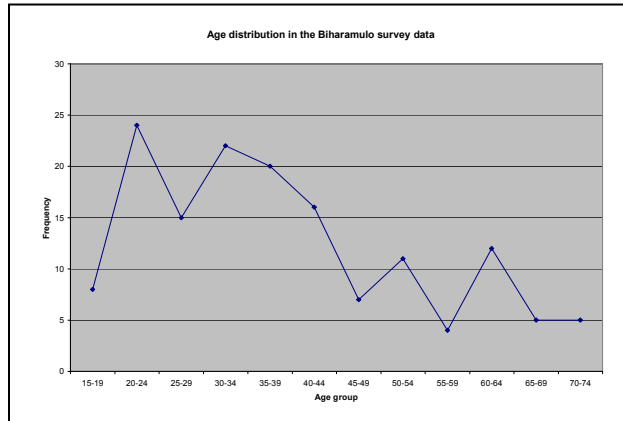
In the Tanzania survey data, the females tend to dominate in Biharamulo data where 67.1% of respondents are females and only 32.9% are males. In the Muleba data, gender distribution tends to be relatively balanced as 52.7% are males and 47.3% are females.



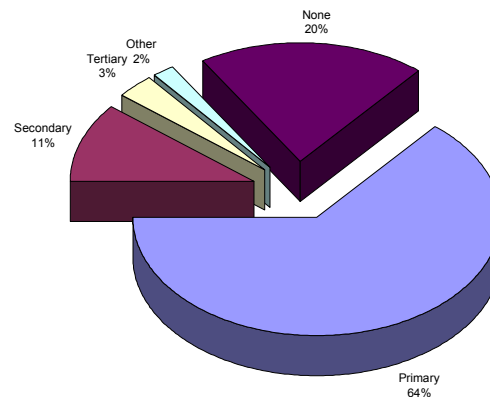
Age distribution in the survey data varies from 18 years to 73 years in the Biharamulo data and from 18 years to 93 years in the Muleba data. In Biharamulo survey, most respondents are in the age group 20-44

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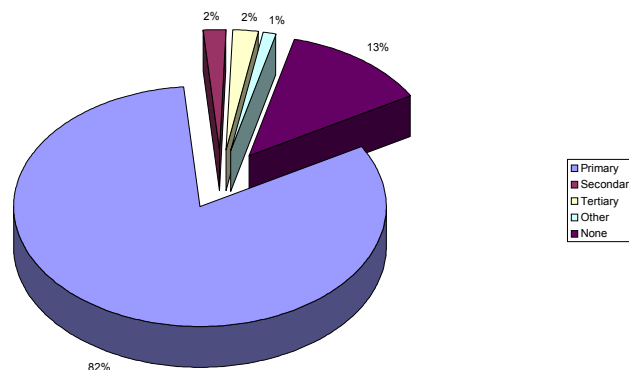
years and in the Muleba survey, the respondents are mostly in the age group 20-59 years (see graphs below).



Education levels in Biharamulo



Education levels in Muleba



Education levels of the respondents in the survey data vary from none to secondary education with majority having primary education. In Biharamulo data, 64.0% of the respondents have primary education, 20% no education, 10.7% secondary education, 3.3% tertiary education and 2.0% other forms of education. In the Muleba data, 82% have primary education, 12.7% no education, 2.0% secondary education, 2.0% tertiary education and 1.3% other forms of education.

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Respondents are mostly in some form of marital union as 75.3% of respondents in Biharamulo report are married, 4.7% are widowed and only 20.0 % are either divorced/separated or single. In the Muleba data, 82.7% are married, 6.7% widowed, and only 10.6% either single or divorced/separated.

#### Marital status of respondents

District	Status	Frequency	Percent
<b>Biharamulo</b>	Single	26	17.3
	Married	113	75.3
	Divorced/separated	4	2.7
	Widowed	7	4.7
	Total	150	100.0
<b>Muleba</b>	Single	11	7.3
	Married	124	82.7
	Divorced/separated	5	3.3
	Widowed	10	6.7
	Total	150	100.0

Household sizes vary from 1 to 17 people in Biharamulo and from 1 to 14 people in Muleba indicating relatively large households. In Biharamulo, most households are in the range of 4-8 persons while in Muleba the common household size range is 3-7 persons per household.

#### Income and expenditure

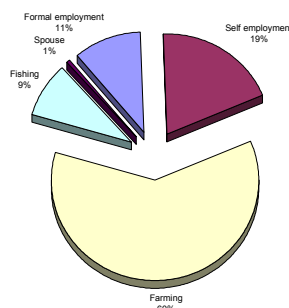
Income in the survey areas seemingly is dependent to a large extent on farming, self-employment, formal employment, and fishing. Other sources of income mentioned include spouses, brewing beer, and remittance. This picture can be linked to education level and gender distribution in the database. Most respondents in Biharamulo tend to be largely dependent on farming for income (72.7%) and the same is true of the situation in Muleba where farming accounts for 93.3% of sources of income. Self-employment tends to be ranked higher in Biharamulo data (22.7%) as a source of income than in Muleba data (11.3%). Fishing accounts for 10.7% of the respondents' sources of income in Biharamulo but is a non-starter in Muleba where only one respondent has indicated fishing as a source of income. Generally, the respondents in the survey area tend to rely on farming as source of income.

#### Sources of income

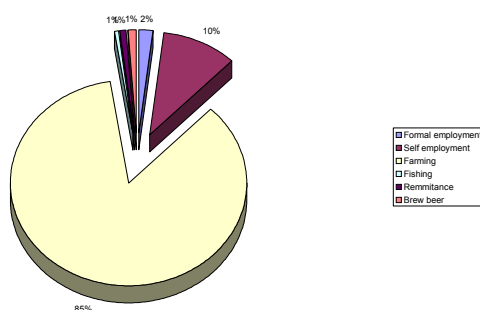
District	Source of income	Frequency	%
<b>Biharamulo</b>	Farming	109	72.7
	Self employment	34	22.7
	Formal employment	19	12.7
	Fishing	16	10.7
	Spouse	1	0.7
<b>Muleba</b>	Farming	140	93.3
	Self employment	17	11.3
	Formal employment	3	2.0
	Brew beer	2	1.3
	Fishing	1	0.7
	Remittance	1	0.7



Sources of income in Biharamulo



Sources of income in Muleba



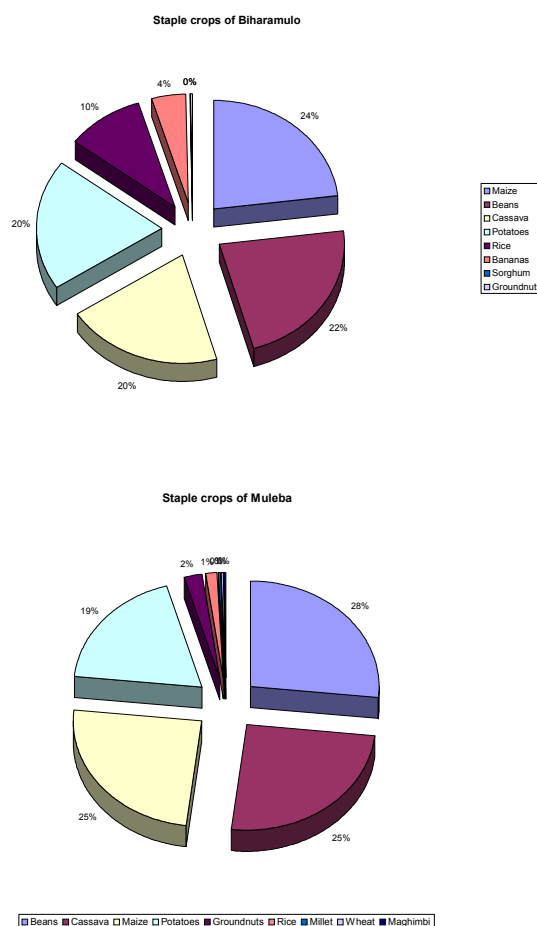
Monthly total income varies from a low of Tanzania shillings 0 to a high of Tanzania shillings 170,000 in Muleba and from 2000 Tanzania shillings to 70,000 Tanzania shillings in Biharamulo data. The Biharamulo total monthly income is largely less than the Muleba one although an individual indicated 0 Tanzania shillings. Since farming tends to be the main source of income in both Biharamulo and Muleba because the Biharamulo weather conditions (lake littoral weather) are likely to be less favourable to agriculture than the Muleba (Uplands or highlands weather) one due to altitudinal variation, income is then expected to be less in Biharamulo than in Muleba.

### Staple Foods of households

District	Foods consumed	Frequency	%
Biharamulo	Maize	137	91.3
	Beans	134	89.3
	Cassava	121	80.7
	Potatoes	117	78.0
	Rice	59	39.3
	Bananas	26	17.3
	Sorghum	1	0.7
	Groundnuts	1	0.7
Muleba	Beans	149	99.3
	Cassava	140	93.3
	Maize	138	92.0
	Potatoes	104	69.3
	Groundnuts	12	8.0
	Rice	8	5.3
	Wheat	2	1.3
	Millet	2	1.3
	Maghimbi	1	0.7

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Staple foods of the survey data areas are given as maize, beans, cassava, potatoes, rice and groundnuts. Other crops consumed are wheat, sorghum and millet. Consumption tendencies are outlined in the table below but in Biharamulo, the main staple crops are indicated as Maize (91.3%), beans (89.3%), Cassava (80.7%) and potatoes (78%). In Muleba, the main staple crops are Beans (99.3%), Cassava (93.3%), Maize (92.0%) and Potatoes (69.3%). Definition of food shortage in the two areas should use scarcity of Maize, beans, cassava and potatoe crops as a benchmark.



On meals of the day, breakfast seems not to be a common meal in Muleba (30.7%) but lunch and dinner are generally regular in both Biharamulo and Muleba. The figures in the table below give indication that lunch and dinner structure is fairly maintained in the survey areas and major drop in their availability can be used as indicator to either food shortage in the areas or drop in purchasing power of the respondents

### Regularity of major meals of the day

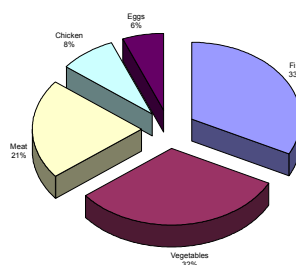
District	Meal normally taken	Frequency	%
Biharamulo	Breakfast	132	88.0
	Lunch	149	99.3
	Dinner (supper)	150	100.0
Muleba	Breakfast	46	30.7
	Lunch	147	98.0
	Dinner (supper)	148	98.7

## Types of foods

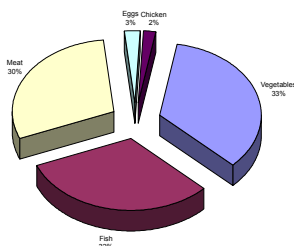
District	Type of Food taken at least once a week	Frequency	%of respondents
<b>Biharamulo</b>	Meat	96	64.0
	Fish	147	98.0
	Eggs	28	18.7
	Chicken	38	25.3
	Vegetables	145	96.7
<b>Muleba</b>	Meat	129	86.0
	Fish	139	92.7
	Eggs	11	7.3
	Chicken	8	5.3
	Vegetables	150	100.0

From the table above and graphs below, it is obvious that even if meals of the day are normally taken, there are variations in the type by survey areas and these variations can be used to indirectly assess the poverty situation in the survey areas. Fish and Vegetables consumption are both seemingly high in the two study areas (even if earlier indication was that fishing was not the main source of income), and this is followed by meat consumption (21% in Biharamulo and 30% in Muleba). Consumption of eggs is seemingly low in both the survey areas (6% in Biharamulo and 3% in Muleba) and the situation is the same with chicken consumption. It would have been reasonable to inquire about reasons for not having the type of meal

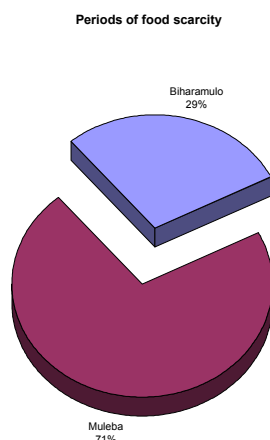
Type of food taken at least once a week (\*Biharamulo)



Type of food taken at least once a week (Muleba)



Checking on periods of food shortages in the households reinforces meals types question. In Biharamulo, only 18.7% of the households surveyed report days of not enough food while in Muleba, 46.7% of the households surveyed report days of not enough food. This can be interpreted as indicator of poverty level variation between the two regions or difference in food production and availability as Muleba seems to be relatively poorer in terms of food scarcity.



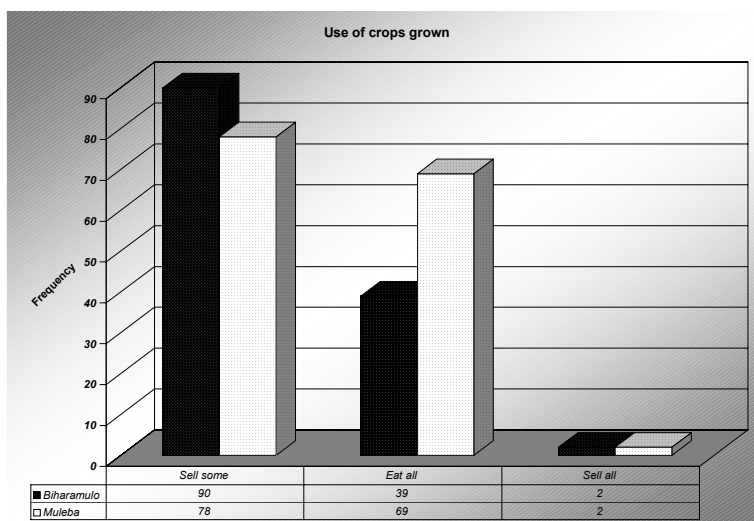
Access to agricultural land in both Biharamulo and Muleba is high (88 and 98.7% respectively) and it seems that it is not access to land that affects food availability but it could be the problem of land productivity and other forces. A look at the types of crops grown on household lands may explain the observed anomaly in food availability between Biharamulo and Muleba survey areas.

#### Crops grown on land

District	Crop	Frequency	%
Biharamulo	Maize	124	82.7
	Beans	118	78.7
	Potatoes	96	64.0
	Cotton	79	52.8
	Cassava	41	27.5
	Rice	13	8.8
	Groundnuts	4	2.7
	Sorghum	3	2.0
	Bananas	2	1.3
	Fruits	2	1.3
	Tomatoes	2	1.3
	Millet	1	0.7
	Sugarcane	1	0.7
	Trees	1	0.7
	Onions	1	0.7
	Tobacco	1	0.7
	Vegetables	1	0.7
Muleba	Maize	145	97.3
	Beans	148	98.7
	Bananas	143	95.3
	Coffee	105	70.0
	Potatoes	84	56.0
	Cassava	56	36.4
	Fruits	10	6.7
	Sugarcane	6	4.0
	Groundnuts	6	4.0
	Vegetables	2	1.3
	Sorghum	1	0.7
	Mchicha	1	0.7
	Pineapple	1	0.7
	Mangoes	1	0.7
	Pawpaw	1	0.7

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What happens to the crop that is grown on land may also be used to indirectly measure poverty levels or reasons for food shortages in the survey areas. In Biharamulo survey data 65.7% of the respondents sell some crops, 28.5% eat all and only 1.5% sell all while in Muleba data 52.0% sell some, 46.0% all and only 1.3% sell all. In this result there is a tilt toward eating all in Muleba area and this can be due to the crops grown not meeting households demand while in Biharamulo there is a tilt toward selling some crops and this can be due to surplus outputs that have to be disposed of or the cash crops of cotton, which must be disposed off.



Checking on the households buying food from the markets further filters the use of crops grown on land. In both survey areas, nearly all buy food from markets (92.7% for Biharamulo and 81.3 for Muleba).

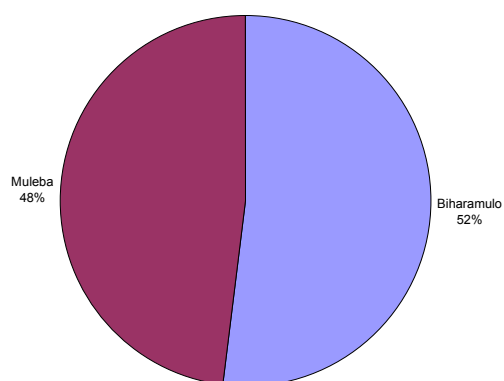
### Wealth indicators

Wealth indicators in this baseline data are assessed using the following property ownership elements:

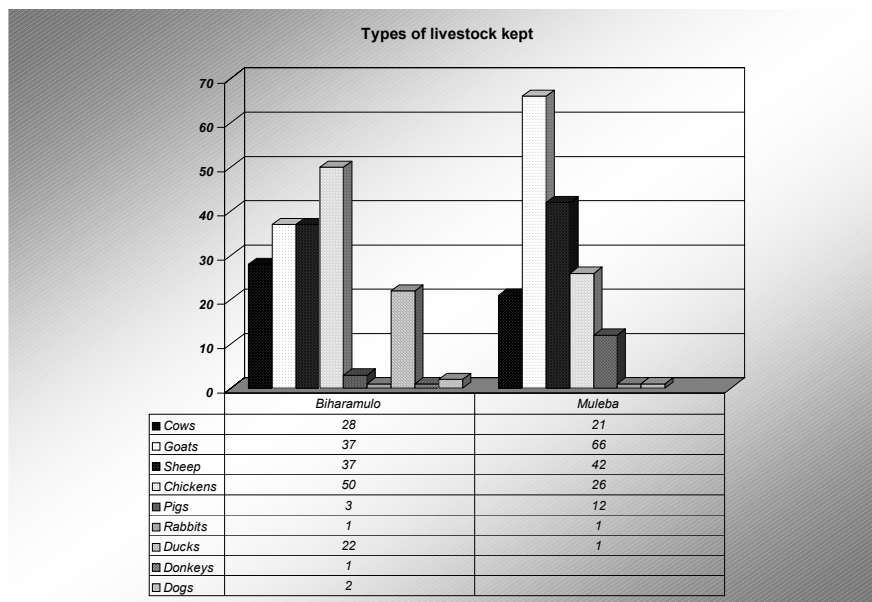
- Livestock keeping
- Land ownership
- Size of land
- House type
- Radio
- Bicycle
- Access to newspapers

Livestock keeping seems to be a common practice in nearly all the households surveyed and this can be for economic reason (livestock are easy to dispose of in the local markets) but can also be cultural tools. It would have been useful to get the number of livestock. Livestock keeping tends to be more common in Biharamulo (64.0%) than in Muleba (59.3%).

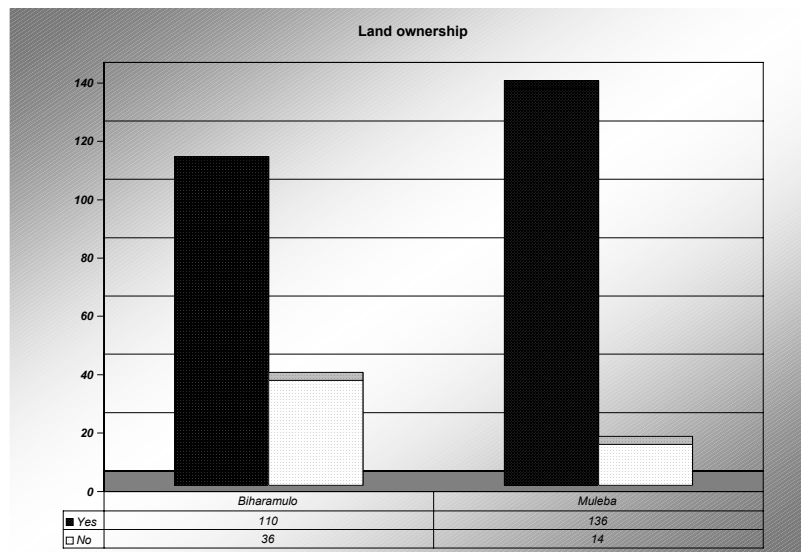
## Livestock Keeping



Types of livestock kept			
District	Livestock Types	Frequency	%
Biharamulo	Cows	28	18.7
	Goats	37	24.7
	Sheep	37	24.7
	Chickens	50	33.3
	Ducks	22	14.7
	Pigs	3	2.0
	Dogs	2	1.3
	Rabbits	1	0.7
	Donkeys	1	0.7
Muleba	Cows	21	14.0
	Goats	66	44.0
	Sheep	42	28.0
	Chickens	26	17.3
	Pigs	12	8.0
	Ducks	1	0.7
	Rabbits	1	0.7

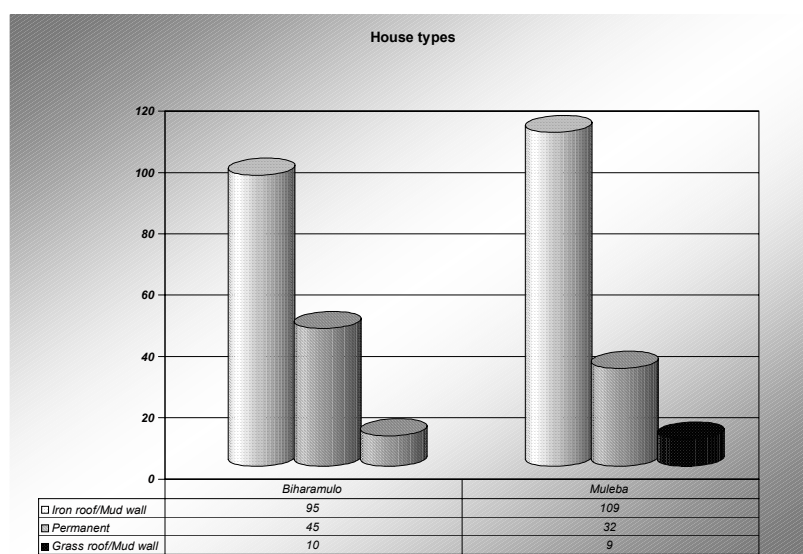


Respondents tend to have access to land in all survey areas as already observed above but when it comes to owning land, Biharamulo tend to lag behind Muleba. The question of land ownership should be viewed in terms of political history of Tanzania. There are political and historical issues in rural Tanzania that sometimes distort land ownership picture. In Biharamulo 73.3% of the respondents own land while in Muleba, 90.7% own land.



Land sizes tend to vary widely in Biharamulo, ranging from 0.5 acres to 20 acres and the same is true of Muleba land sizes, which is in the range 0.25 acres to 30 acres. In Biharamulo, most land parcels are in the range of 2.0 acres to 4 acres and in Muleba most land parcels are in the range of 0.5 acre to 3.

Most houses in the survey areas are of the 'semi-permanent' types (iron roof and mud wall, accounting for 63.3% of the respondents' houses in Biharamulo and 72.7% in Muleba. Grass thatched mud wall houses tend to be rare in both the survey areas (Biharamulo, 6.7% and Muleba, 6.0%) and the same is true of permanent houses (Biharamulo, 30% and Muleba 21.3%).



Owning a radio, a bicycle and having access to newspapers is sometimes considered a status symbol and some measure of wealth in rural Tanzania. Radio is considered basic feature of households and lack of it can be considered a measure of poverty. The bicycle tends to be of a higher status than a radio in the homestead, as it tends to cost more and used to be associated with those in formal employment. The presence of a bicycle can therefore be used to as an indicator of a relatively well to do household although of late it has lost its appeal as a status symbol. Access to newspaper can be used to imply relatively good literacy and this can also be used to infer wealth or higher social status. Ownership of radio, bicycle and access to newspapers in the survey data are summarised in the table below:

#### Ownership of radio, bicycle and access to newspapers

District	Item	Frequency	%
Biharamulo	Radio	127	84.7
	Bicycle	102	68.0
	Access to newspaper	81	54.0
Muleba	Radio	82	54.7
	Bicycle	93	62.0
	Access to newspaper	38	25.3

If radio, bicycle and newspapers are used as a measure of wealth, then Biharamulo seems to be better off than Muleba.

#### Health issues in the survey environments

Source of water used in the households can be a health hazard especially in terms of water borne diseases. In this survey, there is recognition that sources of water become a health hazard mainly during dry seasons when water is scarce.

Sources of water during dry seasons in the survey areas are summarised in the frequency table below. Rivers/streams seems to be a major source of water in Muleba data (70.0%) while in Biharamulo, the main source of water during the dry season is the lake (97.3%). In Biharamulo data, the main sources of water during the dry season in order of percentage scores are lake, protected well, borehole, roof catchment and tap while in Muleba the order is river/stream, borehole, protected well, tap, roof catchment and unprotected well. It is obvious that in Muleba, water borne diseases are likely to originate from the use of lake water while in Muleba, the river/stream water use is likely to be the source. There is indication in the Muleba data that tap water use is relatively common than in Biharamulo.



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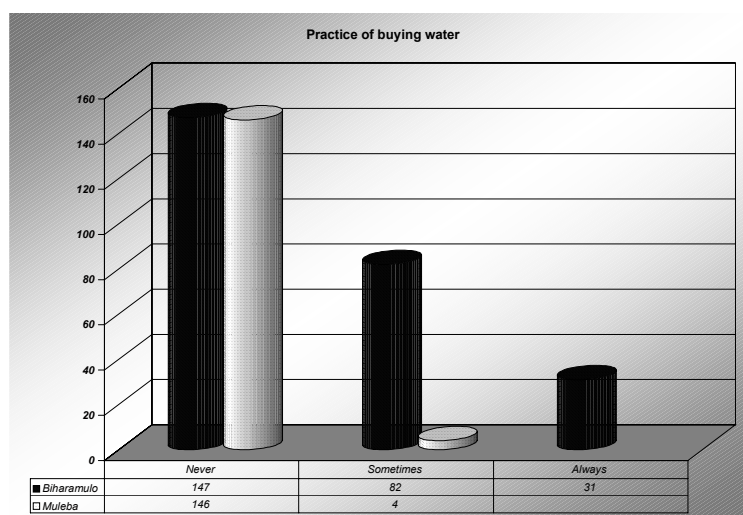
### Sources of water in dry seasons

District	Source	Frequency	%
Biharamulo	Lake	146	97.3
	Protected well	44	29.3
	Borehole	66	44.0
	Roof catchment	22	14.7
	Tap	20	13.3
Muleba	River/stream	105	70
	Borehole	57	38.0
	Protected well	17	11.3
	Tap	14	9.3
	Roof catchment	8	5.3
	Unprotected well	4	2.7

Buying of water in the Muleba survey area is relatively very rare but Biharamulo data indicate a relatively high tendency to buy water even though majority still never buy water and this can be used to imply relative aridity in the Biharamulo survey area.

### Practice of buying water

District	Do you buy water	Frequency	Percent
Biharamulo	Never	147	97.4
	Sometimes	82	54.7
	Always	31	20.7
Muleba	Never	146	97.3
	Sometimes	4	2.7



How water is stored can be a health hazard as well as an indicator of water supply problems. In the survey areas, respondents use the following facilities to store water:

**Water storage units**

Unit of storage	Biharamulo		Muleba	
	Frequency	%	Frequency	%
Jerry cans	107	71.3	130	86.7
Pot	94	62.7	14	9.3
Drums	48	32.0	18	12.0
Large tanks	13	8.7	8	5.3
Pots	98	65.3	128	85.3

The results in the table above indicate that Jerry cans and pots are the preferred water storage units in the survey areas. Note the use of large tanks and drums difference between the survey areas; indicator of wealth or abundance of water?

In both Biharamulo and Muleba, majority of respondents indicate no problem with water accessibility and this may explain the use of jerry cans and pots to store water. Biharamulo reported 96% of the respondents having no problem with access to water and Muleba reported 94% of the respondents having no problem with water accessibility. It is possible that most households surveyed are either located near the river in Muleba or near the lake in Biharamulo. Respondents identified major water problems as follows:

**Water Problems**

Water problem	Biharamulo		Muleba	
	Frequency	%	Frequency	%
Quality	109	72.7	37	24.7
No problem	99	66.0	46	30.7
Availability	7	4.7	16	10.7
Quantity	6	4.0	8	5.3

It appears that there is little water problem in the Muleba area but in Biharamulo, water quality is considered as a major by 72.7% of the respondents. The Biharamulo water quality problem is seemingly due to the fact that the main source of water is lake Victoria.

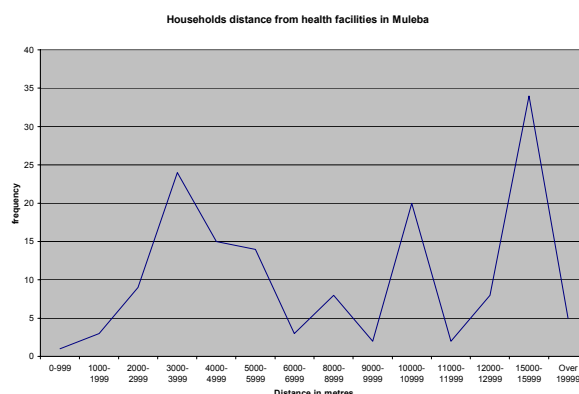
Provision of health services in the Biharamulo survey area seems to be largely centred on government health facilities especially health centres since all the respondents (100%) indicate using the health centre. In the Muleba area, there is notable variation in the type of health facility visited for treatment by family members although majority visit local dispensary (64.7%) and a sizeable number (60.7%) visit Private hospital. local dispensaries. In Muleba, other family treatment centres are given as district hospital (30.7%), herbalist (14.0%), health centre (11.3%) and provincial hospital (0.7%). It seems that there are more treatment centres' option in Muleba than in Biharamulo where all respondents' family members go to the health centre.

**Family treatment centres**

Centre	Biharamulo		Muleba	
	Frequency	%	Frequency	%
Provincial hospital	0	0.0	1	0.7
District hospital	0	0.0	46	30.7
Health centre	150	100.0	17	11.3
Local dispensary	0	0.0	97	64.7
Mobile health post/service	0	0.0	8	5.3
Herbalist	0	0.0	21	14.0
Private hospital	0	0.0	91	60.7
Private Clinic	0	0.0	0	0.0

When ownership of the health facilities is considered, the role of government in health services provision becomes apparent. Biharamulo, all respondents use a government owned health facility while in Muleba, 70.7% indicate that the facilities used by family members are government owned. In the Muleba area, a sizeable number use a religious organisation health facility (70.0%) and this explains the private hospital visitation in the types of health facility table. Muleba area also exhibits private investment in health provision as about 26% of the respondents indicate.

In the Biharamulo, all households in the survey are located within 1 km distance from health facilities and this in most case is a walking distance. In Muleba survey, household are located at distances ranging from 0.5 km to 40 km and the majority of households are seemingly within the 1-6 km, and over 10 km, indicating a wider dispersal of households from health facilities in Muleba than in Biharamulo.

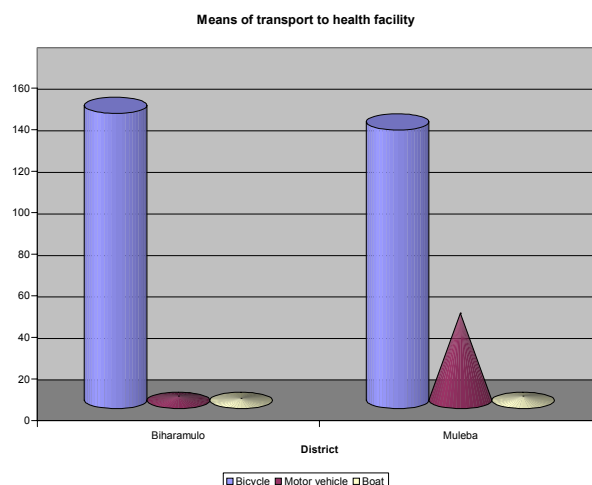


All respondents in Biharamulo can walk to health facilities while in Muleba, 82.6% of the respondents indicate they can walk to health facilities despite indication of long distances from health facilities. In Biharamulo, it seems that most of the health facilities visited by respondents are near their homesteads, while in Muleba, it could be a problem of availability of transport means.

Means of reaching health facilities, a part from walking as indicated above include using motor vehicles and bicycles. In Biharamulo, 1.3% of respondents indicate they use vehicles to reach health facilities, meaning that vehicles are not a common means of transport in the area. In Muleba, 28% indicate they use motor vehicles to reach health facilities and this means that use of motor vehicles to reach health facilities, even though not common, more widespread in Muleba than in Biharamulo. In general, the preferred means of transport to health facilities in the two survey areas is bicycle where 94.7% of the respondents in Biharamulo indicate they use bicycles and the figure is 89.9% in Muleba. Boats are definitely out as means of transport to health facilities in both the survey areas and this indicates that there are either no health facilities in the lake or there is no need to use a boat. Note that most respondents can walk to health facilities.

#### Transport means to health facilities

Transport Means	Biharamulo		Muleba	
	Frequency	%	Frequency	%
Motor vehicle	2	1.3	42	28.0
Bicycle	142	94.7	134	89.9
Boat	1	0.7	2	1.3



Health centres visitations tend to be rare in Muleba data as 58.4% of the respondents indicate no member of the family having visited the hospital and where visitation has occurred, numbers are mostly between 1 and 2 persons. The picture is slightly different in Biharamulo 41.3% indicate having visited once in the last three months and the most common number is 1-2 persons in the households.

#### Visits to hospitals in the last three months by household members

	Biharamulo		Muleba	
	Frequency	%	Frequency	%
Number of visits				
0	42	28.0	87	58.0
1	62	41.3	49	32.7
2	24	16.0	14	9.3
3	14	9.3		
4	3	2.0		
5	3	2.0		
6	1	0.7		
15	1	0.7		

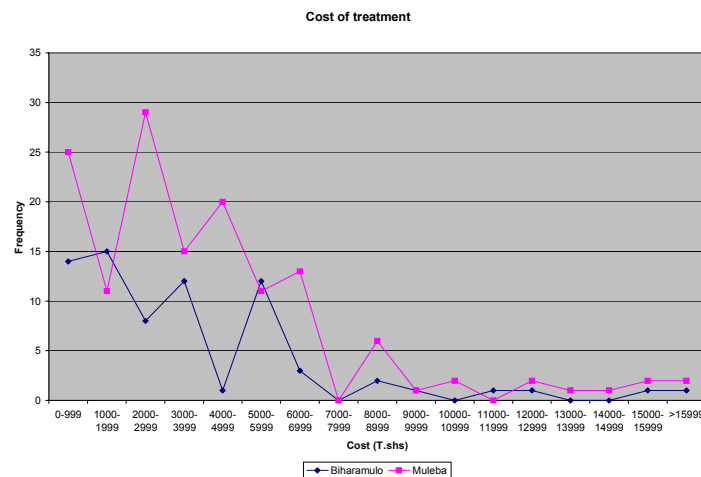


The health facilities visited by respondents tend to satisfy patients needs in terms of services as indicated by 70.7% of respondents in Biharamulo data and 94.6% in Muleba data. This is further supported by indication that majority of family members always get well after treatment (96.0% in Biharamulo and 95.3% in Muleba).

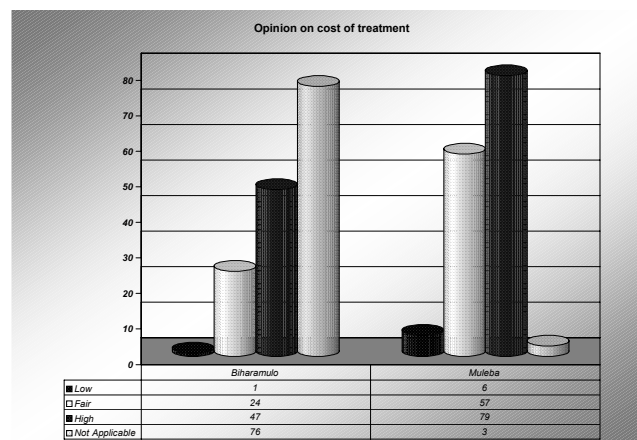
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No data for the question on whether respondents pay for the treatment of cholera. On the treatment of malaria, 46.7% of respondents in Biharamulo indicate having to pay but majority (52.7%) indicate they do not have to pay. In the Muleba data, most respondents (98.7%) indicate they have to pay for the treatment of malaria. The Muleba case could be due to the fact that many of them go to private hospital owned by a religious organization for treatment.

In Biharamulo, respondents indicate they pay between 300 to 50,000 Tanzania shillings (about 28 to 4,600 Kenya shillings) and in Muleba, the respondents indicate they pay between 500 to 20,000 Tanzania shillings (about 46 to 1900 Kenya Shillings). In Biharamulo, patient admission tends to be rare with only 10.7% of respondents indicating admission of patients and this can be explained by the fact that most health facilities visited are health centres, which generally have limited admission facilities. In Muleba, 62.2% of the respondents report admission of patients and the figure seems to be higher than in Biharamulo in Kisumu to only 9.8%.



Even if the cost of treatment tends to be relatively low, the respondents generally feel they are high (Biharamulo, 31.5% and Muleba, 54.5), even though most respondents in Biharamulo (51.0%) indicate the cost issue is not applicable. Note that most of the respondents have low monthly total income and tend to rely on land for income.

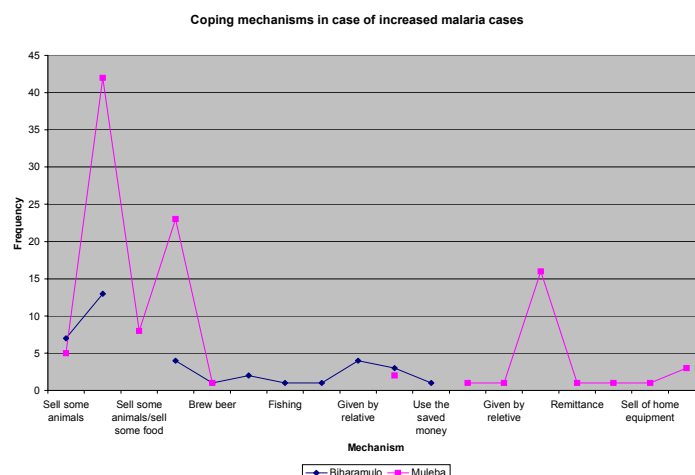


\*\*\*\*There is no data on how people cope with increased cholera cases in households. There is need to collect this data\*\*\*\*

In case of increased Malaria cases, coping mechanisms mentioned include selling some animals and selling some food. In Biharamula data, respondents would tend to sell some food (65.5% of respondents) to cope with increased malaria and the same is true of Muleba data where 76.4% of the respondents would sell some food. Other ways of respondents coping with coping with increased malaria cases are

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borrowing, savings, remittance, selling some property, and labour work. The coping mechanisms tend to make use of respondents' resources and can lead to increased debts and poverty.



### Malaria and Cholera Data

Respondents tend to think that health of family members is associated with weather conditions (see table below) and this belief is based on experience in the environments where the surveys have been conducted.

### Opinion on relation between health of household members and weather

<i>District</i>		<i>Frequency</i>	<i>Percent</i>
Biharamulo	Yes	79	52.7
	No	67	44.7
	Do not know	4	2.7
Muleba	Yes	104	69.3
	No	43	28.7
	Do not know	3	2.0

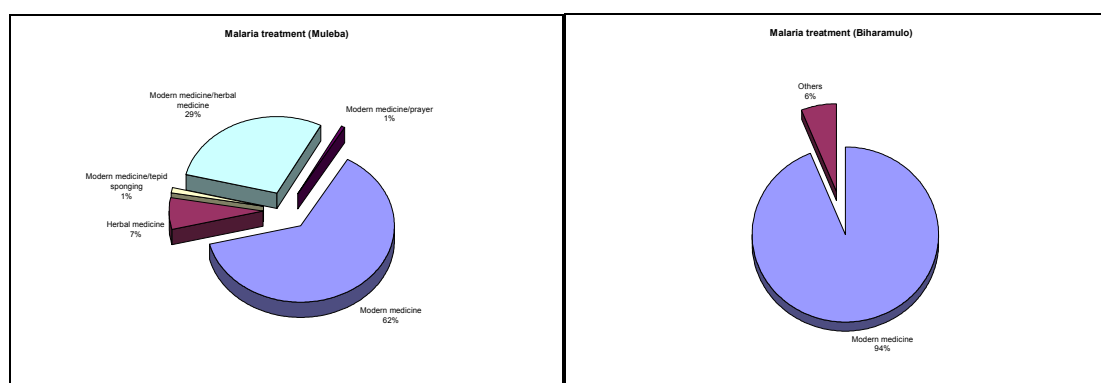
### Malaria data

The respondents experience is tested further by seeking from them the characteristics or signs they use to identify malaria cases and the results is as follows:

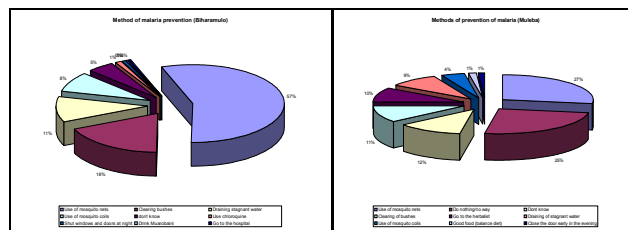
**Opinion on signs of malaria**

<i>Sign of malaria</i>	<i>Biharamulo</i>		<i>Muleba</i>	
	Frequency	%	Frequency	%
Fever	137	91.0	132	88.6
Headache	75	50.0	107	71.3
Stomach ache	21	14.0	23	15.3
Joint ache	55	36.7	55	36.7
Vomiting	58	38.9	88	58.7
Lack of appetite	27	18.0	34	22.7
Convulsion	22	14.7	38	25.3
Anaemia	1	0.7		
Diarrhea	3	2.0	5	3.3
Flue	1	0.7		
Mental Confusion	1	0.7		
Paleness	1	0.7		
Dizziness			3	2.0
Frequent thirst			1	0.7
Jaundice			1	0.7
Red eyes			1	0.7

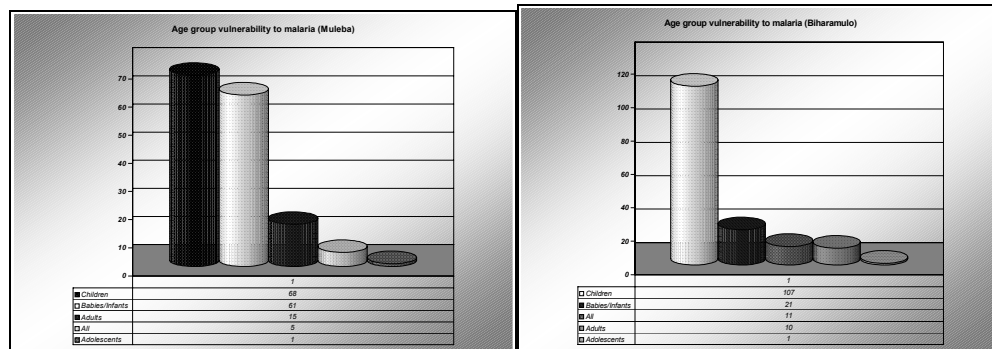
In the Biharamulo data, respondents tend to indicate that malaria is largely treated using modern medicine (94.0%). Actually all respondents (100%) indicate use of modern medicines in treatment of malaria even if 6% of them indicate combining modern medicine with hebarl medicine (2.7%), prayer (2.7%) and tepid sponging (0.1%). In the Muleba data, there seems to be a drop in the percentage of respondents using modern medicine as compared to the Biharamulo data. The results indicate that 62.7% of the respondents in the muleba data use modern medicine only to treat malaria but the rest the remaining 37.3% either use modern medicine in combination with herbal medicine (28.7%), tepid sponging (1.3%), and prayer (0.7%) or use only herbal medicine (6.7%).



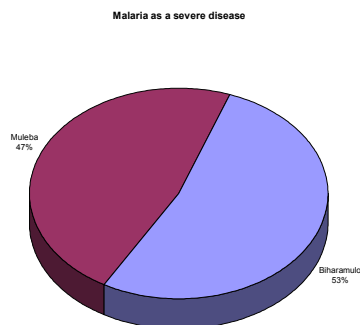
Malaria prevention according to the respondents in Biharamulo survey data include using mosquito nets (76.8%), clearing bushes (24.7%), draining stagnant water (14.8%), use mosquito coils (10.4%), use chloroquine (1.3%), shut windows and doors at night, drink muarobaini (0.7%) and got to hospital (0.7%). In the Muleba data, malaria prevention methods include use of mosquito nets (30.7%), clearing of bushes (12%), use herbalist (10.7%), drain stagnant water (10.0%), use mosquito coils (4.7%), good food or balanced diet (1.3%) and shutting doors early in the evening (1.3%). In both Biharamulo and Muleba data, the respondents are united in the opinion that malaria is caused by mosquitoes (90.6% in Biharamulo and 90.8% in Muleba) and this tends to give an indication of high awareness on the dangers posed by mosquitoes to human health. Other causes of malaria are given as taking evening walk (exposure?), elderliness, prsence of stagnant water, mixed food, change in weather conditions and sun rays.



In both the Biharamulo and Muleba data, children are indicated as the most vulnerable group followed by babies or infants. Respondents in Biharamulo data indicate the order of vulnerability to malaria as, children (71.3%), babies/infants (14.0%), all (7.3%), adults (6.7%), and adolescents (0.7%). In the Muleba data, the order is, children (45.3%), babies/infants (40.7%), adults (10.0%), all (3.3%), and adolescents (0.7%).



On malaria peak periods in the calendar year, the wet season (52.0% in Biharamulo and 52.0% in Muleba) has been singled out as the period when malaria is most common even though a small percentage (11.3% in Biharamulo and 31.3% in Muleba) of the respondents considers dry period as the malaria time or both wet and dry periods (34.0% in Biharamulo and 14% in Muleba) as possible malaria peak time. In the Biharamulo data, the general view on malaria is that of a severe disease as indicated by 97.3% of the respondents and only 2.7% saying no and in the Muleba data, 87.3% of the respondents indicate recognising malaria as a severe disease with only 11.3% indicating malaria is not a severe disease.



It seems to be the general view of respondents that the government should pay for the treatment of malaria (Biharamulo, 73.3% and Muleba 46.7%) although the Muleba data seems to suggest recognition by the respondents that they (34.7%) have to pay for treatment of malaria. On prevention of malaria, the family is seemingly the party considered as responsible (Biharamulo, 48% and Muleba, 48.7%) even if some still think it is the responsibility of the government (Biharamulo, 28% and Muleba, 40%).

In case of a member of the family having malaria, it is generally the opinion of the respondents in Biharamulo (98%) that the person should go to the health facility for treatment and in Muleba the view is seemingly the same as 96.7% of the respondents indicate the person should go to health facility. This is further supported by opinion on local herbalists ability to treat malaria where only 15.8% of the



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respondents in Biharamulo are in favour and 85.3% having no faith on the herbalists ability. There is increased faith in the ability of local herbalists to treat malaria in the Muleba data where 46.7% of the respondents believe the herbalist can treat malaria.

In general, most respondents tend to have a strong opinion on using bed nets when sleeping as indicated by 92% of respondents in Biharamulo and 66% of respondents in Muleba.

Action to be taken when one has malaria are clear in the data and no action is clearly not a popular option as expressed in the frequency scores below:

### Action to be taken in case of malaria

Action	Biharamulo		Muleba	
	Frequency	%	Frequency	%
Go to health facility	146	97.3	126	84.0
Treat at home	11	7.4	39	26.0
Visit herbalist	1	0.7	30	20.0
Do nothing	1	0.7	0	0.0

Action taken when children have malaria also does not include not doing anything and are as follows:

### Action to be taken when a child has malaria

Action	Biharamulo		Muleba	
	Frequency	%	Frequency	%
Go to health facility	145	96.7	126	84.0
Treat at home	8	5.3	35	23.3
Visit herbalist	1	0.7	25	16.7
Do nothing	1	0.7	0	0.0

When a child has malaria or an individual has malaria, the action on top of priority list is to go the health centre and this action has already been expressed early in the report.

In medicine used to treat malaria, opinions vary in names of drugs but there is a tendency to have a combination of 'on counter' pain killer drugs and known prescription anti-malaria drugs such as Fansidar, Metakelfin, Amodiaquine, chloroquine, Seprine, homaquine, malarquine, and the quinine family although some indicate use of herbs such as Marobaini (neem tree).

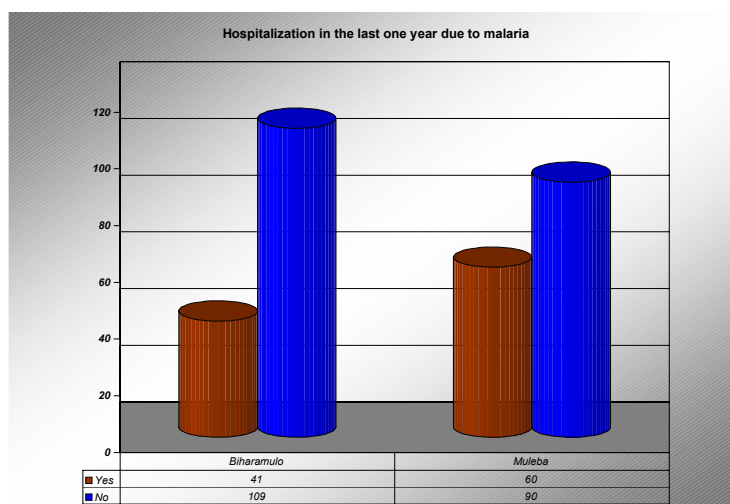
Effectiveness of control measures against malaria may be affected by household size. In the Biharamulo data, households' sizes range from 1 to 17 persons and the range in Muleba data are 1 to 14 persons. Use of bed nets is used to measure exposure to mosquito bites, which is the main cause of malaria according the respondents. Measure of bed nets use is in the form of number of bed nets in the households as compared to number of people spending the night. In The Biharamulo data, there are households that do not have bed nets (17.3% of the respondents) but most households have 1-4 bed nets, which does not compare well the large number of persons spending the nights. Muleba data exhibit a worse situation, where 86.7% of the respondents indicate no bed nets in the households, where bed nets are available, they are usually 1-2 nets as compared to a general number of 4-6 persons spending nights. It seems that bed nets use is more common in Biharamulo than in Muleba. In Muleba survey data, 87.3% of the respondents indicate that nobody in their households use bed nets, while there is an improved situation in the use of bed nets in Biharamulo with only 18.7% of the respondents indicating no use of bed nets.

Those using bed nets tend not to treat the nets with insecticides as 65.3% of the respondents indicate in the Biharamulo data, while 86.7% of respondents in Muleba data indicate that treatment of nets does not even arise since they do not use them. Where there are treatments of nets, it is likely to be once to twice a year. Treatment of nets with insecticides is clearly not a common practice in both the Biharamulo and Muleba data.

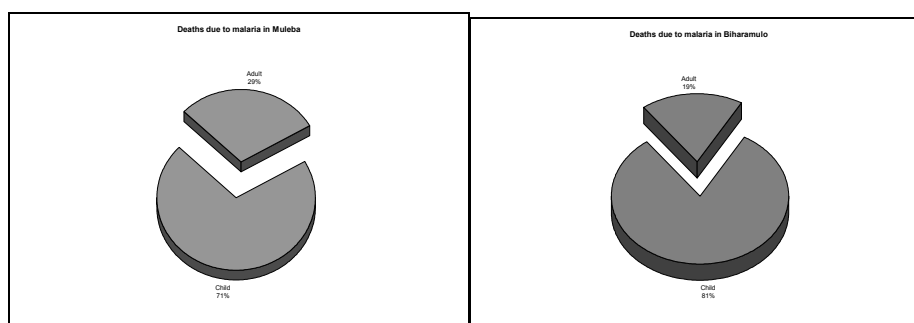
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Mosquito control measures in households in the Biharamulo data include use of mosquito coils (34.0%), bush clearance (22.0%), draining of stagnant water (19.3%), insecticides spray (16%) and screening of houses (12.0%) in that order. In Muleba survey data, the control measures are; use of house screening 19.3%), bush clearing (13.3%), drain stagnant water (10.0%), mosquito coils (7.3%), and spray with insecticides (5.3%).

Hospitalisation due to malaria tends not to be common in both Biharamulo (27.3%) and Muleba (40.0%) although Muleba data indicate a relatively high hospitalisation than in Biharamulo.



Deaths in households due to malaria cases tend to be rare events in both Biharamulo (10.7%) and Muleba (22.0%) data although it seems as if there are more deaths due to malaria in Muleba than in Biharamulo. In cases where deaths due to malaria in the last five years are reported, the majority of cases are children as is represented in the graph below.



### Diarrhoea and Cholera data

Diarrhoea and cholera issues are not indicated as focused on one particular survey area but from the data results seems to be focused on Biharamulo survey although the discussions are general since earlier indications have not shown report of cholera cases in both Biharamulo and Muleba data.

Good sanitation is one the major measures against diarrhoea and cholera and type of toilet used is crucial in the sector. Types of toilets used tend to be pit latrines in most cases as is indicated by 99.6% of respondents in Biharamulo and 84.6% of respondents in Muleba indicate respectively. Pit latrines if not located and constructed properly may pollute sub-surface water storage or nearby surface water systems, thus a danger to the health of the people. Use of bush as a toilet is one of the major health hazards especially in terms of infectious diseases such as cholera and diarrhoea and this practice seems to be also present in both survey areas.

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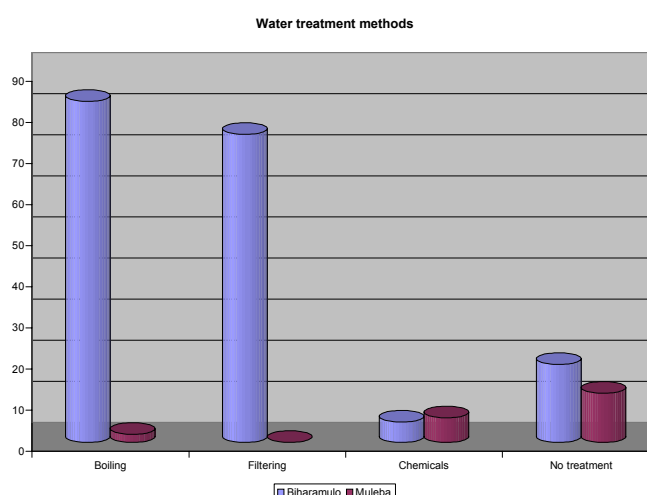
Access to sewage system is generally lacking in Biharamulo data as 97.3% of the respondents indicate no access and only 2.7% indicating some form of access. Access to sewage system is not even mentioned in the Muleba data, where only 8.7% have responded and all do not have access to sewage system.

Sanitation issues within an area are usually addressed through institutions but presence of such institutions are generally lacking in the two survey areas although Biharamulo data show the presence of such institutions. In Biharamulo, 45.3% of the respondents indicate presence of institutions dealing with sanitation.

Water is an essential element to the survival of living beings but can also be a source of diseases if not treated properly. There are many ways of treating water so as to make it safe for use and the respondents in the survey data for both Biharamulo and Muleba have given the following treatment preferences:

### Water treatment methods

Treatment	Biharamulo		Muleba	
	Frequency	%	Frequency	%
Boiling	83	55.3	2	1.3
Filtering	75	50.0	0	0.0
Chemicals	5	3.3	6	4.0
No treatment	19	12.7	12	92.3



Reasons for not treating water in Biharamulo are given as; tap water has decreased diarrhea, boiling water is tireless (is it tiring?) activity, HESAWA water safe, rain water safe, borehole water safe, water has no problem, fear to loose water taste, fuel is a problem to water treatment, no time to boil water, no utensils for boiling water, not used to boil water and boiling water is costly. In Muleba data, the reasons for not boiling water are given as; not used to boiling water, consider all water to be clean and safe, consider spring water to be safe and lack of boiling Utensils .It seems that those not treating their water are of the opinion that the water is safe especially if it is from rain water, spring, tap and borehole. Others think that boiling water makes water lose its taste or people are just not used to boiling water. Lack of fuelwood seems to be a major issue in the Biharamulo data and alternative fuel source should be offered to encourage people to boil water.

Awareness on the consequences of using untreated water is very high with Biharamulo recording 86.7% awareness and Muleba recording 84.6% awareness. The consequences are given in the table below and it is disease that is considered the major consequence (85.1% for Biharamulo and 91.7% for Muleba).

**Consequences of drinking untreated water**

<i>Consequences</i>	<i>Biharamulo</i>		<i>Muleba</i>	
	Frequency	%	Frequency	%
Disease	126	85.1	11	91.7
None	6	4.1	1	8.3
Don't know	16	10.8	0	0.0

Information on consequences of using untreated water tends to be received mainly through health service providers (46.0%), formal sources (30.0%), informal network (21.3%), media (18.0%) and community awareness programmes (9.3%) in Biharamulo. The Muleba data seems not to be reliable and it is as if cholera or diarrhea questions are not focused on Muleba survey area (see table below).

**Means of receiving information on consequences of drinking untreated water**

<b>Means</b>	<b>Biharamulo</b>		<b>Muleba</b>	
	Frequency	%	Frequency	%
Health service providers	69	46.0	5	38.5
Formal sources	45	30.0	4	30.8
Informal networks	32	21.3	3	23.1
Community awareness programmes	14	9.3	0	0.0
Media	27	18.0	0	0.0

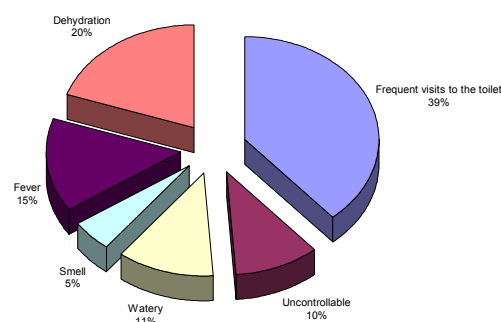
Washing of hands before meals is one of the main hygienic practices basic to protection against infectious diseases such as cholera and diarrhoea, and in the survey data 99.3% of the Biharamulo respondents and 100% of Muleba respondents do practice it but there is need to filter this further by focusing on the quality of washing hands.

Prevalence of a disease is usually measured within a time period and in this survey, the last five-year period is used to measure prevalence of diarrhoea in Biharamulo and Muleba areas. In the Biharamulo survey data, 45.3% of the respondents report diarrhoea occurrence amongst the household members while in Muleba the figure is 38.5%. This tends to suggest moderate prevalence of diarrhoea in Biharamulo and low prevalence in Muleba. For respondents to recognise a diarrhoea case, there are certain characteristics of the disease that can be used to describe it. In the survey data, the diarrhoea cases reported in the Biharamulo data and Muleba data have the following characteristic scores:

**Nature of Diarrhoea cases**

<b>Nature</b>	<b>Biharamulo</b>		<b>Muleba</b>	
	Frequency	%	Frequency	%
Frequent visits to the toilet	37	24.7	4	30.8
Uncontrollable	10	6.7	2	15.4
Watery	11	7.3	0	0.0
Smell	5	3.3	0	0
Fever	14	9.3	0	0.0
Dehydration	19	12.7	0	0.0

Nature of diarrhoea in Biharamulo



Diarrhoea as a communicable disease is transmitted through various interaction levels and how it is transmitted in the Biharamulo survey data are in terms of drinking water from lake (15.8%), bathing in lake (12.2%), eating food (10.1%), drinking piped water (2.2%), drinking pond water (0.7%), and attending funeral (0.7%). In Muleba data, causes of diarrhea are indicated as; after eating food and after drinking water. There seems to be many possible sources of diarrhoea in the two survey area especially water and food. These possible causes of diarrhoea can be summarised into two groups; use of untreated water and poor eating habits.

Where diarrhoea cases are reported in Biharamulo data, 29.3% of the respondents indicates the disease is life threatening and in the Muleba data, only 0.7% consider diarrhoea as life threatening. There seems to be some form of under stating severity of diarrhoea cases.

Awareness on cholera is seemingly very high in the two survey areas of Biharamulo and Muleba. In the Biharamulo environment, 96.0% of the respondents indicate they know of the disease cholera and in Muleba data, 92.3% indicate they know the disease. High awareness of a disease usually is an indicator of the disease having been experienced in a geographical area over duration of time. Awareness may also indicate a deliberate information campaign through official channels or through non-governmental organizations.

How cholera is transmitted according to the respondents is given in the table below:

#### Causes of Cholera

##### How one gets cholera

	Biharamulo		Muleba	
	Frequency	%	Frequency	%
Drinking untreated water	7	5.1	1	7.7
Eating contaminated food	63	46.0	0	0.0
Drinking untreated water/eating contaminated food	48	35.0	7	53.8
Don't know	19	13.9	5	38.5
Dirtiness	17	11.4*	0	0.0
Eating cold food	1	0.7*	0	0.0
Flies	1	0.7*	0	0.0

\*Additional information provided by respondents in Biharamulo survey.

When cholera strikes, there is need for urgent action and in the Survey data, most respondents are of the opinion that when one gets cholera, the right action is to take the person to the health facility (96.7% of respondents in Biharamulo and 84.6% in Muleba). Treating at home seems not to be a popular option (only 0.7% of respondents in Biharamulo data). In case of treatment at home, majority (76.8% in Biharamulo and all who have responded in Muleba) indicate not knowing what to do. Oral rehydration or giving fluids such as porridge seems to be the known method of treatment at home in case of Biharamulo data. These measures can be classified as first aid or emergency measures before proper

treatment at health facilities. This seems to suggest that even treatment at home indicated in the Biharamulo data can be just a stopgap measure before taking to health facility.

The weather conditions, which might promote cholera, are used as a measure of relation between weather conditions and cholera outbreak. Most respondents seem to suggest that cholera occurs mostly during wet weather conditions (94.0% in Biharamulo and 61.5% in Muleba data respectively). The opinion on weather condition promoting cholera occurrence seems to be at variance with the idea that cholera is most like to occur during period of low water supply usually associated with dry conditions.

To prevent the disease, respondents have suggested use of treated/boiled water, washing of hands before eating/after toilet (good hygienic practices) and covering food as the most important measures in the Biharamulo data. Other measures suggested by respondents in the Biharamulo data to prevent cholera include use of toilets (3.3%), and general cleanliness or hygiene (12%). In the Muleba data, drinking treated water and washing hands (30.8%) and general cleanliness (30.8%) are seemingly the preferred cholera prevention methods but washing hands after toilet visit is mentioned. What emerges from the question of how to prevent cholera is the recognition of using safe water and good hygienic practices especially washing hands.

A cholera episode requires immediate action to be taken and in the survey data, both Biharamulo and Muleba, the overall preferred action is to take the person to a health facility. In Biharamulo data, 96.6% of the respondents preferred taking to health facility and in Muleba data, the figure is 76.9%. The respondents in all cases seemingly have no alternative to taking the affected person to hospital and treating at home. This indicates awareness on the serious nature of cholera that is better handled at a health facility.

#### Action to be taken if cholera strikes

District	Action	Frequency	Percent
Buharamulo	Treat in a health facility	144	96.6
	Do nothing	4	2.7
	Treat at home	1	0.7
	Total	149	100.0
Muleba	Treat in a health facility	10	76.9
	Do nothing	2	15.4
	Treat at home/treat in health facility	1	7.7
	Total	149	100.0

The number of people affected by cholera in last outbreak can be used as a measure of the magnitude of the cholera problem last time round. In the survey, the question of number of people affected in households in the last outbreak of cholera focused on the Biharamulo data. The Biharamulo figures on number of people affected by cholera in last outbreak seem to suggest no cholera cases (94.7%) in the survey area and this indicates that last cholera outbreak was either an isolated event or the sampled households largely not affected (see table below). In cases where cholera is reported, the number tends to be only one individual (4.7%).

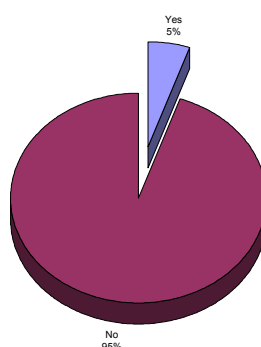
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# Number of people affected by cholera in homesteads

District		Frequency	Percent
Biharamulo	Valid	0	142
		1	7
		4	1
	Total	150	100.0

The low number of reported cholera cases above is further reinforced by few cases of visitation to health facility for cholera treatment. In Biharamulo data, 94.7% of the respondents indicate no visit to health facility for cholera treatment and only 5.3% report cases of health facility visit. This situation needs to be checked against hospital records as most respondents do go to health facilities when sick (earlier mentioned).

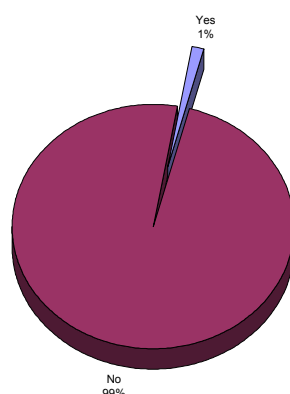
Visitation to health facility to treat cholera in Biharamulo



Cholera treatment at health facilities is considered further by analysing cases of hospitalisation (admission) of household members to health facility for cholera treatment. The Biharamulo data still indicate low hospitalisation cases since only 5.3% of respondents report hospitalisation due to cholera. This links to few visitation cases reported above.

Cost of treating cholera cases varies from 1880 to 30,000 Tanzania shillings in the Biharamulo data thus indicating low expenditure on cholera treatment. This may be linked to few cases of hospitalisation as well as few visitations to health facilities for cholera treatment. There is also need to take into account low income levels in the survey data, which may affect number of visits to health facility for treatment as well as what is spent on treatment of cholera. One would expect increased deaths due to cholera if there were few visits to health facilities for treatment of cholera. In the Biharamulo data, few cases of deaths due to cholera are reported with only 1.3% of respondents indicating deaths due to cholera. This should be seen in terms of reported cases of cholera in households, which is also very low (mentioned in previous paragraphs). If there were no cases of cholera in the first place then no deaths due to cholera should be expected.

Deaths due to cholera in Biharamulo



Of the reported cases of deaths due to cholera (2 in number), all are adults and tends to suggest that cholera in Biharamulo survey area affects adults more than children or it may be just a case of better hygienic conditions for children and increased risk exposure for adults.

#### Daily schedules for categories of household members

##### Normal daily schedule of female adult (4.am to 12 midnight)

Time	Biharamulo	Muleba
4 a.m – 6 a.m	Sleep	Wake up
6 a.m – 8 a.m	Wake up	Business
	At work	Farm work
	Brew beer	Home chores
	Business	
	Farm work	
	Home chores	
8 a.m – 10 a.m	Sewing	
	At work	Business
	Brew beer	Farm work
	Business	Home work
	Home chores	
10 a.m – 12.00 noon	Sewing	
	At work	Business
	Brew beer	Farm work
	Business	Fetch water
	Farm work	Cooking
	Home chores	
12.00 – 2 p.m	Sewing	
	At work	Lunch
	Brew beer	
	Business	
	Home chores	
	Farm work	
	Lunch	



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2 p.m - 4 p.m	At work Brew beer Business Home chores Farm work Lunch Sewing	Business Farm work Resting
4 p.m - 6 p.m	At work Business Brew beer Home chores Farm work Resting	Business Farm work Home chores
6 p.m - 8 p.m	At work Business Home chores	Home chores Farm work
8 p.m - 10 p.m	Business Home chores	Home chores Dinner
10 p.m - 12 midnight	Sleep	Sleep

**Normal daily schedule of male adult (4.am to 12 midnight)**

Time	Biharamulo	Muleba
4 a.m - 6 a.m	Sleep Wake up Fishing Wake up	Wake up
6 a.m - 8 a.m	At work Business Carpentry Farm work Fishing Herding animals Sleep Wake up	Business Carpentry Farm work Labour work Travelling Ufundi
8 a.m - 10 a.m	At home At work Business Carpentry Farm work Fishing Herding animals Resting	Business Carpentry Farm work Labour work Travelling Ufundi
10 a.m - 12.00 noon	At home At work Business Carpentry Farm work Fishing Lunch Herding animals Resting	Business Carpentry Farm work Herding animals Resting Labour work Travelling Ufundi

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12.00 – 2 p.m

At home  
At work  
Business  
Carpentry  
Farm work  
Fishing  
Lunch  
Herding animals  
Resting

Lunch  
Travelling

2 p.m – 4 p.m

At home  
At work  
Business  
Carpentry  
Farm work  
Fishing  
Lunch  
Herding animals  
Resting

Business  
Carpentry  
Farm work  
Resting  
Labour work  
Travelling  
Ufundi

4 p.m – 6 p.m

At home  
At work  
Business  
Carpentry  
Back home  
Farm work  
Fishing  
Herding animals  
Resting  
Visiting friends

Business  
Carpentry  
Farm work  
Herding animals  
Drinking beer  
Labour work  
Leisure  
Travelling  
Ufundi

6 p.m – 8 p.m

At home  
At work  
Business  
Back home  
Dinner  
Farm work  
Fishing  
Home chores  
Resting

Business  
Home chores  
Back home  
Drinking beer  
Leisure  
Herding animals  
Travelling

8 p.m – 10 p.m

At home  
At work  
Business  
Dinner  
Fishing  
Home chores  
Resting  
Sleep

Dinner  
Travelling

10 p.m – 12 midnight

At work  
Business  
Fishing  
Sleep

Sleep  
Travelling

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**Normal daily schedule of female child (4.am to 12 midnight)**

<b>Time</b>	<b>Biharamulo</b>	<b>Muleba</b>
<b>4 a.m – 6 a.m</b>	Sleep	Sleep
<b>6 a.m – 8 a.m</b>	Home chores School Wake up	Wake up School At home Farm work Playing Wake up
<b>8 a.m – 10 a.m</b>	Home chores School	Home chores School At home Farm work Fetch water Cooking Playing
<b>10 a.m – 12.00 noon</b>	Home chores School	School At home Lunch Lunch Playing
<b>12.00 – 2 p.m</b>	Home chores School	School At home Lunch Playing
<b>2 p.m – 4 p.m</b>	Lunch School	Lunch School Farm work Resting
<b>4 p.m –6 p.m</b>	Farm work Home chores Religious studies Tuition	Farm work Home chores Religious studies At home Playing
<b>6 p.m – 8 p.m</b>	Home chores Sleep Tuition	Home chores Back home
<b>8 p.m – 10 p.m</b>	Home chores Sleep	Home chores Sleep Dinner
<b>10 p.m – 12 midnight</b>	Sleep	Sleep

**Normal daily schedule of male child (4.am to 12 midnight)**

<b>Time</b>	<b>Biharamulo</b>	<b>Muleba</b>
<b>4 a.m – 6 a.m</b>	Sleep Wake up	Sleep
<b>6 a.m – 8 a.m</b>	At work School Sleep Wake up	School Sleep Wake up At home Playing
<b>8 a.m – 10 a.m</b>	At work School Wake up	School At home Farm work Playing

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10 a.m – 12.00 noon	At work School	School At home Farm work Playing
12.00 – 2 p.m	At work School	School At home Farm work Playing
2 p.m – 4 p.m	At work Lunch School	Lunch School
4 p.m – 6 p.m	At work Farm work Home chores Lunch Herding animals School Tuition	Farm work Lunch School At school Playing Resting
6 p.m – 8 p.m	Farm work Home chores Religious studies Sleep	Farm work Home chores Fetch firewood Playing School
8 p.m – 10 p.m	Home chores Sleep	Home chores Sleep Dinner
10 p.m – 12 midnight	Sleep	Sleep

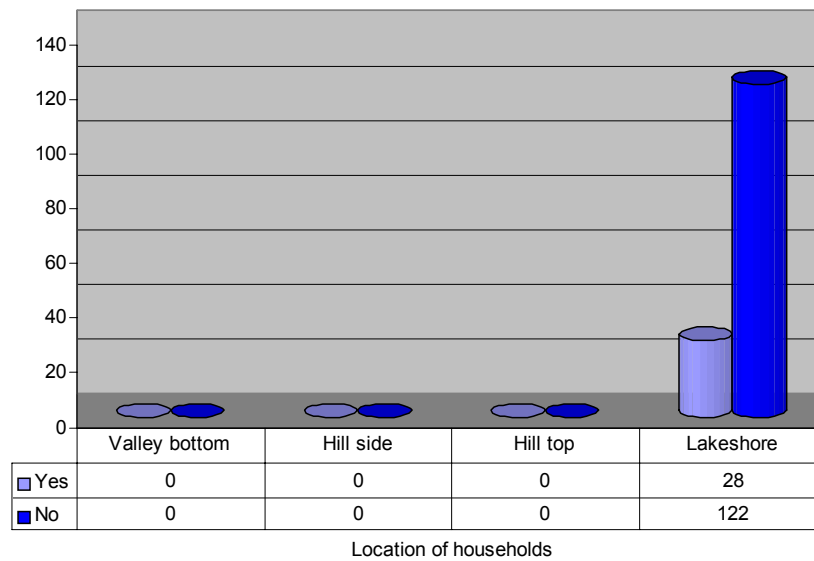
### Measures Associations

The location of a household in a given environment affects exposure or contact with conditions that may promote the occurrence of certain diseases. In this analysis attempt is made to associate the sitting of a household to the presence of stagnant water.

### Presence of stagnant water by location of households

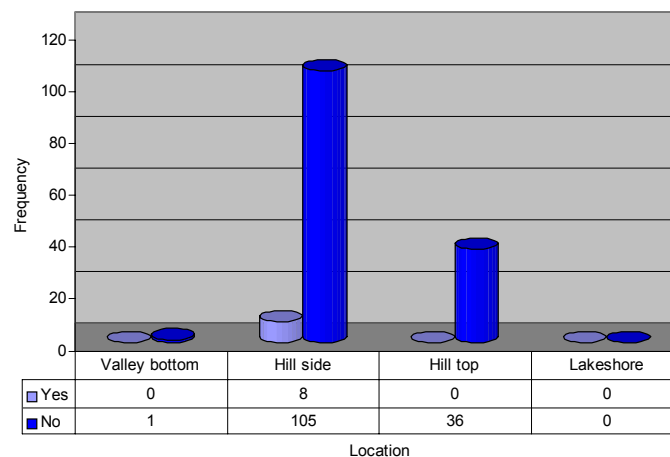
The figure below shows a cross-tabulation relationship between presence of stagnant water and location of households on the Biharamulo surface area. Indication from the figure below is that Biharamulo surface is largely a flat terrain on the lakeshore and location is not therefore important in terms of presence of stagnant water bodies near households. A large number of respondents in the Biharamulo data indicate lack of stagnant water bodies nearby yet the area is on the lakeshore. It is the stagnant water bodies that provide breeding ground for mosquitoes and therefore exposure to malaria.

Presence of stagnant water by location of households in Biharamulo



Muleba seems to be located in a hilly area with majority of respondents to be found on the hillside (113) and a few on the hilltop (36). A single household in the Muleba data is located on the valley bottom and zero on the lakeshore. Indication is that there are few stagnant water bodies in the Muleba survey area, and where there presence is indicated, they are likely to be near households on the hillside.

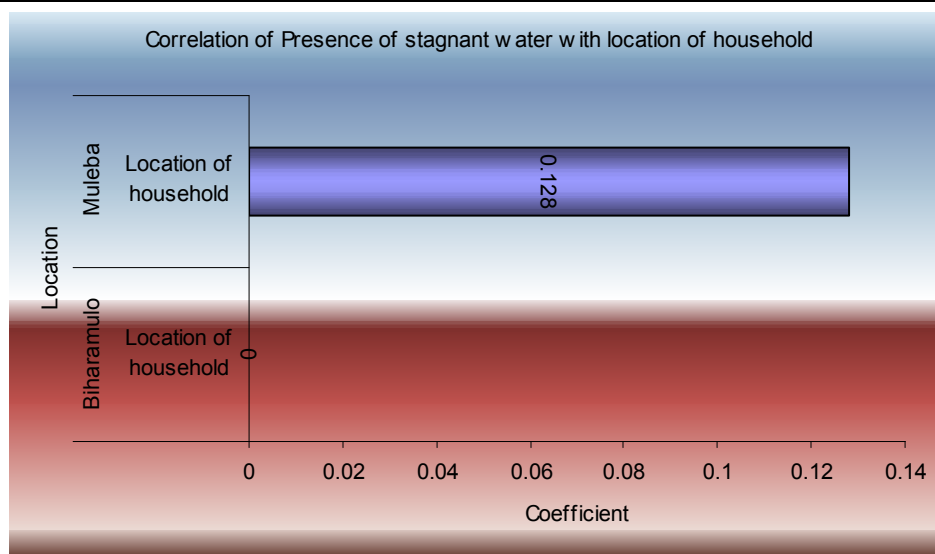
Presence of stagnant water by location of households in Muleba



A rank correlation statistics,  $r_s$ , (distribution free measure suitable for ordinal data association measure) is used to measure the strength of association between presence of stagnant water bodies and location of households. The results for Biharamulo indicate no correlation between presence of stagnant water and location of households since all households are on the lakeshore. This means that the presence of stagnant water bodies as indicated by 28 of the respondents cannot be attributed to variation in the location of the households. In the Muleba data, indication is that there is a weak and non-significant correlation between presence of stagnant water body and location of households (see table below). This means that the presence of stagnant water bodies near households in Muleba data are not solely due to location and presence of stagnant water bodies are likely to be chance events. That is, other factors not included in the survey data may help to explain the presence of water bodies in Muleba data and since most households are on the hillside where stagnant water are geographically not expected due to good drainage on sloping surfaces, there is need to identify factors behind the presence of water bodies near some households in Muleba.

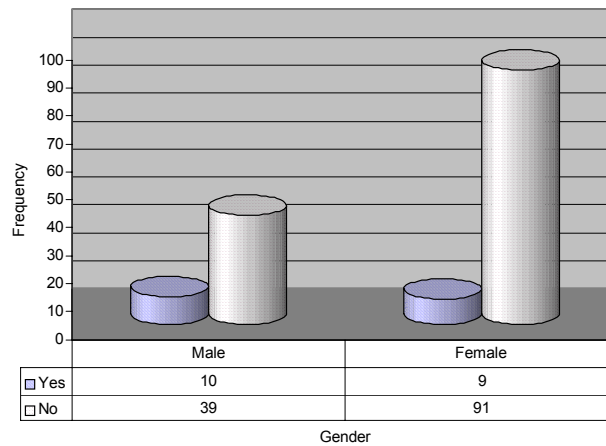
**Correlation (Spearman's) of presence of stagnant water by location of household**

District				Presence of stagnant water?
Biharamulo	Spearman's rho	Location of household	Correlation Coefficient	.
			Sig. (2-tailed)	.
			N	150
Muleba	Spearman's rho	Location of household	Correlation Coefficient	.128
			Sig. (2-tailed)	.118
			N	150

**Source of income by socio-economic variables**

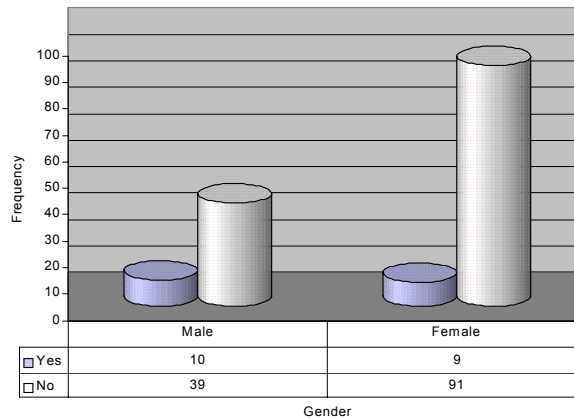
Assumption is made that socio-economic variables do affect opportunities in economic well being. In this study, the socio economic variables used to test this assumption are gender, education level, marital status and age as they relate to source of income, which is a factor in level of income. In Biharamulo data, gender seems not to be a factor in formal employment as source of income since most of those included in the study are females and in all gender cases, formal employment as source of income is lowly ranked as indicated in the figure below.

Formal employment as source of income by gender (Biharamulo)

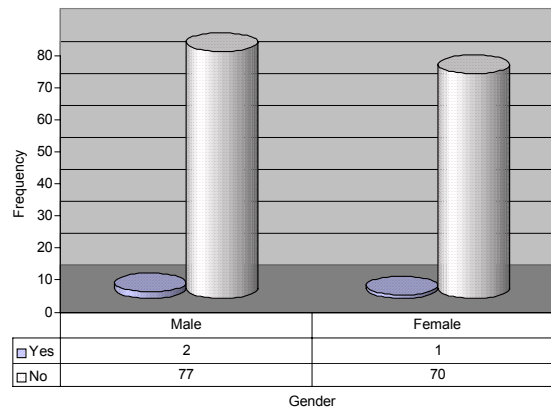


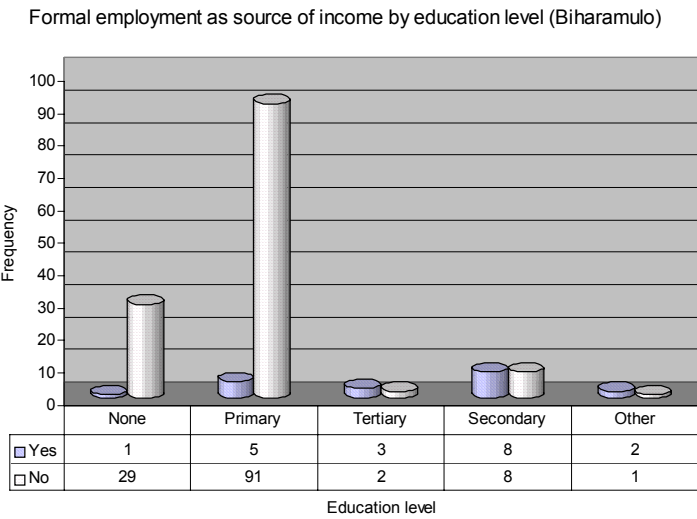
In the Muleba survey data, there is no improvement in formal employment position as source of income even if the number of males seems to be slightly better than that of females (see figure below). What seems to emerge from the two survey areas is the fact that formal employment is not a major source of income.

Formal employment as source of income by gender (Biharamulo)



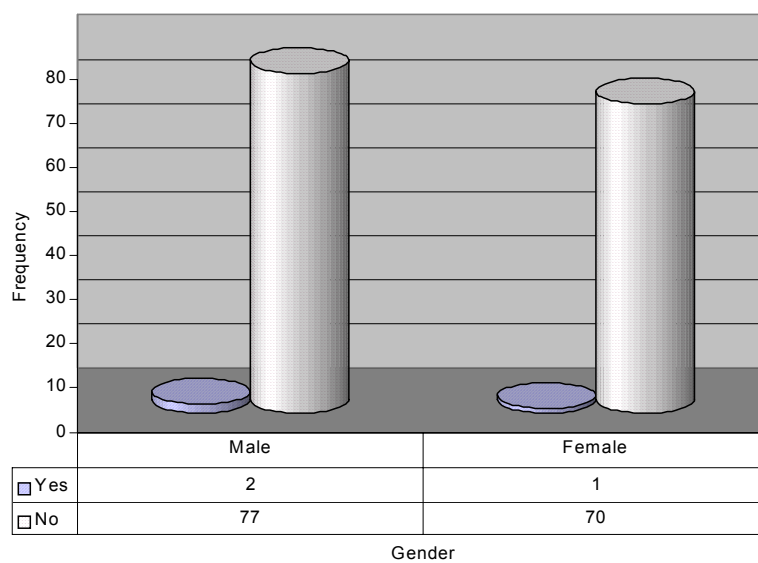
Formal employment as source of income by gender (Muleba)



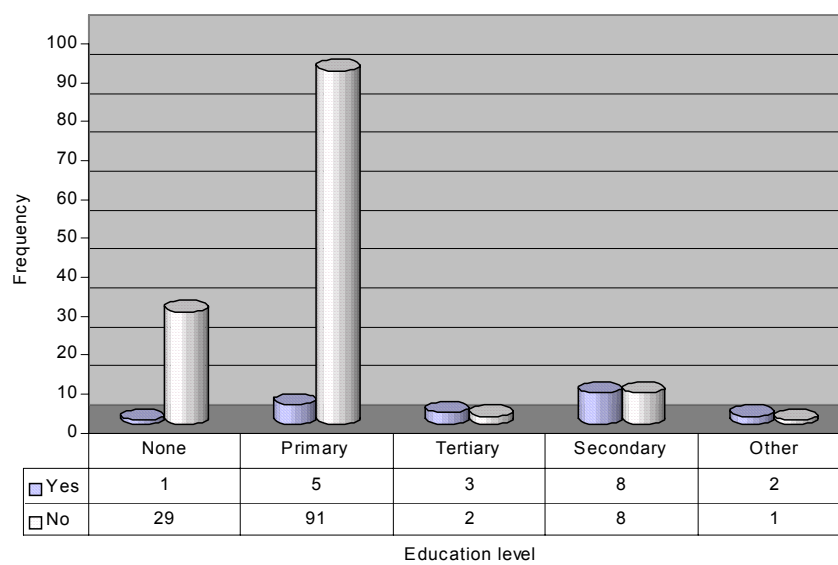




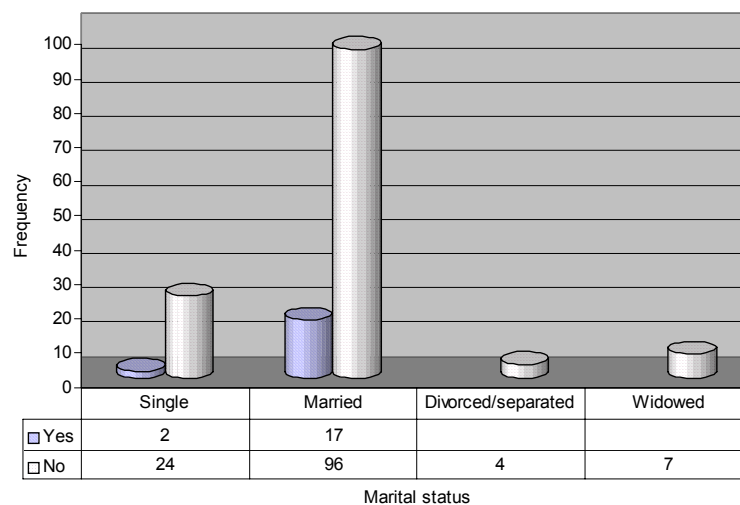
Formal employment as source of income by gender (Muleba)



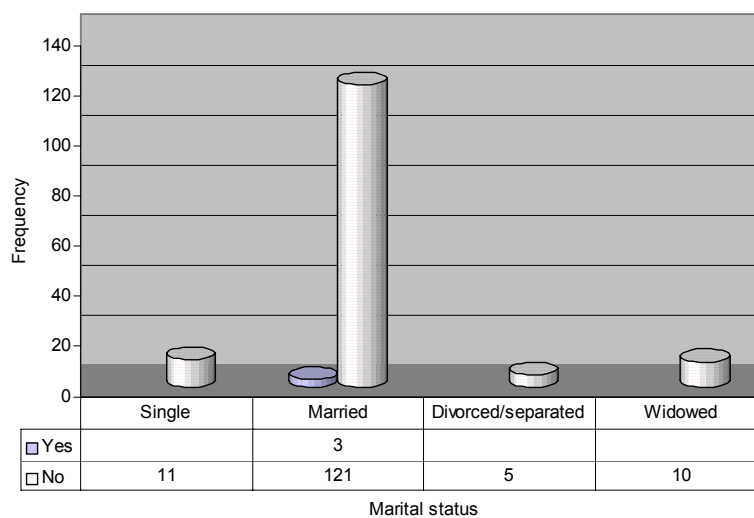
Formal employment as source of income by education level (Biharamulo)



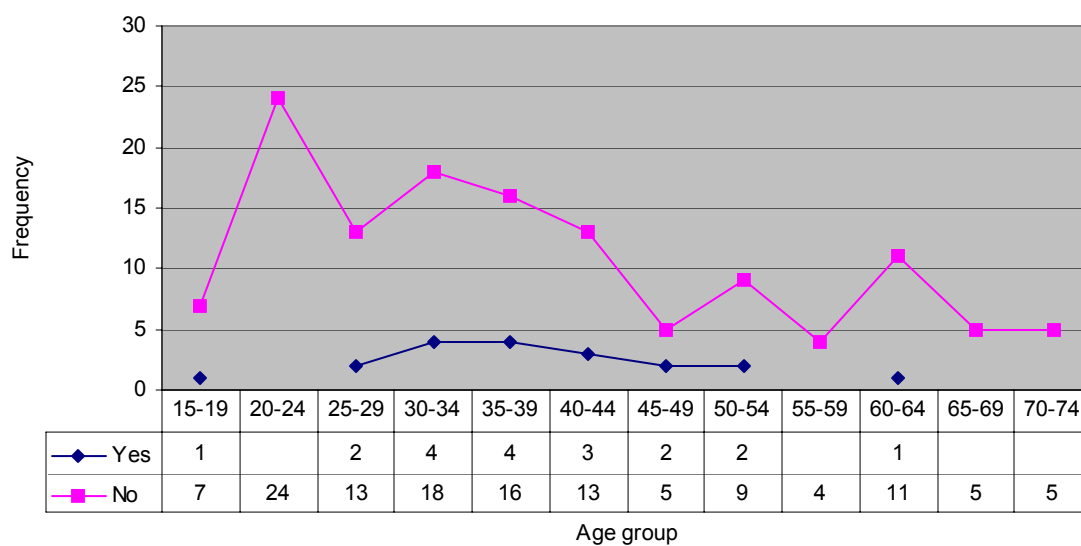
Formal employment as source of income by marital status (Biharamulo)



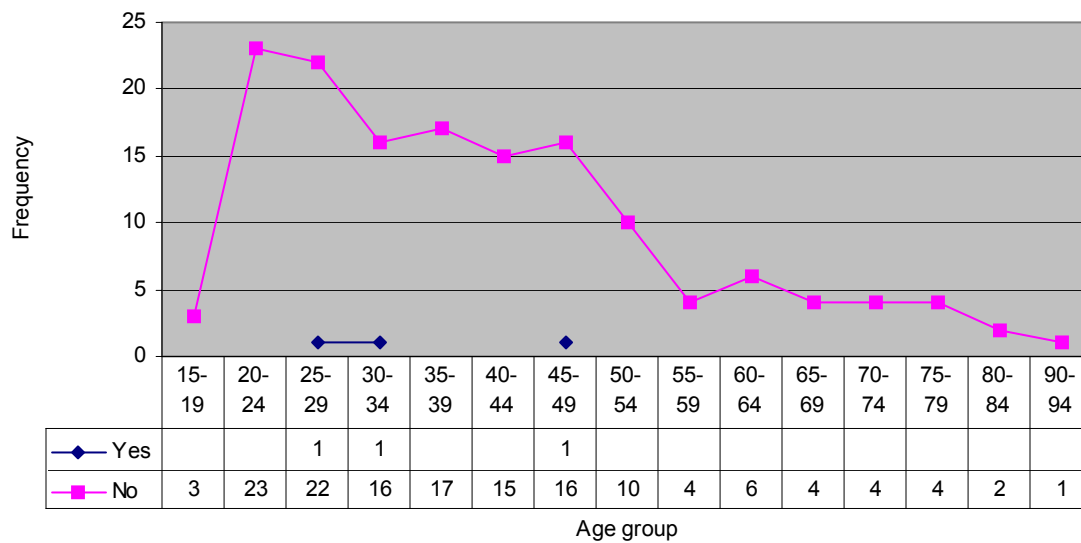
Formal employment as source of income by marital status (Muleba)



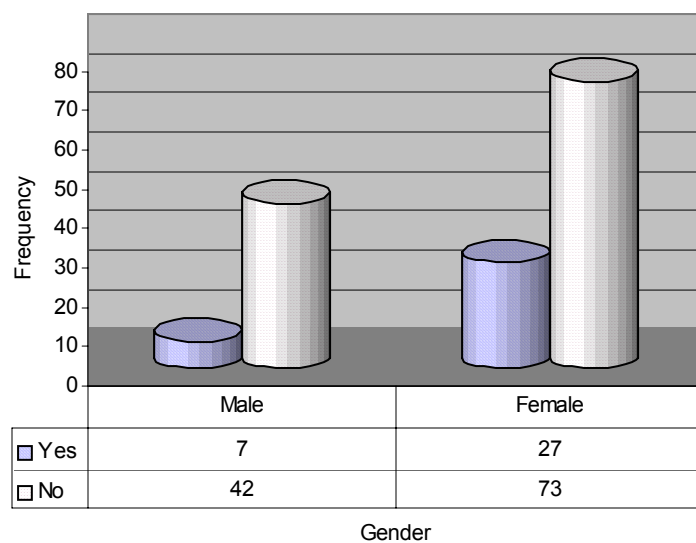
Formal employment as source of income by age (Biharamulo)



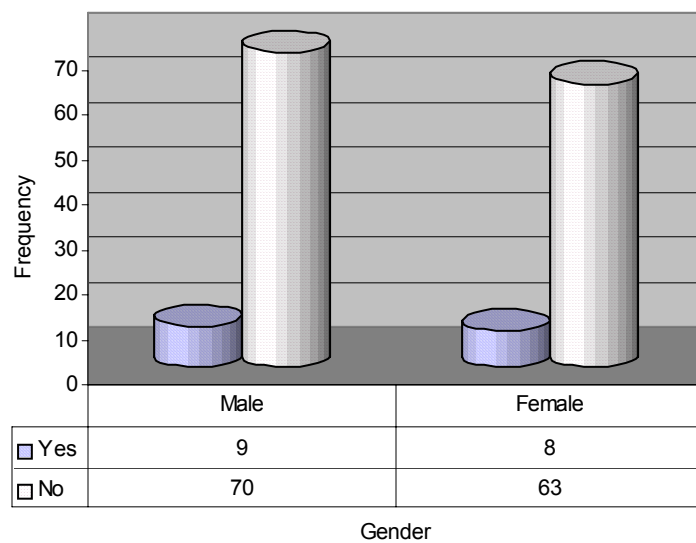
Formal employment as source of income by age (Muleba)



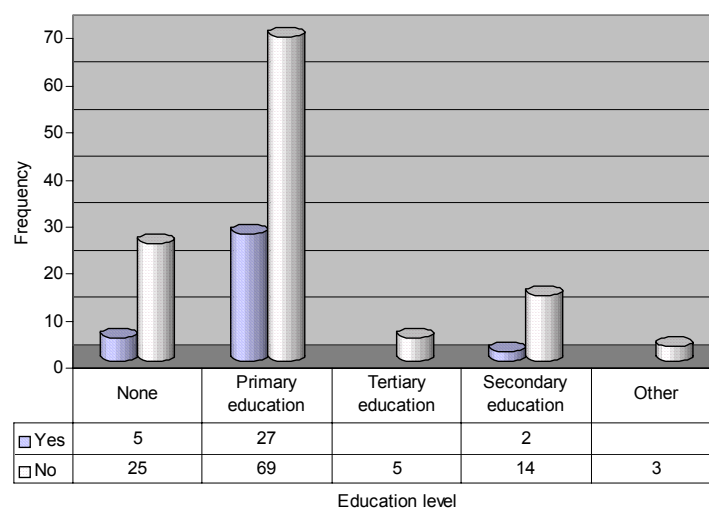
Self-employment as source of income by gender (Biharamulo)



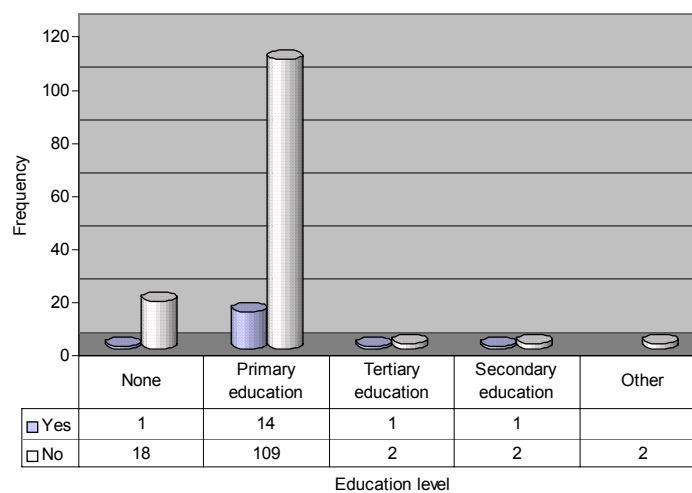
Self-employment as source of income by gender (Muleba)



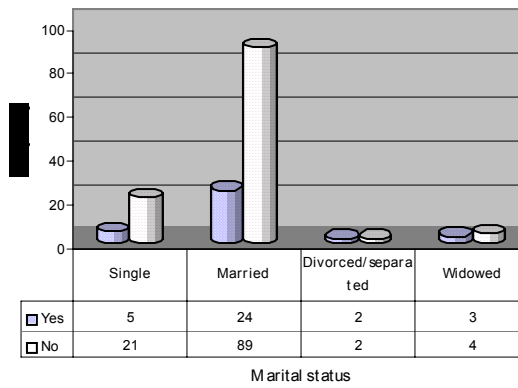
Self-employment as source of income by education level (Biharamulo)



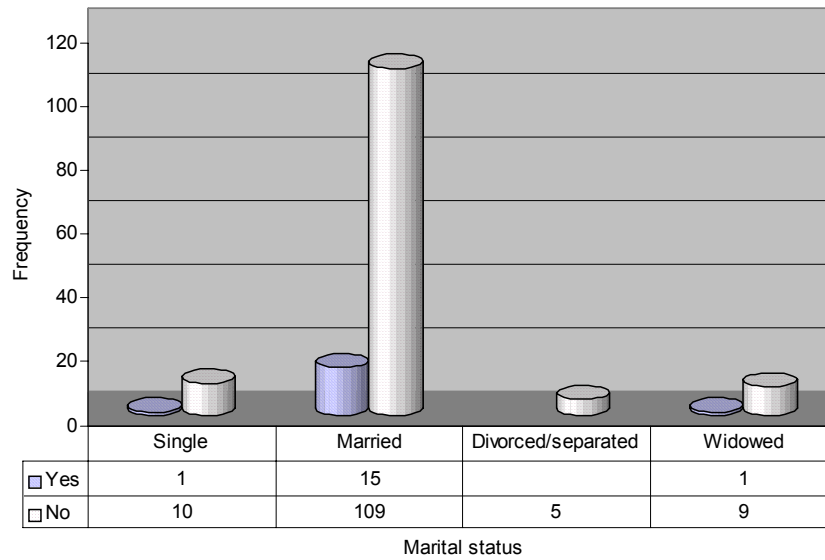
Self-employment as source of income by education level (Muleba)



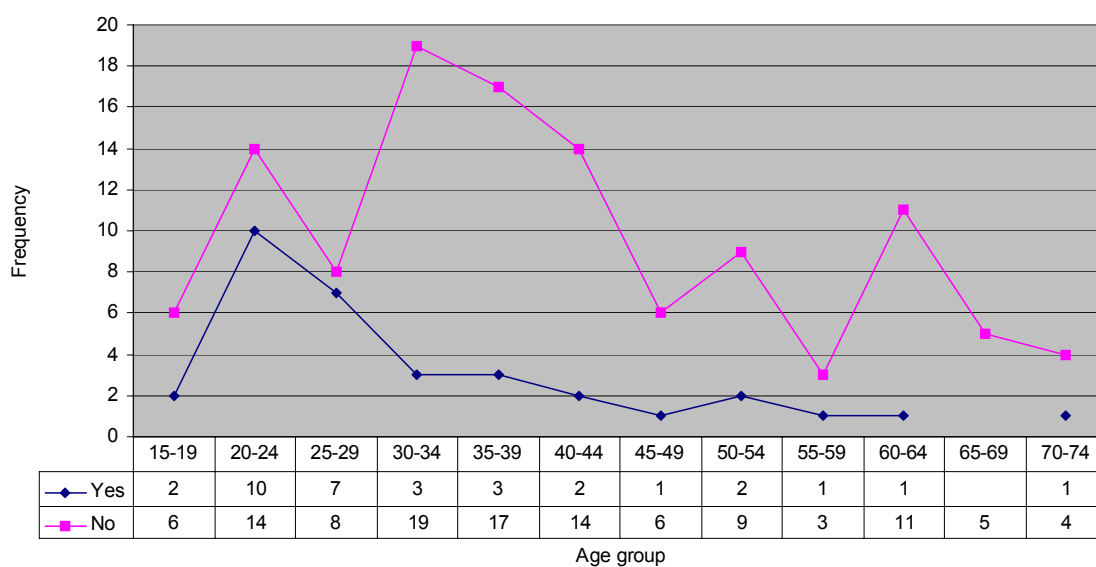
Self-employment as source of income by marital status (Biharamulo)



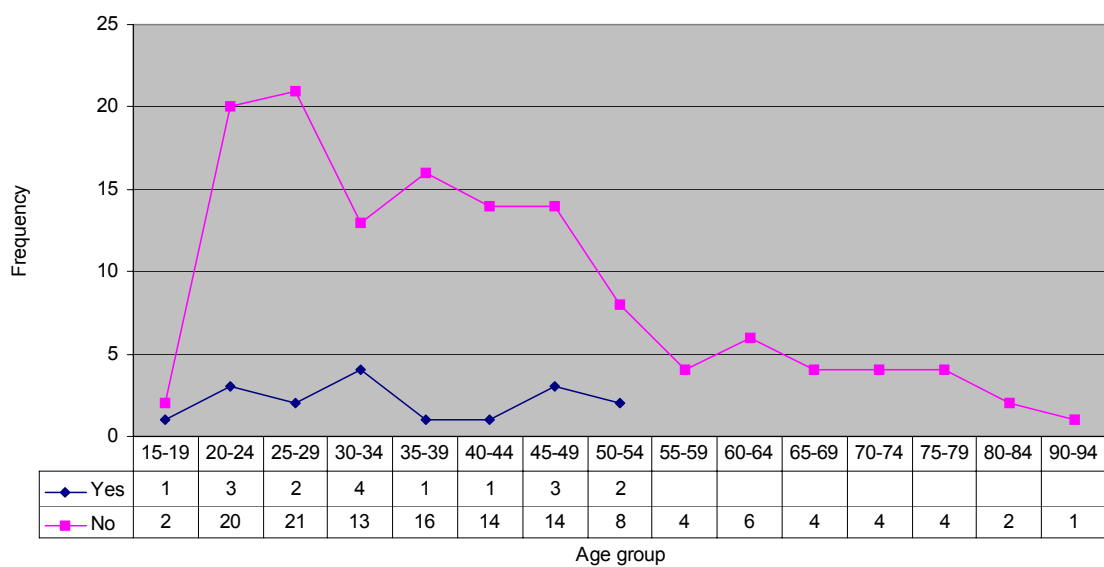
Self-employment as source of income (Muleba)



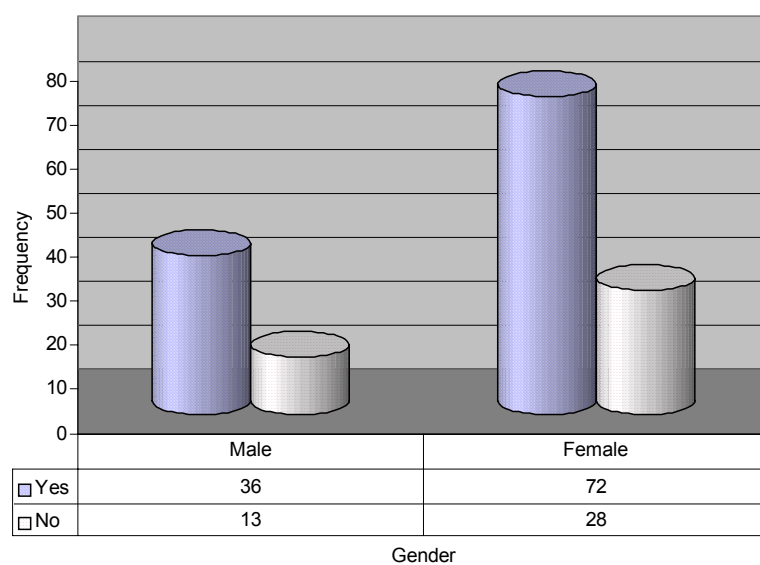
Self-employment as source of income by age (Biharamulo)



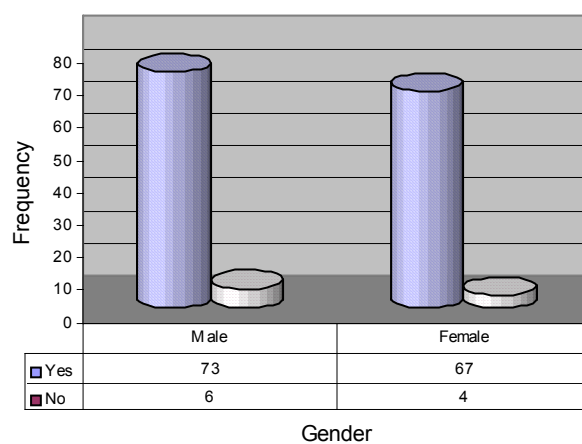
Self-employment as source of income by age (Muleba)



Farming as source of income by gender (Biharamulo)

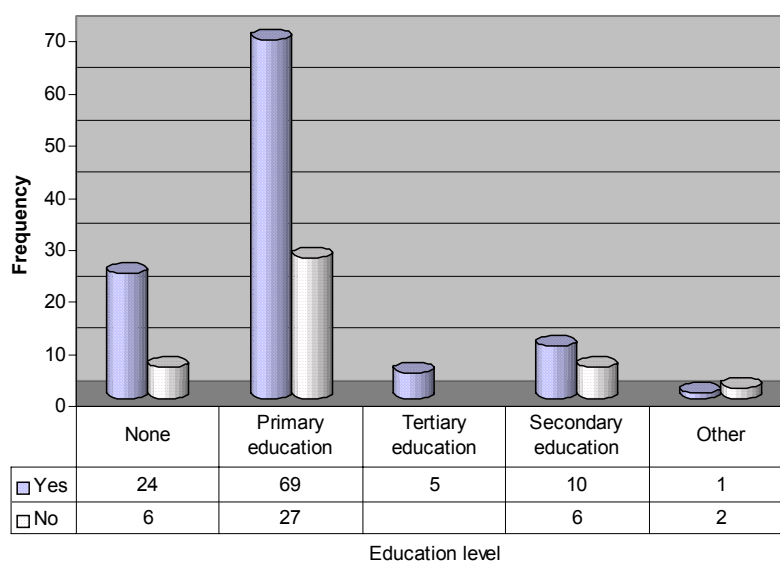


Farming as source of income by gender (Muleba)

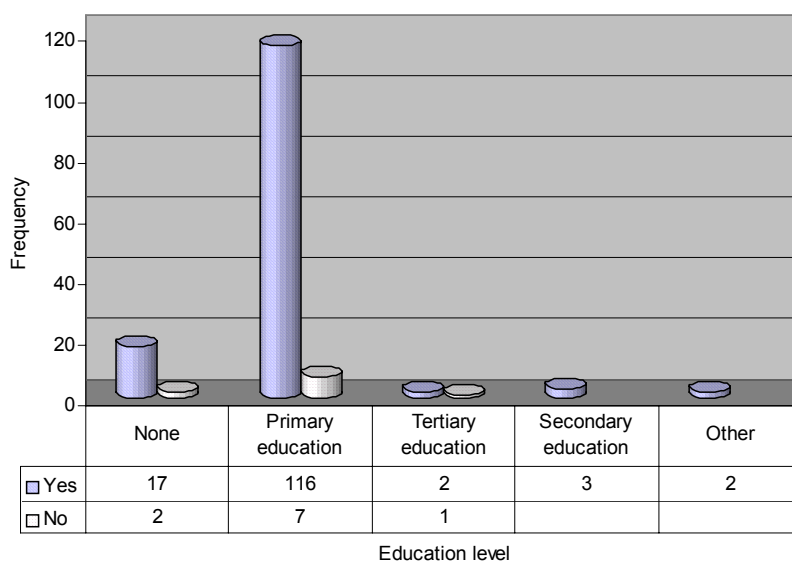




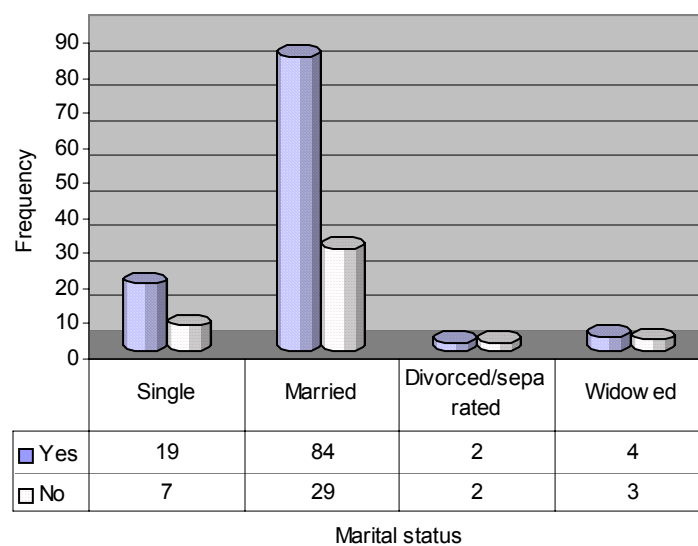
Farming as source of income by education level (Biharamulo)



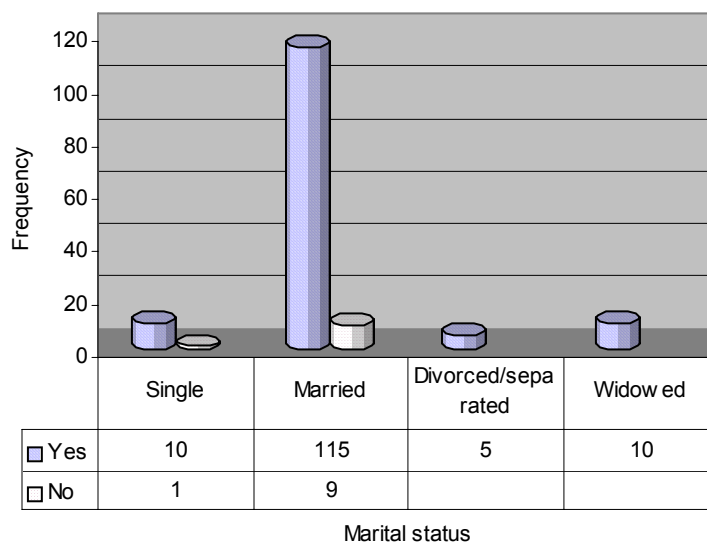
Farming as source of income by education level (Muleba)



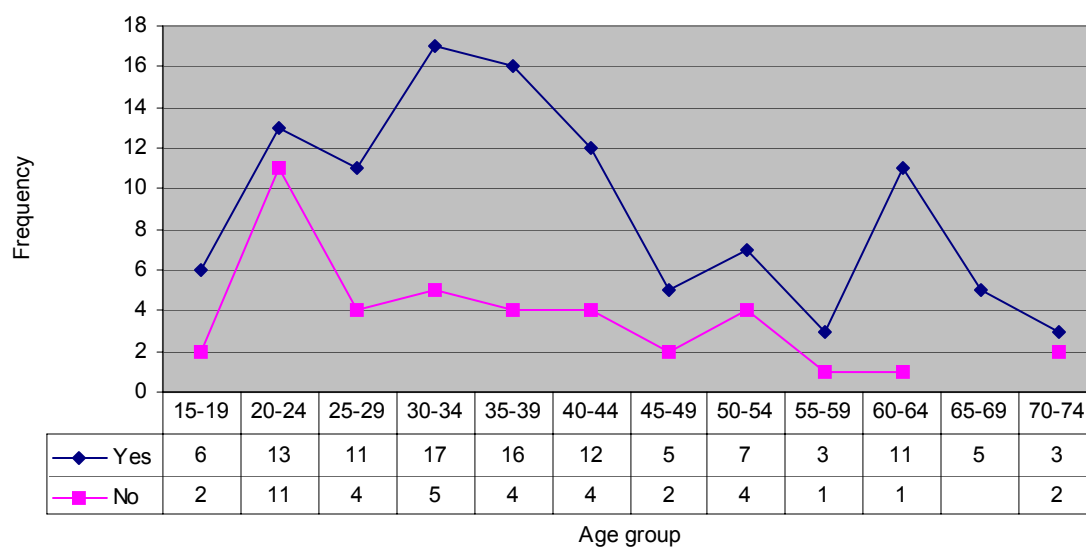
Farming as source of income by marital status (Biharamulo)



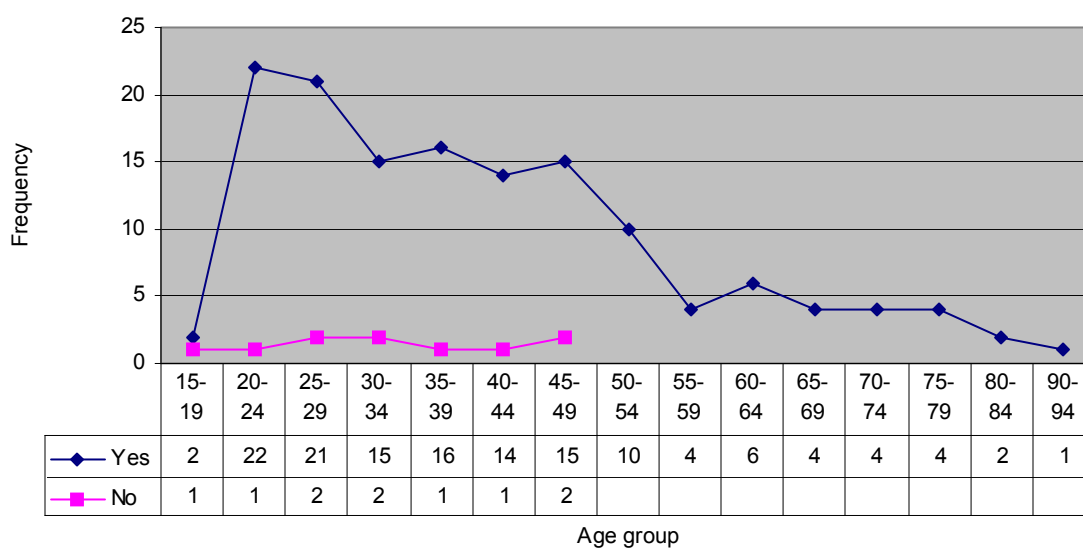
Farming as source of income by marital status (Muleba)



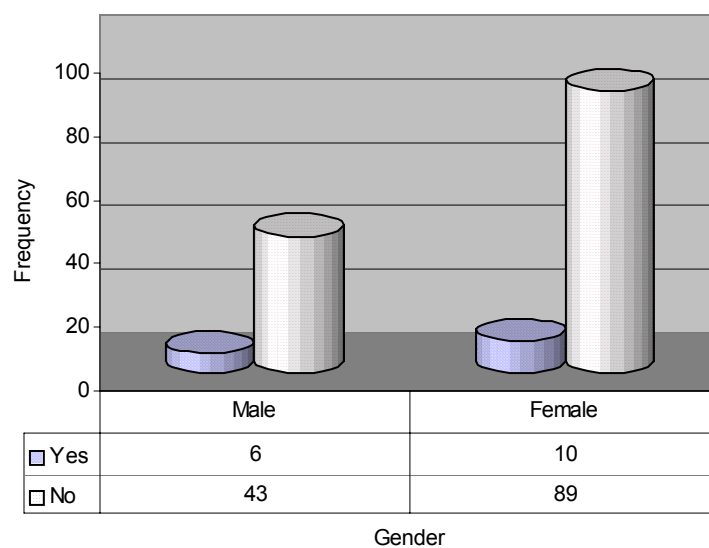
Farming as source of income by age (Biharamulo)



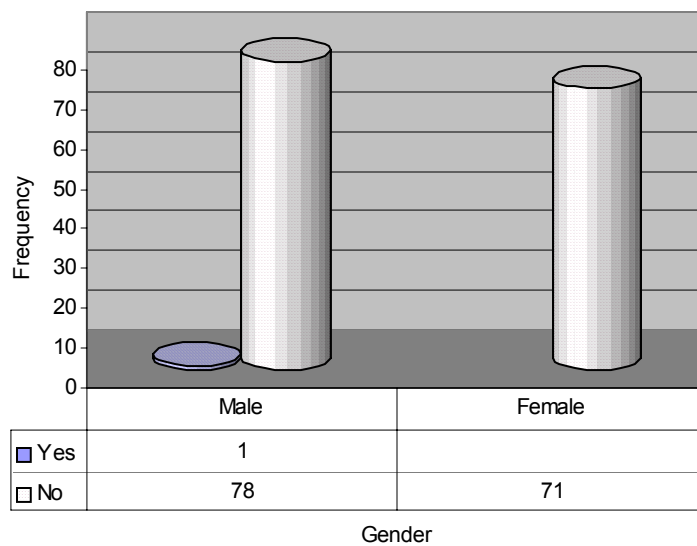
Farming as source of income by age (Muleba)



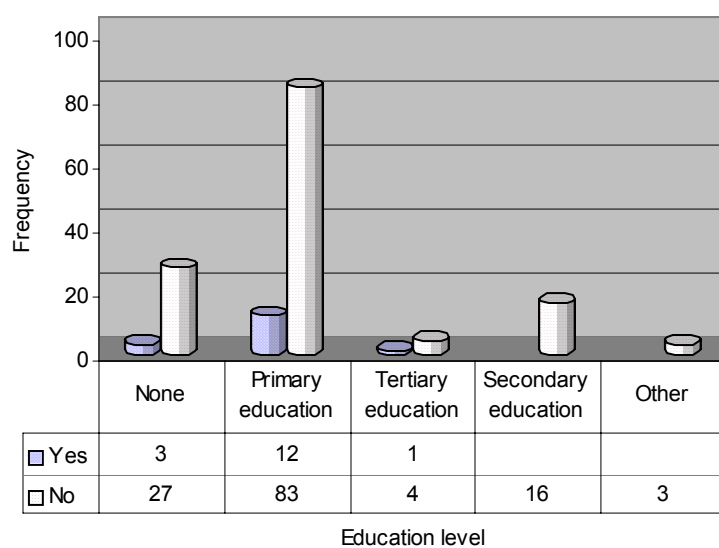
Fishing as source of income by gender (Biharamulo)



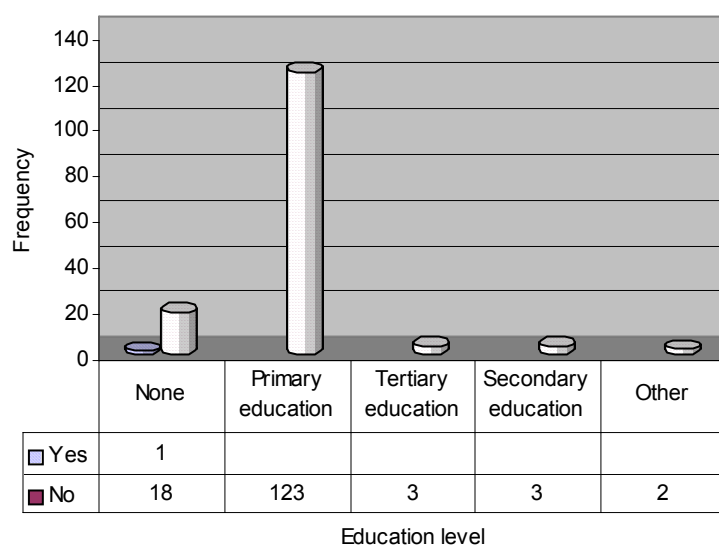
Fishing as source of income by gender (Muleba)



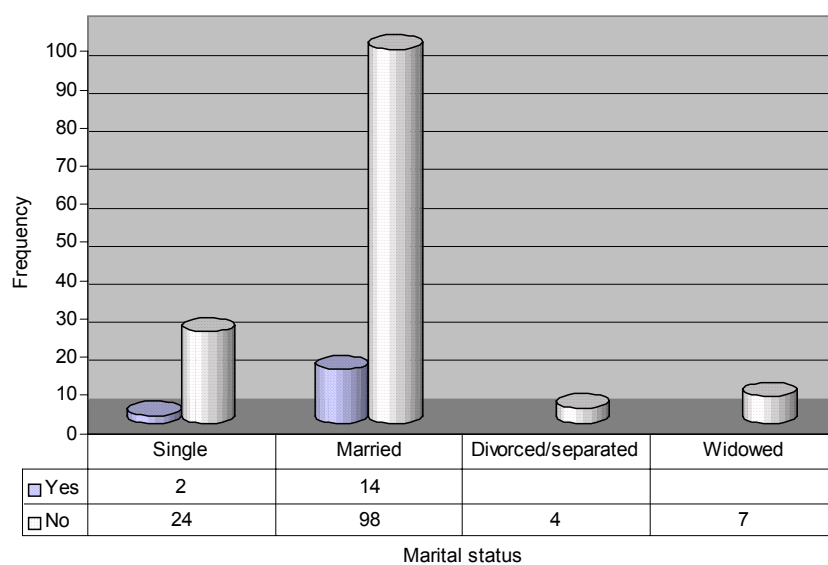
Fishing as source of income by education level (Biharamulo)



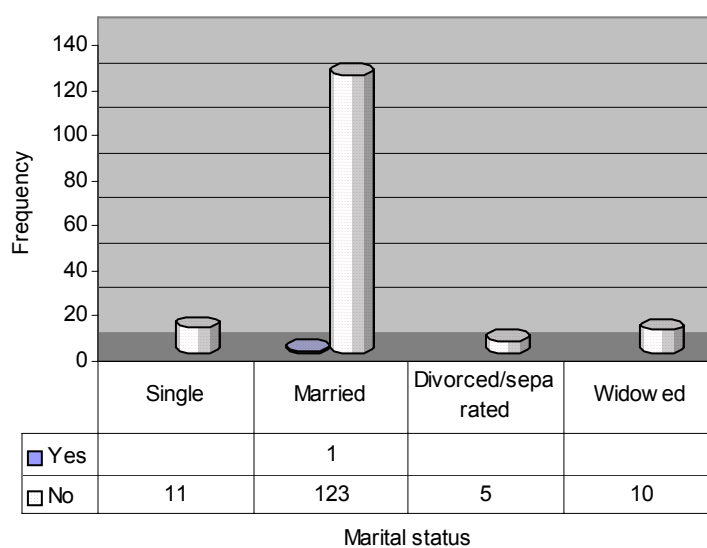
Fishing as source of income by education level (Muleba)



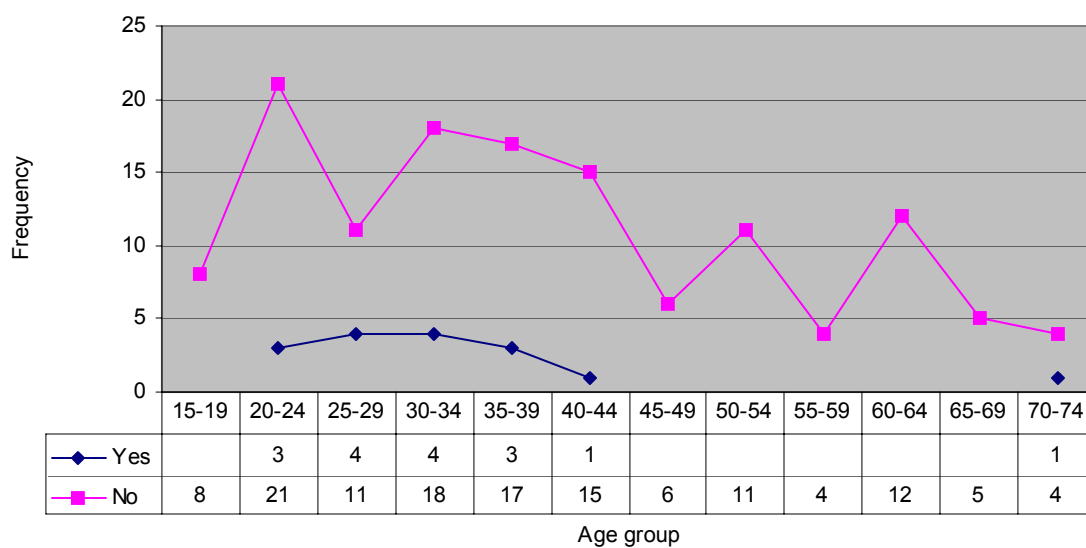
Fishing as source of income by marital status (Biharamulo)



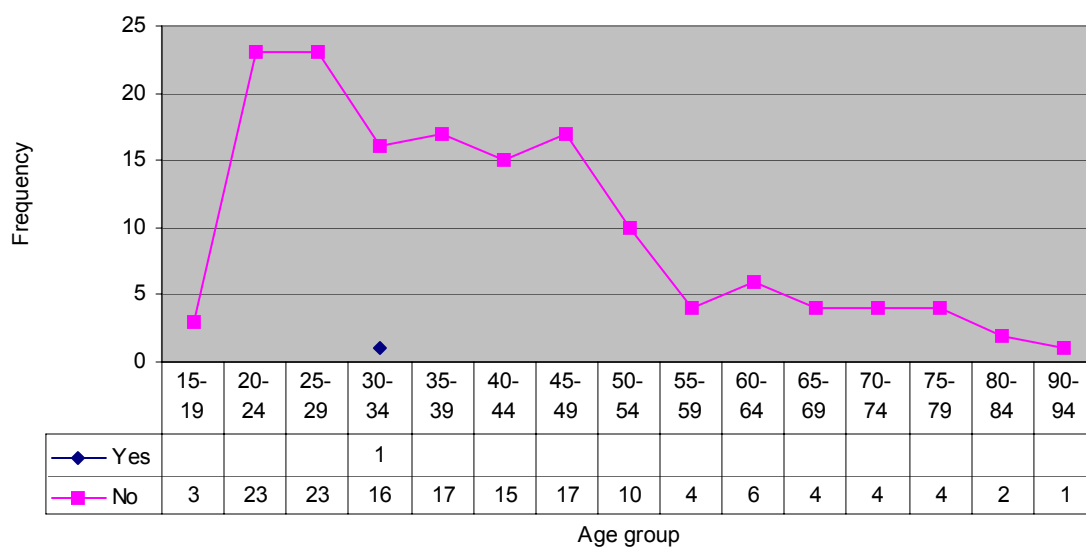
Fishing as source of income by marital status (Muleba)



Fishing as source of income by age (Biharamulo)



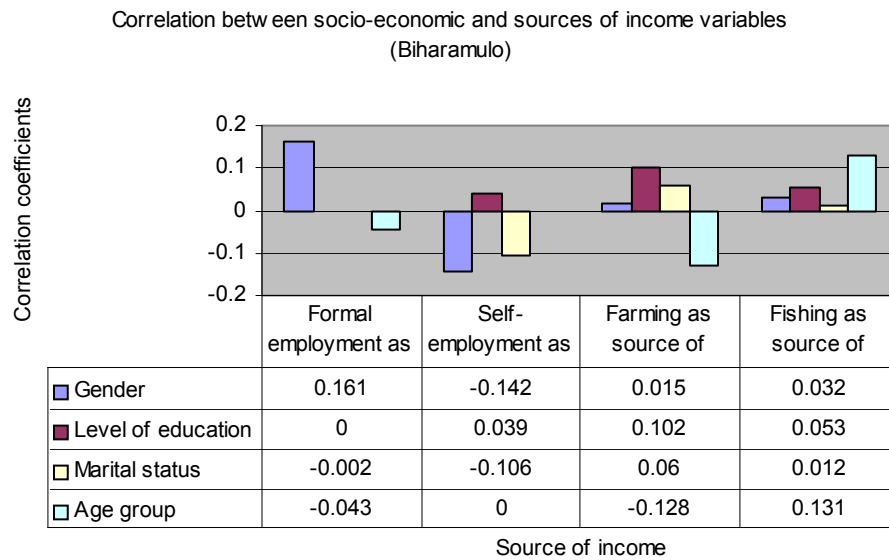
Fishing as source of income by age (Muleba)



Statistical measures of association give indication to the strength of association and significance of the observed association. Where data measurements are not at the interval or ratio scale levels, it is advisable to use non-parametric inferential statistics. In this survey data analysis, a powerful measure of association that has been selected is the Spearman's rank correlation,  $r_s$ , which has 91% efficiency of the power of Pearson's product moment correlation.

### Socio-economic variables by sources of income

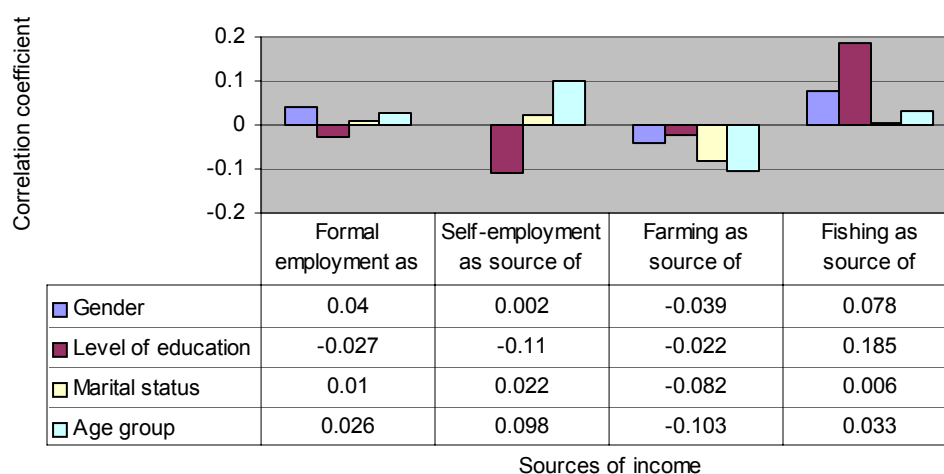
In this survey data, socio-economic variables are gender, level of education, age and marital status. These variables are hypothetically taken to affect the type of economic activities individuals in the societies included in the survey (Biharamulo and Muleba). The economic activities used in the survey are the sources of income, which include formal employment, self-employment, farming and fishing, primarily. In the Biharamulo survey data, the Spearman's rank correlation results indicate socio-economic variables of levels of education and age as the ones with significant correlation with sources of income of formal employment and self-employment respectively. Level of education has  $r_s$  coefficient with formal employment, which is negative (-0.420), and is significant at  $\alpha = 0.01$  (2-tailed) while age has a weak positive correlation (0.235) and is significant at  $\alpha = 0.01$  (2-tailed). This picture is presented graphically in the figure below.



In the Muleba survey data, Spearman's correlation analysis results indicate that the socio-economic variable with significant correlation with sources of income is level of education. The level of education has a weak (0.185) but significant ( $\alpha = 0.05$ , 2-tailed test) correlation with fishing as source of income. This means that even if there is significant correlation between level of education and fishing as source of income, the correlation is weak and therefore there are other major factors dictating the role of fishing as source of income.



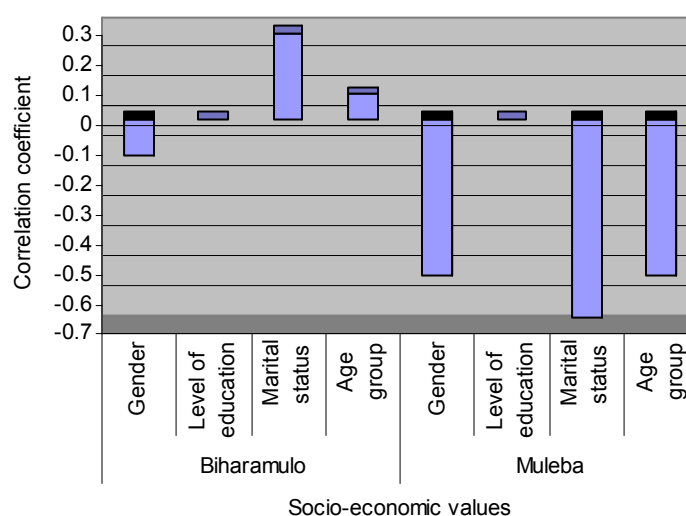
Correlation of socio-economic and sources of income variables (Muleba)



### Socio-economic variables by total monthly household income

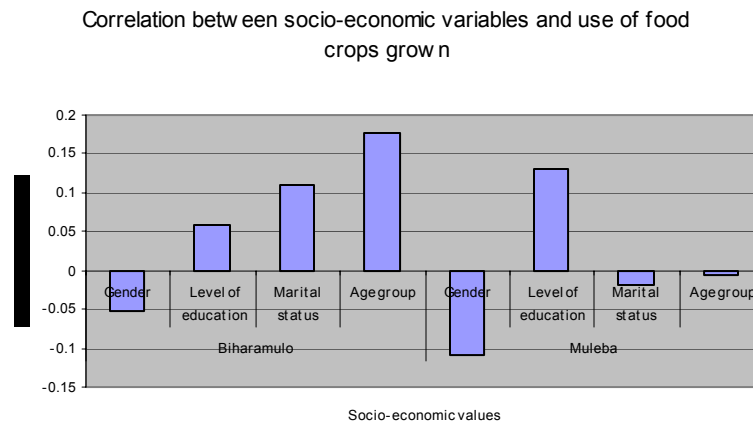
The assumption that socio-economic variables affect sources of income is by extension used to make assumption on the effects on total monthly incomes of households. It is only in the Biharamulo survey data that one socio-economic variable, level of education, has a strong positive and significant relation with total income for households per month. In the Biharamulo data, the Spearman's correlation coefficient is 0.613, which is significant at  $\alpha = 0.01$  (2-tailed test). In the Muleba data strong but negative correlations are recorded for gender (-0.525), marital status (-0.664) and age (-0.522) but in all cases not significant. This means that in the Muleba data, the association between socio-economic variables and total income of households per month is pure due to chance as there are other variables not included in the model that explain the total income.

Correlation of socio economic variables and Total income for households per month



### Socio-economic variables by use of food crops grown

Since some socio-economic variables affect sources of income and by extension total income of households, they can be assumed to affect the use of food crops grown. Spearman's correlation analysis indicate that in general there are weak correlations although in Biharamulo data, age has a weak correlation (0.176) but significant at  $\alpha = 0.05$ , 2-tailed). The overall results are presented in the figure below.

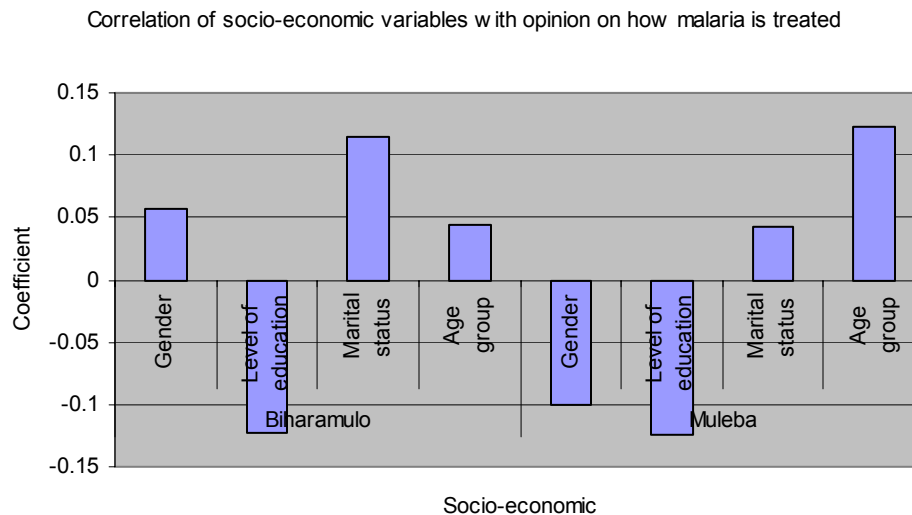


### Socio-economic variables by land ownership

One of the main sources of income in the survey data as a whole is farming. The analysis of data has taken into consideration the assumption that socio-economic variables affect land ownership in the study area. In the Biharamulo data correlation analysis, all the socio-economic variables have a weak association with land ownership and all the coefficients are insignificant when subjected to 2-tailed t-test. This means that the observed associations are due to chance and there are other variables that need to be used in the land ownership model, such as past government policy on land ownership.

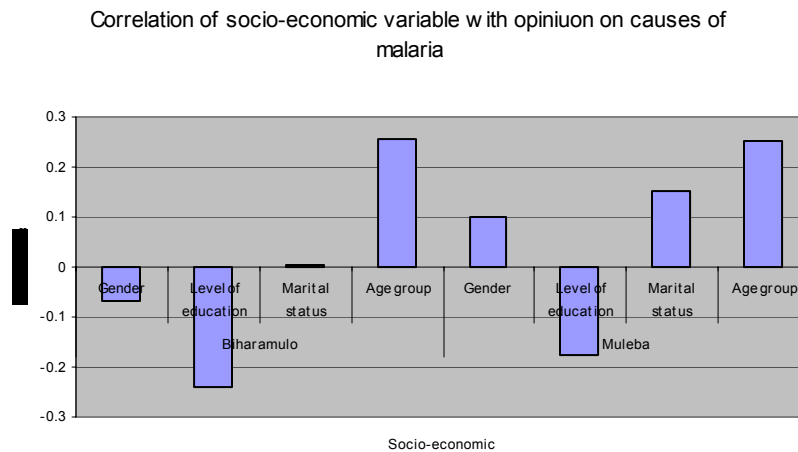
### Socio-economic variables by opinion on how malaria is treated

Socio-economic variables also tend not to have significant effect or association with opinion on how malaria is treated (see graph below).



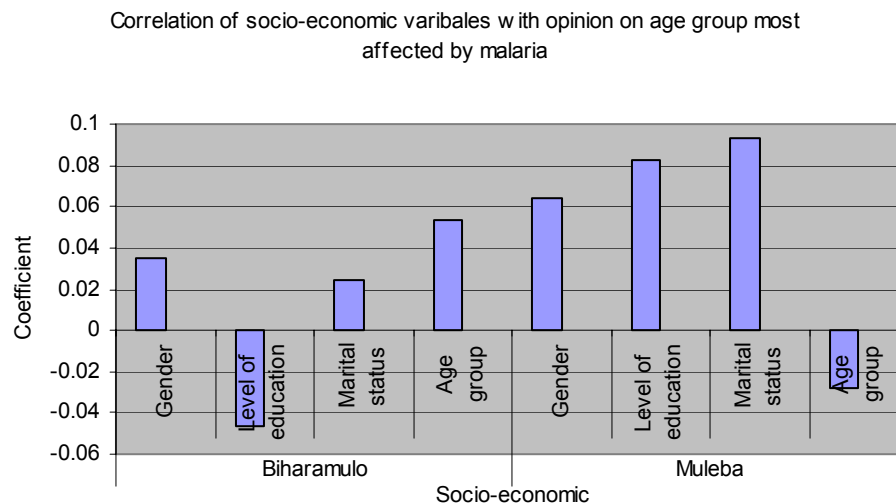
### Socio-economic variables by opinion on cause of malaria

On causes of malaria, two socio-economic variables of age and level of education, have significant association. In the Biharamulo survey data, level of education has a weak negative (-0.240) correlation but significant at  $\alpha = 0.01$ , 2-tailed test, while age has a weak positive correlation (0.258) significant at  $\alpha = 0.01$ , 2-tailed test. Muleba data indicate that age and level of education have significant correlation with opinion on causes of malaria, where age has a weak positive correlation (0.254) significant at  $\alpha = 0.01$ , 2-tailed test while level of education has a weak negative correlation (-0.175) significant at  $\alpha = 0.05$ , 2-tailed. This means that even if age and level of education have a role to play on opinion on causes of malaria, there are other important variables not included in the model.



### Socio-economic variables by opinion on age group most affected by malaria

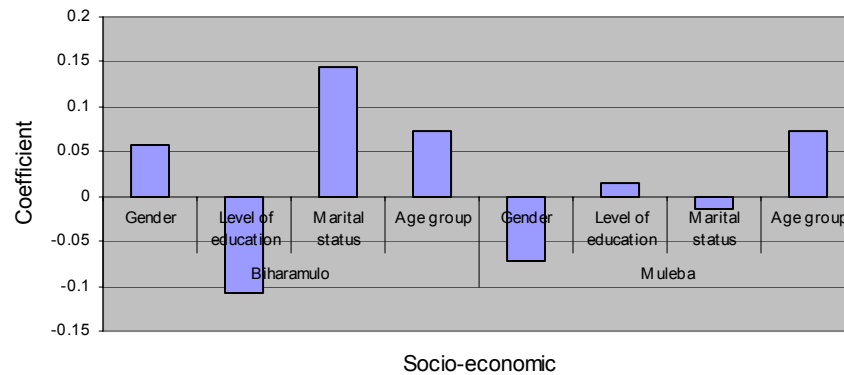
Opinion on age group most affected by malaria seems to have no significant correlation with socio-economic variables and any association observed is due to chance (random event).



### Socio-economic variables by opinion on part of the year malaria is most common

Depending on sources of income and therefore activities an individual is involved as factors in exposure to malaria, socio-economic variables is assumed to impact on an individual's opinion on part of the year malaria is most common. Spearman's correlation analysis results indicate no significant association. This means that the hypothesis or assumption that socio-economic variable significantly affect opinion on part of the year malaria is most common does not hold and any observed association is a chance event.

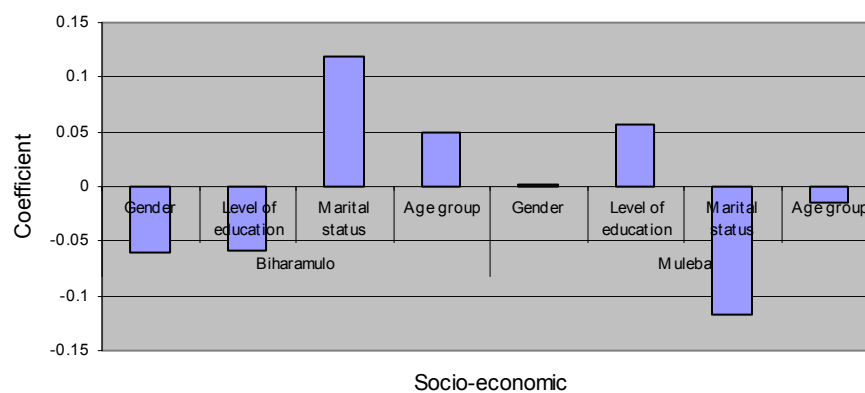
Correlation of socio-economic variables with opinion on which part of the year is malaria most common



### Socio-economic variables by opinion on malaria as a severe disease

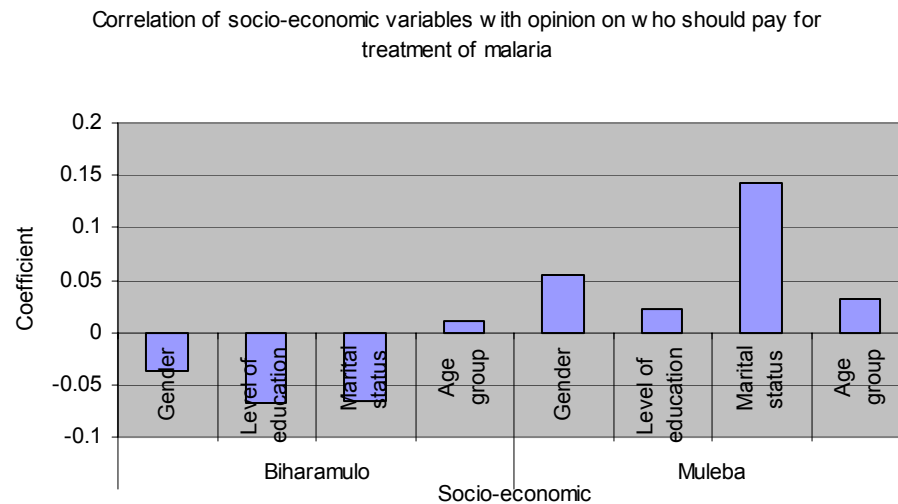
Socio-economic variables are seemingly not significantly correlated with opinion on malaria as a severe disease (see graph below).

Correlation of socio-economic variables with opinion on malaria as a severe disease



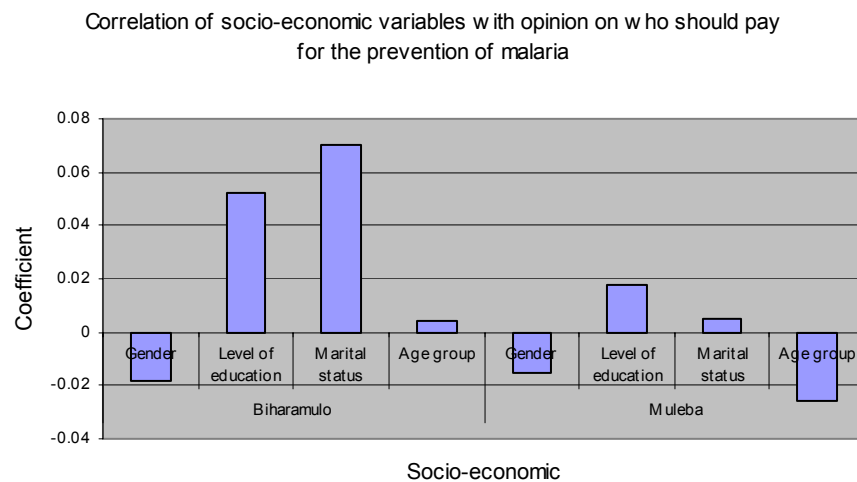
### Socio-economic variables by opinion on who should pay for malaria treatment

The associations in the graph below are in all cases not significant when tested using t-statistics. Correlation coefficients below are therefore chance events.



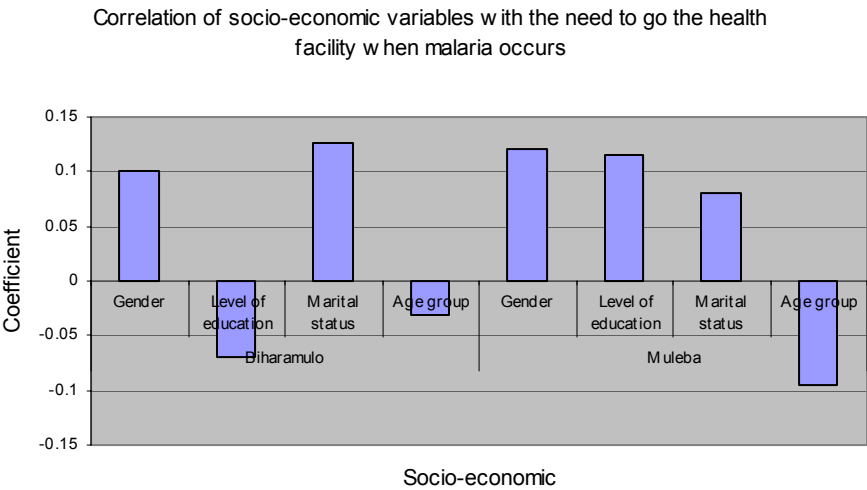
### Socio-economic variables by opinion on who should pay for prevention of malaria

Socio-economic variables are seemingly not significantly associated with opinion on who should pay for prevention of malaria. This means there are other factors, which affect opinion on who should pay for malaria other than, the socio-economic variables included in the correlation model and the observed correlations as in the graph below are chance events.



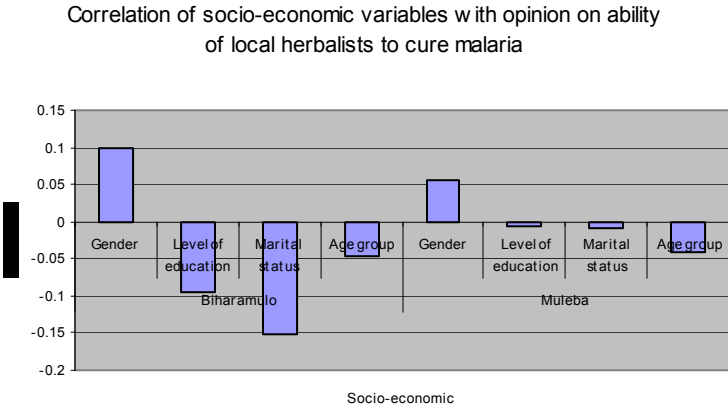
### Socio-economic variables by need to go to health facility when malaria strikes in the household

Correlations of socio-economic variables with opinion on need to go to health facility are not significant and are therefore chance events.



**Socio-economic variables by opinion on ability of local herbalist to cure malaria**

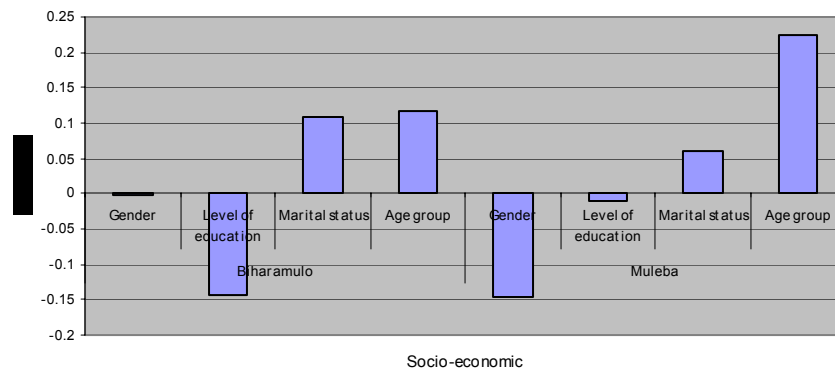
There are no significant correlations between socio-economic variables with opinion on the ability of local herbalists to cure malaria and any correlation is purely a chance event.



**Socio-economic variables by opinion on the need to use bed nets during the night in the households**

In the Muleba survey data, age of individuals in the survey have weak positive correlation (0.225) significant at  $\alpha = 0.01$ , 2-tailed test. The rest of socio-economic variables in both Biharamulo and Muleba data are not significantly correlated with opinion on the need to use bed nets, and where there is correlation, the association is purely a chance event. This means that other important factors have not been included in the correlation model.

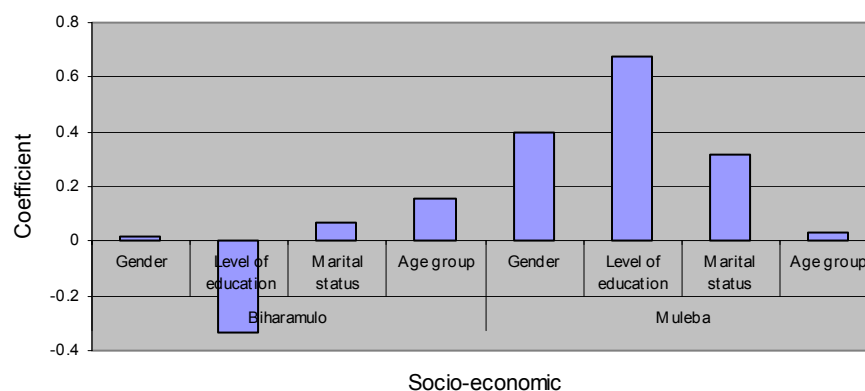
Correlation of socio-economic variables with opinion on the need to use bed nets



### Socio-economic variables by awareness on the dangers of drinking untreated water

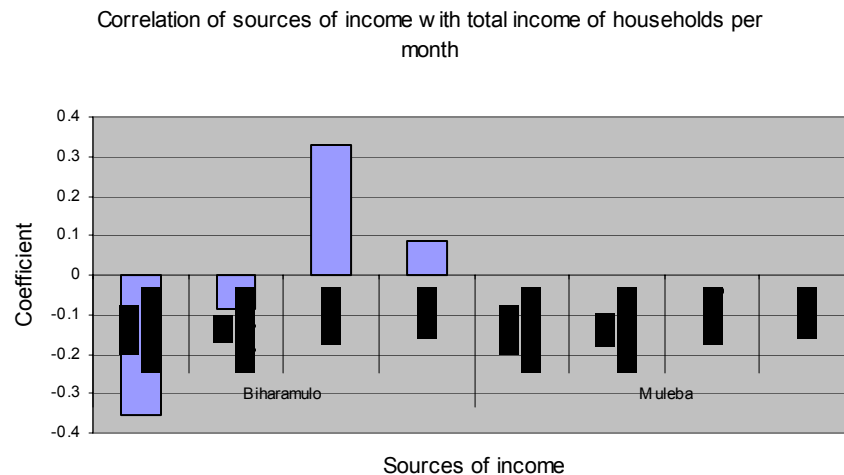
In the Biharamulo survey data, level of education has a weak negative (-0.334) but significant correlation ( $\alpha = 0.01$ , 2-tailed test) with awareness on the consequences of drinking untreated water. In the Muleba survey data, level of education has a strong positive (0.677) significant correlation with awareness on the dangers of using untreated water. Other socio-economic variables in both Biharamulo and Muleba data have no significant correlation with awareness on the dangers of using untreated water.

Correlation of socio-economic variables with awareness on the dangers of using untreated water



### Source of income by total income of households per month

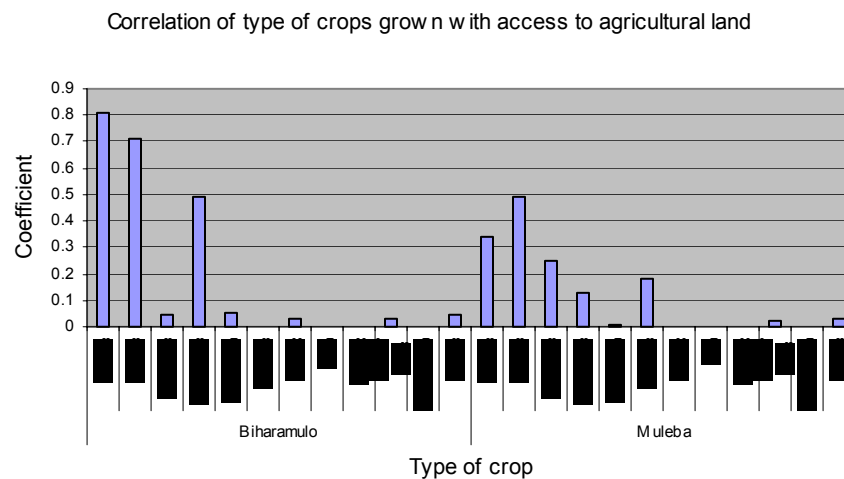
The correlation analysis in this case makes assumption that source of income of individuals in the survey affect total income of households per month. Results of spearman's correlation analysis indicate that sources of income have no significant correlation with total income of households per month. In the Muleba data, it is not even possible to generate correlation coefficients between sources of income and total income of households.



### Type of crops grown on land by access to agricultural land

The assumption in this analysis is that the type of crops grown by an individual household is dependent on access to land and land ownership. In the Biharamulo survey data, Maize, beans and potato growing had positive significant correlation with access to land. Maize (0.806) and beans (0.709) have strong positive significant correlations at  $\alpha = 0.01$ , 2-tailed test, with potato having relatively weak (0.492) positive but significant correlation. It seems like the three crops of maize, beans and potato are the main crops of the area and any person with access to land is likely to grow them.

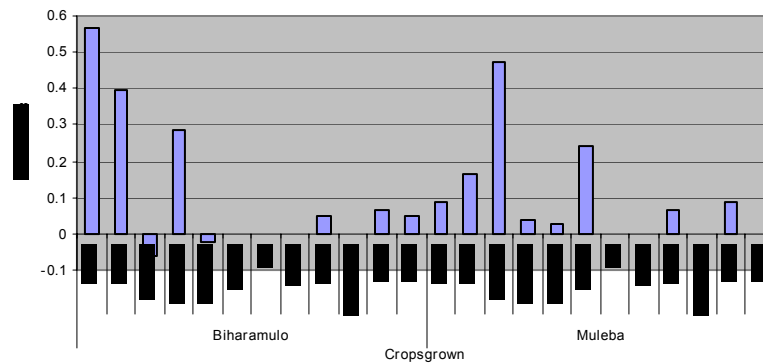
In the Muleba survey data, crops grown with significant correlation with access to land are maize (0.341 at  $\alpha = 0.01$ , 2-tailed), beans (0.493 at  $\alpha = 0.01$ , 2-tailed), bananas (0.250 at  $\alpha = 0.01$ , 2-tailed) and coffee (0.178 at  $\alpha = 0.05$ , 2-tailed). In order of waiting, it seems that beans and maize are the regular crops with bananas and coffee as perennial crops.



When type of crops grown on land is analysed further using land ownership, the crops identified in the access to land correlations are the same ones but with different weighting. In the Biharamulo survey data, maize (0.568 at  $\alpha = 0.01$ , 2-tailed) is the main crop in terms of land ownership followed by beans (0.396 at  $\alpha = 0.01$ , 2-tailed) and potatoes (0.288 at  $\alpha = 0.01$ , 2-tailed). In the Muleba data, maize does not feature in the list of crops with significant correlation with land ownership. The main crops are bananas (0.472 at  $\alpha = 0.01$ , 2-tailed), coffee (0.240 at  $\alpha = 0.01$ , 2-tailed) and beans (0.163 at  $\alpha = 0.05$ , 2-tailed) and this indicates that the perennial crops of bananas and coffee are the main indicators of land ownership in Muleba survey data.



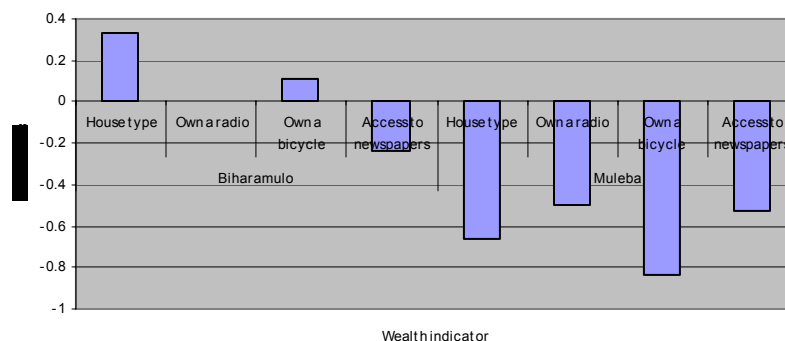
Correlation of type of crops grown with land ownership



### Wealth indicators' by total income for household per month

In the survey, a number of variables have been used as wealth indicators but house type, radio ownership, bicycle ownership and access to radio are used in this analysis as they also add social status to wealth indicator. The results largely indicate no significant correlation even in cases where correlation is strong, except for bicycle ownership in Muleba, where there is a strong negative significant correlation (-0.840 at  $\alpha = 0.05$ , 2-tailed). This means that, apart from bicycle ownership in Muleba data, observed correlations are random events (chance events).

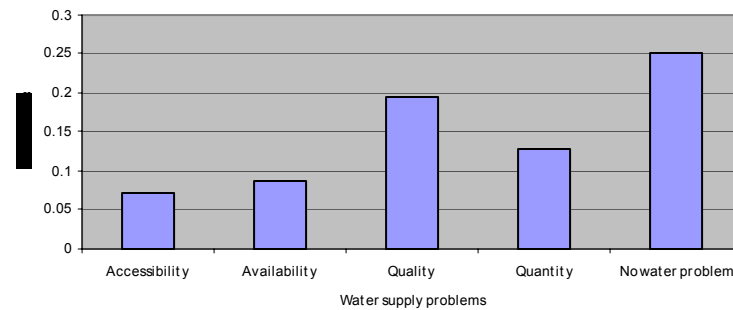
Correlation of wealth indicators with total income of households per month



### Water supply problems by location of households

In this survey water supply problems are assumed to be related to location of households and spearman's correlation analysis results indicate that in the Bihamamulo data, there are no correlations. In the Muleba data, absence of water problem (0.252 at  $\alpha = 0.01$ , 2-tailed) and quality of water (0.194 at  $\alpha = 0.05$ , 2-tailed) that are significantly correlated with location of households even if the correlation is generally weak. Other variables need to be included in the correlation model in an attempt to explain the observed water supply problems.

Correlation of water supply problems with location of household (Muleba)

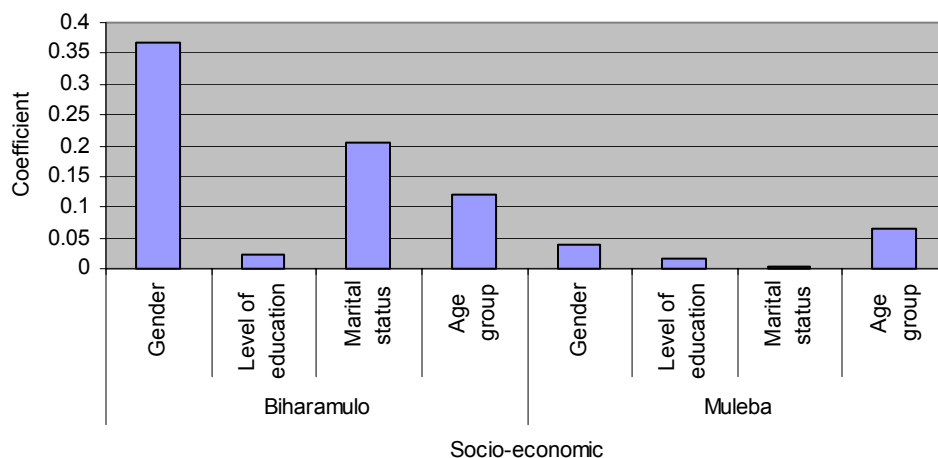


### How to cope with increased malaria in households by total income of households per month

It is hypothesised that means of coping with increased malaria in households is dependent on income of households. Spearman's correlation analysis is employed to measure and test the correlation between coping mechanisms and total income of households per month. Results in all cases indicate weak and insignificant correlations and any association is pure a chance event. This means that coping with increased malaria cases need to be explained in terms of other variables not included in the model. In the Muleba data, no correlation can be implied while in Biharamulo data, a correlation is negative but insignificant.

When socio-economic variables of gender, level of education, age and marital status are included in the correlation model, the correlation results indicate that there are weak and insignificant association with how individual households cope with increased malaria cases.

Correlation of socio-economic variables with coping with increased malaria



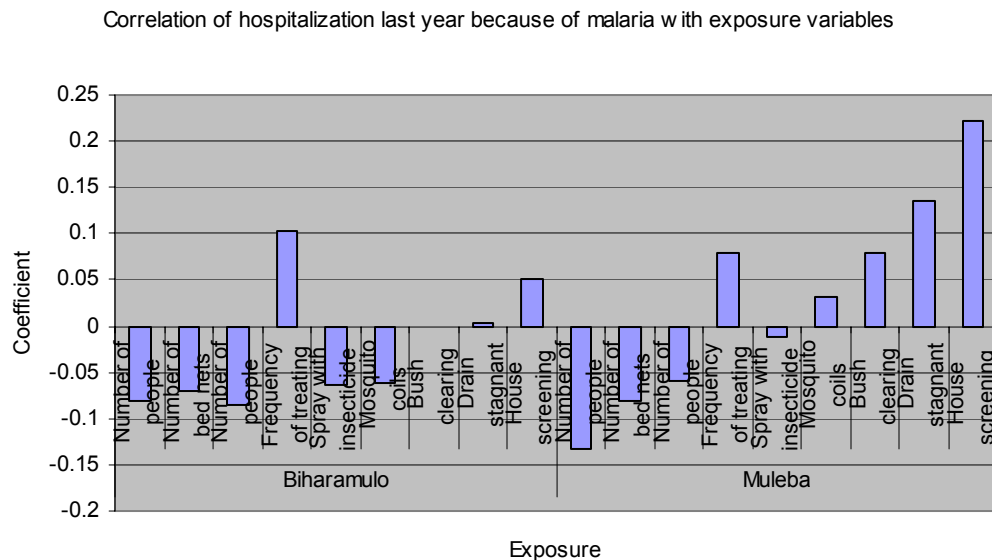
### Cases of hospitalisation due to malaria by exposure variables

Hospitalisation cases due to malaria in households is assumed to be related to exposure to mosquito bites measured using the following variables:

- number of people who sleep in the household
- number of bed nets in the household
- number of people who sleep under bed nets
- frequency of treating bed nets with insecticide
- use of spray to control mosquitoes
- use of mosquito coils to control mosquitoes
- bush clearing to control mosquitoes

- draining of stagnant water to control mosquitoes, and
- house screening to control mosquitoes

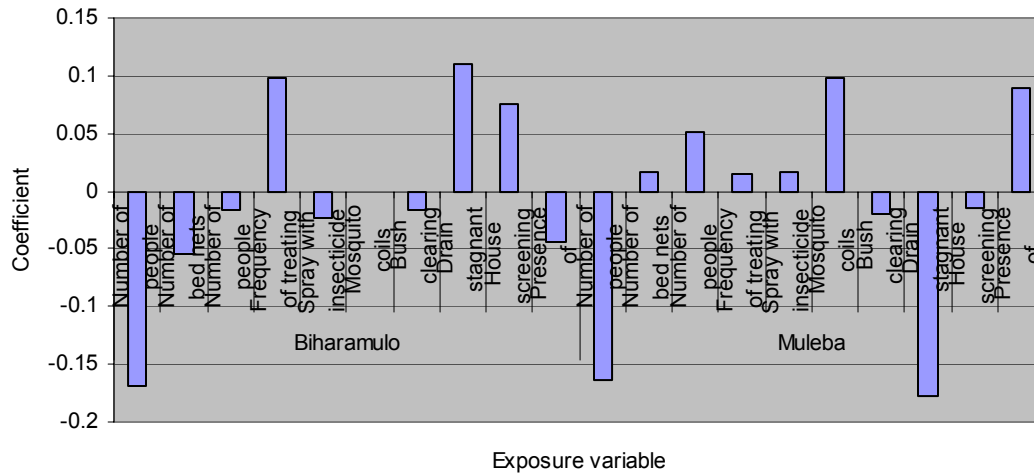
When the above variables are included in the hospitalisation spearman's correlation model, the results indicate that in all cases of the Biharamulo data, no significant correlation can be implied and the observed are just due to chance. In the Muleba data, house screening has a weak but significant correlation (0.22 at  $\alpha = 0.01$ , 2-tailed) with cases of hospitalisation in households.



### Deaths in the last five years due to malaria by exposure variables

In cases where hospitalisation cases does not show significant correlation with exposure to malaria, then one can use the number of deaths due to malaria since not all can afford hospitalisation charges. A spearman's correlation analysis results in the following exposure variables of number of people who sleep in the household, and practice of draining stagnant water being identified as significantly related to deaths in households due to malaria. In Biharamulo data, it is only the number of persons sleeping in the household, which has a weak negative (0-0.169) but significant ( $\alpha = 0.05$ , 2-tailed) correlation with deaths in households due to malaria. In the Muleba data, numbers of people sleeping in the household (-0.163 at  $\alpha = 0.05$ , 2-tailed) and draining of stagnant water (-0.177 at  $\alpha = 0.05$ , 2-tailed) have weak negative but significant correlations with deaths in households due to malaria.

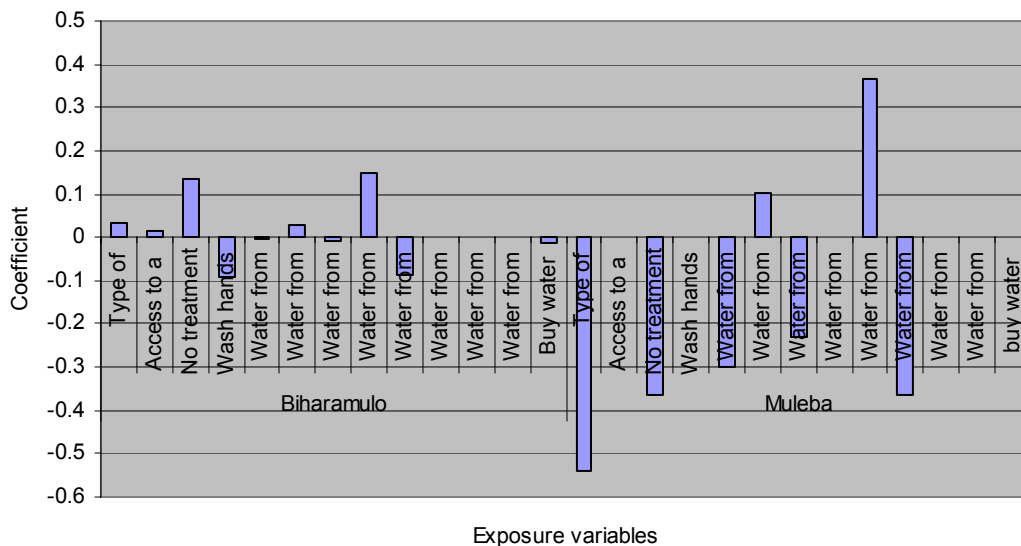
Correlation of exposure variables with deaths in household due to malaria in the last five years



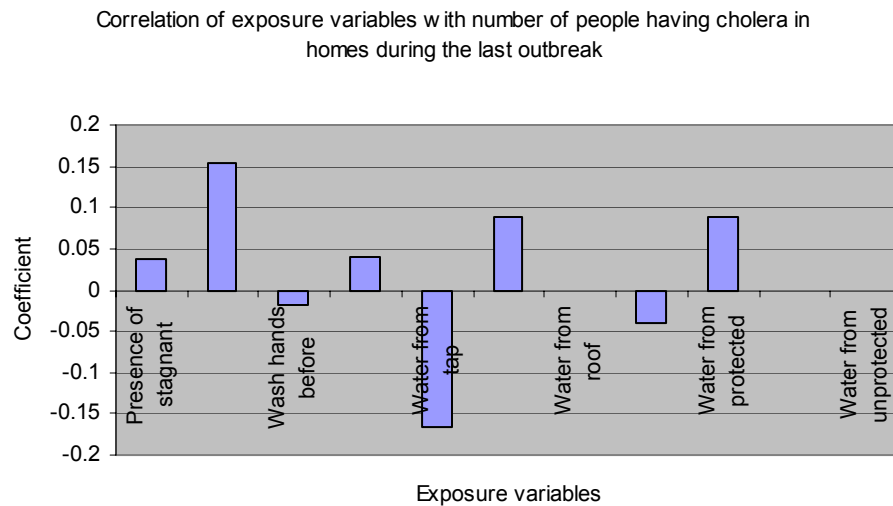
### Diarrhoea occurrence in household in the last 3 months by exposure variables

Diarrhoea cases are assumed, in this survey, to be related to certain environmental conditions. The environmental conditions used in this analysis are presence of stagnant water, type of toilet used, practice of washing hands before and after meals, and sources of water during the dry periods (borehole, roof catchments, lake, tap, protected well, river and unprotected well). Spearman's correlation results indicate weak and insignificant correlations in all cases (see graph below).

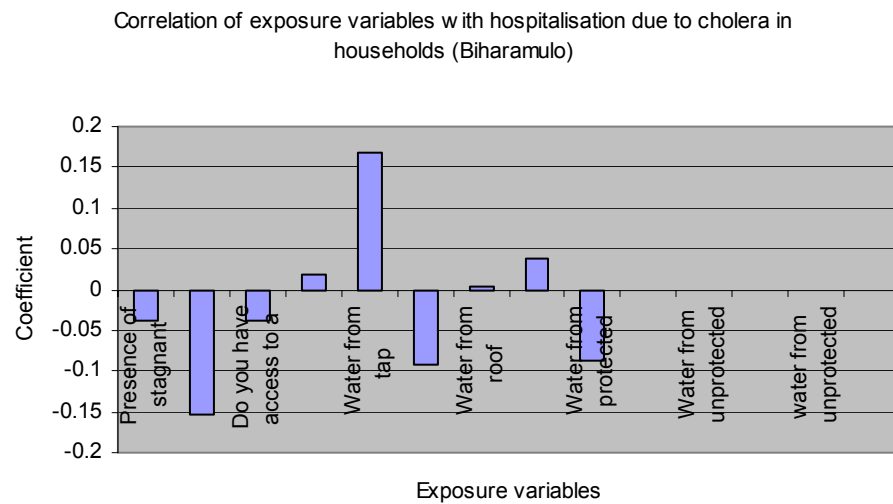
Correlation of exposure variables with Has anybody in your household above 5 years old had diarrhoea in the last three months?



Diarrhoea cases may not be easy to talk about but serious events like cholera are most likely to be remembered by respondents. Cholera cases in households is analysed using spearman's correlation technique to identify possible main elements in the environment that may be responsible. The exposure variables above are used in the correlation model and results indicate weak but significant correlation (-0.167 at  $\alpha = 0.05$ , 2-tailed) between use of tap water and cases of cholera in the Bihamamulo data. No significant correlation can be implied in the Muleba data between cholera cases and exposure variables (see graph below).



The role of exposure variables in cholera episodes is further analysed using hospitalisation of members of households and the results conform to number of people having cholera above. Access to tap water is still indicated as having weak significant correlation with cases of hospitalisation due to cholera in the Biharamulo data but no trace of correlation in the Muleba data.



**OUTPUT 4: FOCUS GROUP DISCUSSION ANALYSIS FOR KENYA****Asati Beach Male FGD. 13<sup>th</sup> August 2003****A. Demographic locational characteristics and incidence of disease.**

<b>Participant</b>	<b>Age</b>	<b>Marital status</b>	<b>Education level</b>	<b>Location of home</b>
A	24	Married	Std 7	1 km away from Lake
B	50	Married	N/A	700 mts away from the lake
C	35	Married	Form 2	500 mts from the lake
D	24	Married	Std 8	600 mts from the lake
E	29	Married	Form 4	1 ½ kms from the lake
F	81	Married	N/A	1 mile from the lake

**Participant A's household members.**

Gender	F.A	F.C
Age	21	5

The participant said that none of his family members has been affected by cholera.

**Participant B's household members.**

Gender	F.A	F.C	F.C	F.C	F.C
Age	30	10	6	4	2

The participant said that none of his family members has suffered from cholera, but has only seen the disease at a neighbours place.

**Participant C's household members.**

<b>Gender</b>	<b>F.A</b>	<b>M.C</b>	<b>M.C</b>
<b>Age</b>	<b>24</b>	<b>9</b>	<b>5</b>

The participant said he was personally infected by cholera ..... mimi mwenyewe nilipatwa na kipindupindu round May/June 2002, was admitted to hospital for 5 days.

**Participant D's household members.**

<b>Gender</b>	<b>F.A</b>
<b>Age</b>	<b>19</b>

This couple is recently married and have no children. The participant said that he was affected by cholera around July 1998 and was admitted for four days.

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**Participant E's household members.**

Gender	F.A	F.C
Age	23	9 months

The participant said that none of his family members has suffered from cholera.

**Participant F's household members.**

Gender	F.A	FC/MC
Age	4 wives	10

The participant said that he has four wives and ten children whom he could not remember their ages. The participant said he was affected by cholera in 1990 but cannot remember the month. Further more, at the same time in 1990, his wife was also affected by cholera but he cannot remember the month of the incidence.

**B. EXERCISE 1.**

The participants drew the map of Mr. Aloice Opiyo's home showing its location from the Lake, pit latrine, nearest health centers and private clinics (see chart).

**C. INDICATORS OF WEALTH**

The participants said that in their community wealth is determined by aspects such as: 2-3 fishing boats, about 5 cows, fishing nets, availability of foodstuffs (millet), permanent house, formal employment, more educated children.

The participants agreed on three categories of people in their community based on their wealth possessions. These are:

1. The rich (wealthy) – have about 5 cows, has 3-4 boats and fishing nets, permanent houses, formal employment, arable land, and ability to educate his children.
2. Middle class: have one boat, fishing nets, has bicycles for "bodaboda", semi-permanent house, cultivates for subsistence, and has 2-3 cows and a kiosk for business.
3. Poor (maskini): Has nothing a house or has a mud and grass thatched house, has no land, and sometimes has no food to feed the family. Poor people keep on begging from others or come to the beach to collect the fish leftover for food.

**D. TIME ACTIVITY PATTERNS****Table of normal daily schedule for different members of the household.**

F.A	M.A	F.C	M.C
6 a.m –9 a.m, wake up, do cleaning, and prepare breakfast & children for school.	6 a.m – 7a.m, some men wake up & go to the shamba	6 a.m- wake up, prepare to go to school.	6 a.m, wakes up, prepare to go to school.
8 a.m – 9 a.m, some women go to the beach to collect fish & dry them.	6 p.m – 6 a.m, men go out to fish.	7 a.m – 5 p.m, at school.	7 a.m – 5 p.m, at school.
9 a.m – 2 p.m, some go to the shamba, look for vegetables & look after livestock.	9 a.m – 12 p.m, some men look after livestock, others take lunch & relax.	Those who do not go to school assist with domestic chores.	Those who do not go to school assist with domestic chores.
2 p.m – 5 p.m, some go to the market to do business (selling fish)	12 noon – 4 p.m, some men go out for business while others relax.	5 p.m – 8 p.m, assist with domestic chores after school.	5 p.m – 8 p.m, assist with domestic chores after school.
5 p.m – 8 p.m, prepare supper.	5 p.m – 8 p.m, some men come back home for supper while others go back to the beach for fishing up to 6 p.m.	8 p.m – 9 p.m, takes supper.	8 p.m – 10 p.m, do studies and goes to sleep.
8 p.m – 9 p.m, sleep.	9 p.m – 10 p.m, some men sleep.	9 p.m – 10 p.m, do studies and sleeps.	

**E. KNOWLEDGE OF DISEASE (CHOLERA).**

All the participants said that cholera is caused by consumption of dirty and contaminated water, foodstuffs and poorly prepared food.

The disease is then spread by houseflies, which carry the disease from, the dirty environments to the human food.

The participants said that if one eats food without washing hands and also eat meat from dead cows would be affected by cholera.

With regards to symptoms, the participant said that the common symptoms of cholera are severe diarrhearing, severe vomiting of whitish fluids, and lack of appetite, fatigue and sunken and pale eyes.

The participants said that cholera is most common during the rainy season because most people are used to leaving human wastes in the open, so when the rains come, they carry all the human wastes into the lakes and rivers. Hence when the people consume water directly from the lake and rivers without boiling they are normally affected by cholera.

The participants further said that during harvesting time there is too much food and people excrete anyhowly and too much thus contaminating the environment with human wastes, which is swept to the lake and rivers leading to the outbreak of cholera.



The participants said that they acquire knowledge about cholera from the public health officers and the government health centers. The public health officers in conjunction with the chiefs and their assistants organize for barazas to sensitize people on the outbreak of cholera.

Furthermore, the participants get information on cholera outbreak through radios and schools. There is also information on the outbreak of the disease through “informal networks”.

#### **F. ATTITUDE, PRACTICE AND IMPACT.**

All the participants said that cholera is a very severe disease because it kills many people at once; it incapacitates them such that they are weak. Some participants said that cholera is a very deadly disease because it kills quickly and comes abruptly ..... it finishes people’s money on treatment. For instance, one participant said that he had to sell his cow to treat himself while one participant said that he lost a grandmother in 1994 from the cholera epidemic.

The participants said that the government should provide treatment whenever there is an outbreak of cholera, because its treatment is very costly (expensive) to the people who mostly are poor and since the disease comes abruptly, the people lack enough resources to combat it at once.

However, in terms of prevention, the participants said that they are the ones to deal with it and more so the women because they are the ones concerned with the general cleanliness of the home.

The participants said that when one is affected by cholera, they prefer taking them to hospitals. However, some participants said that there are cases of using traditional herbs but on very rare cases (occasions).

One participant said that when he was sick, he went to a certain Asian shop in Kisumu and bought a drug called “zamani” which was very effective in treating cholera.

Most participants said that they prefer taking their patients to the government health centers because they are affordable and provide affective drugs.

There is also self-medication whereby the patients are given salt solution to replace the lost water.

At the hospital the patients are treated by use of tetracycline, but in severe cases one participant said that he was put on a transfusion on a drip of a drug not familiar to him.

The participants said that they prevent cholera by: constructing pit latrines, constructing racks for utensils, washing hands thoroughly before meals, proper disposal of wastes, draining of stagnant waters, covering food all the time, boiling water for domestic use and proper sanitary (wash hands) after long calls.

#### **G. VULNERABILITY AND COPING MECHANISMS.**

The participants said that cholera is a very dangerous disease which affects everybody and can easily kill people, however the most affected are grown ups because they are the ones exposed to dirty food and environments.

The participants said that their vulnerability to cholera is caused by:

1. Lack of doctors and medical technicians to attend to them all the time
2. Lack of money to take the patients to hospital
3. Some sort of ignorance amongst the people about cholera and
4. Lack of reliable means of transport to the health centers.

#### **H. EXERCISE 2: COPING MECHANISMS.**

The participants came up with eight coping mechanisms when there is a cholera outbreak to prevent the disease. They then ranked them as follows from the most important to the least important as shown in the table. The participant’s further demonstrated the ranking on the wheel (see chart).

Coping mechanism	Rank
Digging pit latrines	2
Seek medical attention	3
Proper disposal of waste	5
Good sanitation (wash hands)	4
Boiling of water	1
Eating well prepared foods	6
Self-medication	8
Eating warm foods	7

With regards to the interventions, the participants said that the government through the public health officers create awareness and announce about the outbreak of cholera.

The participants said that the government is more active when there is an outbreak of cholera, but they are relaxed when there is no cholera outbreak.

The government through the chiefs instruct people to construct pit latrines and also close up unhygienic eating-places.

The participants said that there are no NGO's in the area, which are fully involved in the cholera control. They mentioned Plan International and they said only assist the people in construction of pit latrines and water tanks. The private clinics come in as an alternative to the government health centers.

#### **I. EXERCISE 3: PME BASELINE**

The participants expressed their feelings on whether very happy, moderately happy or very unhappy with the government, NGO's and the private clinics when there is an outbreak of cholera (see chart).

Those very happy with the government dispensary was because they were given free medication, and treated them well.

Those moderately happy with the government health centers said that they were not given full dose to treat their patients hence some resorting to traditional herbs while others resorted to private clinics while the government dispensaries charged some fee before treatment; the government dispensaries opened very late or were closed at night, also the government dispensaries lacked sufficient drugs to combat cholera outbreak.

Those very happy with the chief said that they disseminated information on the prevention of cholera, forced people to construct pit latrines and utensil racks and closed down all unhygienic eating-places to control the spread of cholera.

The participants were moderately happy with the chief because they were too slow in creating awareness and only came in after people dying in an area.

Very unhappy with the chief because the chief arrested a person who suggested that the government should supply the sick with free drugs.

Those participants very happy with the private clinic said that they were easily accessible, the nurses were always available to treat the patients and there was no congestion in the hospital.

**Demographic, Locational Characteristics and Incidence of Disease**

Participant	Age	Marital status	Education level	Location of home
A	42 years	Married	Form 1	900 ms from Lake, 3 kms from river.
B	24 years	Married	Std 8	3 kms from Lake, 2 ½kms from river.
C	51 years	Married	Std 8	3 kms from Lake, 1 kms from river.
D	26 years	Single	Form 4	3 km from Lake.
E	29 years	Married	Std 7	1 ½ km from the Lake

**Other specific characteristics include:**

**Participant A's household members.**

Gender	M.A	M.C	M.C	M.C	M.C	M.C	F.C	M.C
Age	51 yrs	26	24	23	21	18	16	13

The participants said that her husband was infected by cholera at the age of 26 years just immediately after she was married to him but cannot remember the year and month. Furthermore, her sister was infected by cholera, but cannot remember the month and year.

**Participant B's household members.**

Gender	M.A	M.C	M.C	M.C
Age	30	9	6	5 months

The participant said that her husband was infected by cholera in April 1988, admitted for 4 days in hospital and discharged.

**Participant C's household members.**

Gender	M.A	F.C	F.C	F.C	M.C	M.C	M.C
Age	69	30	28	26	20	18	15

The participant said that neither the members of her household nor the entire family relatives have been affected by the disease.

**Participant D's household members.**

Gender	M.A	F.C	M.C
Age	N/a	N/a	N/a

The participant is not married and has no children. She has never been affected by cholera, but just heard of it at a neighbours home, where a child was infected in July 2002 but was treated and got well.

**Participant E's household members**

Gender	M.A	M.C	F.C	F.C	M.C
Age	36	16	10	9	4

The participant said that she had a co-wife but passed away. She said that her household members have never suffered from cholera, but only heard of the disease at the neighbours.

**EXERCISE 1.**

The participants drew the map of Mrs. Rose Akinyi Odhiambo's home showing its location from the Lake, pit latrine, nearest health centers and private clinics (see chart).

**INDICATORS OF WEALTH**

The participants said that in their community, wealth is determined by aspects such as: more cows, more wives, big piece of cultivatable/arable land, vehicles (motor vehicle), fishing boats and nets, permanent houses and educated children or the ability to educate children.

The participants agreed on three categories of people in their community based on their wealth possessions. These are:

1. **The rich (wealthy):** have about 20 acres of land (arable), about 20 cows, has a vehicle, has about 4 fishing boats and fishing nets, has about 4 wives, has also a permanent house.
2. **Middle class:** have about one fishing boat, fishing nets, at least 2 wives, able to educate children up to standard 8, has a semi-permanent house, has a bicycle, has about 5 cows and 5 acres of arable land.
3. **Poor (Maskini):** has nothing, maybe a grass thatched mud house, and either works for others as a labourer to get food or goes out begging. "Maskini hana chochote, anasaidiwa tu na watu, na pia ni mtu wa kuomba omba, ama anenda kuokota samaki zilizobaki ili apate chakula." However, the participants said that for those people who stay near the Lake, there are very few poor people because most people do fishing and are therefore able to get food and even feed their families.

**D. TIME ACTIVITY PATTERNS**

**Table of normal daily schedule for different members of the household:**

<b>F.A</b>	<b>M.A</b>	<b>F.C</b>	<b>M.C</b>
6 a.m - 9 a.m - women wake up; do cleaning and preparing breakfast/prepare children for school.	6 a.m - 9 a.m wake up and go to the shamba/or do business. None of the husbands were fishermen.	6 a.m children wake up, prepare for school.	6 a.m - wake up & prepare for school.
8 - 9 a.m some women go to the beach to collect fish/dry them.	9 a.m - 12 noon- most men look after livestock, others relax.	7 a.m - 5 p.m- children at school.	7 a.m - 5 p.m go to school.
9 - 2 p.m some go to the shamba, look for vegetables/look after livestock.	2 pm- 5 p.m go to the market to relax with friends.	Those who do not go to school assist with domestic work.	Those who do not go to school look after livestock.
2 - 5 p.m some go to the market to do business (selling fish).	5 p.m - 8 p.m return back home.	5 p.m - 8 p.m assist with domestic work.	5 p.m - 8 p.m assist with looking after livestock
5 p.m - 8 p.m prepare supper.	8 p.m - 9 p.m take supper.	8p.m -9 p.m takes supper	8 p.m - 9 p.m take supper.
8 p.m - 9 p.m prepare to sleep.	9 p.m sleep.	9 p.m - 10 p.m sleep.	9 p.m - 10 p.m sleep.

**E. KNOWLEDGE OF DISEASE (CHOLERA).**

All the participants said that cholera is caused by, consumption of dirty and contaminated foodstuffs and water, and also poorly prepared food.

Then the disease is spread from one person to another by houseflies and other unhygienic disposal of human wastes.

With regards to symptoms, the participants said the common symptoms of cholera are severe diarrhoea, severe vomiting of whitish fluids, fatigue and general weakness, pale eyes, lack of appetite and general loss of weight.

The participants said that cholera is most common in the rainy seasons because when the rain comes it carries all the human waste into the Lake and rivers. Hence when the people consume the water directly from the Lake and rivers without boiling they are affected by cholera.

The participants said that they acquire knowledge about cholera from the public health officers and the government health centers. The public health officers in conjunction with the chiefs and assistant chiefs organize barazas through which they disseminate information on the outbreak of cholera.

There are also women groups or CBO's such as ADEE groups that create awareness to the community members on how to prevent the cholera epidemic. ADEE groups was formed in the year 2002.

Furthermore, the participants get information on cholera outbreak through radios and from schools. There is also information on the outbreak of cholera through "informal networks."

**F. ATTITUDE, PRACTICE AND IMPACT.**

All the participants said that cholera is a very severe disease because it kills many people at once, it incapacitates them such that they are weak, loose weight and therefore very weak.

The participants said that the government should provide treatment whenever there is an outbreak of cholera, because its treatment is very costly (expensive) to the people, and since the disease comes abruptly, the people are poor and lack the resources to combat the disease at once.

However, in terms of prevention, the participants said that they are the ones to deal with it and more so the women because they are the ones concerned with the general cleanliness of the home.

The participants said that when one is affected by cholera, there is self-medication, but in most cases, the people are advised to rush the patients to hospital for treatment.

In the hospital the patients are normally given ORS and tetracycline.

The participants said that they prevent cholera, by: constructing pit latrines, constructing racks for utensils, washing hands thoroughly before meals, proper disposal of wastes, draining of stagnant waters, covering food all the time, boiling water for domestic use and proper sanitary (wash hands) after long calls.

**G. VULNERABILITY AND COPING MECHANISMS.**

The participants said that cholera is a very dangerous disease which affects everybody and can easily kill people, however the most affected are grown ups ----- but the participants said that they don't know the reason why it is so.

The participants said that their vulnerability to cholera is caused by: lack of doctors and medical technicians to attend to them all the time, lack of sufficient drugs in the health centers to treat the people, and inaccessibility to the hitherto health centers.

**H. EXERCISE 2: COPING MECHANISMS**

The participants came up with eight coping mechanisms when there is a cholera outbreak to prevent cholera. They then ranked them as follows from the most important to the least important as shown in the table. The participants further demonstrated the ranking on a wheel (see chart).

Coping mechanism	Rank
Boiling of water before use	2
General house cleanliness	3
Construction of a rack for utensils	4
Proper disposal of wastes	5
Construction of pit latrines	1
Drainage of stagnant water	6
Seek immediate medical treatment	7
Self medication	8

With regard to the interventions, the participants said that the government through the public health officers create awareness and announce about the outbreak of cholera. The government then further supplies drugs to the dispensaries to treat the people. The government through the chief enforces that people must construct pit latrines and observe strict sanitary rules.

On the side of NGO's, the participants said that Plan International supplied drugs to the dispensaries in the year 2000 when there was a cholera outbreak while KWAHO a local NGO assists people in construction of pit latrines and water tanks.

The private clinics come in as an appendage to the government health facilities but they charge for all the services to the people.

**I. EXERCISE 3: PME BASELINE TABLE.**

The participants expressed their feelings on whether very happy, moderately happy or very unhappy with the services provided to them by the government, the NGO's and the private clinic when there was an outbreak of cholera. (See table).

All the participants were very happy with the government dispensaries, government administration, private clinics and the NGO's.

Very happy with the government dispensary because they provided beds and other facilities during the cholera outbreak. They further provided free medicine.

The doctors were also available in the health centers overnight. The health center also provided prevention drugs to non-patients.

Very happy with the chiefs announcement because it enabled the people to take precautionary measures and save lives and at least people were forced to construct pit latrines to avert the problem of the outbreak of the disease in future.

Very happy with the private clinic because it assisted /helped the people at night sometimes when the government health centers were closed. The private clinics are always open and easily accessible and near to the people.

Very happy with the NGO's because they provided free drugs to the patients.

**J. EXERCISE 4: ROLE PLAY**

The participants role-played the coping mechanisms during the outbreak of cholera (modes of treatment and prevention).

**Actors:** NGO representative, patient, doctor and chief.

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The parent takes his son to the government health center. While on the way the patient is given salt solution to replace the loss of water in the body.

The Plan International has also supplied the government health center with free drugs. At the government health center, the doctor examines the patient, while confirming from the parent the symptoms of the patient.

The patient is finally admitted for treatment for four days after which he is discharged. The doctor instructs the patient and his parent to go and attend the chiefs baraza.

At the chiefs baraza the chief instructs everybody that whenever you are affected by cholera rush to the government health centers, because the government and Plan International have provided free drugs to treat the people. The chief further instructs the people to construct pit latrines and boil water before domestic use. He further instructs people not to eat in funerals. The chief ends the baraza by warning the people that whoever does not follow the regulations will be arrested and charged in court or will pay fine.

**A. Demographic locational characteristics and incidence of disease.**

Participant	Age	Marital status	Level of education	Location of households
A	21	Married	Std 7	10 kms from Lake & 2 kms from river.
B	29	Married	Std 8	10 kms from Lake and 3 km from river
C	30	Married	Form 4	10 kms from lake & 1 km from river
D	36	Married	Std 7	15 kms from river & 3 kms from river
E	29	Married	Form 4	7 kms from lake & 700m from river
F	52	Married	Std 7	8 kms from lake & 1 kms from river.

**Participant A's Household Members.**

Gender	F.A	F.C	M.C
Age	20	1	3

The participant has one wife aged 20 years old and two children, male and female. The participant said that he has not had any incidences of cholera whatsoever.

**Participant B's household members.**

Gender	F.A
Age	25

The participant is married but has not yet gotten a child. He said that he has never experienced or been affected by the cholera outbreak.

**Participant C's household members.**

The participant is married to a 25-year-old lady and they have a 5 months old baby girl as shown in the table.

Gender	F.A	F.C
Age	25	5 months

The participants said that he has never been affected by the cholera outbreak.

**Participant D's household members.**

Gender	F.C	F.C	M.C
Age	29	9	10

The participant said that he was affected by cholera in April 1994 when the entire family was affected.

**Participant E's household members.**

Gender	F.A	F.C	M.C	M.C
Age	27	1 week	4 years	2 years.

The participant said that he has never been affected by cholera in his household but his mother and brother suffered from cholera in May 1997 and June 2002 respectively.



**Participant F's household members.**

Gender	F.A	F.C	M.C	M.C	M.C	M.C
Age	30	4 yrs	23 yrs	20 yrs	10 yrs	6 yrs

The participant said that his entire household has never suffered from cholera, but close members of his family such as brothers, sisters and cousins have suffered from cholera especially in 1988 and 1989 when there was an outbreak of the disease but could not remember the months.

**B. EXERCISE 1:**

The participants drew the map of Mr. Peter Ogada's home showing its location, distance from Lake and river, pit latrines and the nearest health centers (see chart).

**INDICATORS OF WEALTH.**

The participants said that the wealth/well being of a person in their community is determined by aspects such as: size of land, number of children especially sons, own shops and rental houses, number of cows, number of women, permanent house and formal employment.

The participants agreed on three categories of people in their community based on their wealth possessions. These are:

**i. The rich (wealthy).**

These have about 30 acres of land, about 30 cows, more sons around six, or more women, possession of a posho mill, shops, rental houses, one with a permanent house and farming implements such as ox-plough and a generator.

**ii. The middle class.**

Has land between 2 – 6 acres, about 4 – 10 cows, about 5 children, has a bicycle and a semi-permanent house.

**iii. Bottom class.**

Has land between 50 – 100 yards, sometimes has no wife and children, does not have a cow, has a mud and grass thatched house, does not have even children and sometimes he eats by chance .....has no food to eat.

**C. TIME ACTIVITY PATTERNS.****Table of normal daily schedule for different members of the household.**

<b>F.A</b>	<b>M.A</b>	<b>F.C</b>	<b>M.C</b>
6 A.M – 9 A.M, wake up, wash clothes, house and prepare breakfast, take breakfast and wash utensils.	6 a.m – 7 a.m, wake up, take breakfast.  6 a.m – 11 a.m, go to the farm, business and formal work.	6 a.m – 7 a.m, wake up and go to school up to 5 p.m. (Those not in schools assist with household chores and farm work. After school also assist with household chores/ do studies.	6 a.m – 7 a.m, wake up and go to school up to 5 p.m. (Those not in school look after cattle and farm work.
9 a.m – 12 noon. Does farm work.	<b>N/B:</b> Some men are out as from 6 p.m – 3 a.m fishing).		Those who are at school assist in slashing compound, and looking after cattle, relax and do studies.
12 noon – 1 p.m, preparation of lunch and take lunch.	11 a.m – 12 noon, lunch.	8 –9 p.m, take supper and sleep.	
1 p.m – 5 p.m, some women go to the market for business, while others go to fetch water & firewood and search for food.	12 noon – 6 p.m, some relax, others go out to do business or look after cattle.  6 p.m – 7 p.m, others are still out with friends.		8 p.m – 9 p.m, take supper and sleep between 9 p.m and 10 p.m.
5 p.m – 8 p.m, come back home, prepare supper.	7 p.m – 8 p.m, come back home & take supper.		
8 p.m – 9 p.m, take supper.	9 p.m – retire to bed.		
9 p.m retire to bed.			

**E. KNOWLEDGE OF THE DISEASE (CHOLERA).**

All the participants said that cholera is caused by eating dirty and contaminated foodstuffs and water ..... vyakula, na maji machafu ndiyo huleta ugonjwa wa kipindupindu .....

The participants said that use of open-air toilets and eating food without washing hands is a major cause of cholera. The participants said that cholera is spread by houseflies.

With regard to symptoms of cholera, the participants indicated that : severe diarrhea, severe vomiting (loose vomiting) of fluids milky in colour, general weakness, fatigue and shock accompanied by rumbling stomach are the major symptoms associated with the disease.

The participants said that cholera is most common during the dry season because that is the time when all the rivers do not have enough water, and are not flowing freely, therefore the germs remain in the water, people fetch the same water for domestic use and others do general cleaning in the stagnant water hence the general consumption of dirty water.

The participants said that they acquire information about cholera from the public health technicians (specialists) through the radio, through the chiefs and assistant chiefs barazas and in government health centers. Furthermore, the participants said that through informal networks, the neighbours inform each other about the outbreak of cholera.

### **E. ATTITUDE, PRACTICE AND IMPACT.**

All the participants said that cholera is a very dangerous and severe disease because it kills people in the shortest time possible (within six hours). They said that cholera weakens the people, hence reducing the productive population. It is a very costly disease to treat and very cumbersome for the people to handle due to lack of drugs and long distances to the nearest health centers.

The participants therefore argued that the government should pay for the treatment of cholera because ... it is a very costly disease to treat and it is very unpredictable and deadly .... That some times it comes abruptly when people do not have the money to treat themselves.

For prevention of malaria, the participants said that they should be the ones responsible by constructing pit latrines, boiling water, and maintaining clean environment.

Most participants said that when they are affected by cholera, it is advisable to seek quick medical attention in the nearest health centers. The participants said that due to the severity of cholera they are normally advised against self/medication, however, as they are taking the patient to hospital they could mix a salt solution to give to the patient to replace the lost water during the diarrhoea and vomiting spell.

The participants said that they prevent cholera by boiling water for domestic use, washing hands with hot water, covering food all the time and use of toilets every time for long calls.

### **G. VULNERABILITY AND COPING MECHANISMS.**

The participants argued that when cholera strikes , everybody is affected equally, however, the most affected are adults ..... kama kipindupindu inaingia hakuna mdogo wala mkubwa anaweza kubaki ..... lakini sanasana wazee ndio hufa sana kutokana na huu ugonjwa wa kipindupindu.....

The participants argued that the adults are more vulnerable to cholera than children because, children are always confined and hence not exposed to dirty foods and environments like grown ups.

The participants also said that men are the most affected because they are very careless and very mobile, going to funerals, eating in hotels and taking water anywhere hence more exposed to the diseases.

The participants said that their vulnerability to cholera is caused by:

1. Lack of knowledge on the symptoms of cholera at an early stage ... hence the disease becomes persistent and hard to treat.
2. Lack of balanced diet among the people hence the body is always weak and very susceptible to the disease.
3. Lack of reliable means of transportation to hitherto, very distant health centers for treatment.

### **H. EXERCISE 2: COPING MECHANISM.**

The participants came up with six coping mechanisms whenever there is a cholera outbreak in prevention of the disease and ranked them as shown in the table from the most important to the least import.

<b>Coping mechanism</b>	<b>Rank</b>
Self medication	5
Boiling water for domestic use	1
Use toilets for long calls	2
Seek medical treatment	3
Wash all types of fruits/vegetables	4
Eating fresh fish from the Lake	6

With regards to interventions towards cholera, the participants said that the government supplies cheap affordable drugs to the health centers. Furthermore, the government through the chiefs and Asst. Chief's barazas create awareness on the outbreak and prevention modes of cholera. It is through these barazas that the people are informed on the outbreak of the disease and told to construct pit latrines, boil water for domestic use, put up bathrooms, and utensil- racks. Furthermore, they are informed that there is need for quick medical attention.

The NGO's such as Plan International fund the health centers with drugs, also assist schools and homes in the construction of pit latrines and water tanks.

Apart from the government health centers, the private clinics also do provide treatment to cholera patients but at a fee.

### **I. EXERCISE 3: PME BASELINE.**

The participants expressed their feelings on whether very happy, moderately happy or very unhappy with the interventions by the government, the NGO's and the private clinic (see chart).

Very happy with the government health centers. For the participants who felt very happy with the services provided by the government health centers said that: there was quick medical care and a patient could easily be referred to another hospital for specialized medical attention.

For those very happy with the administration/chief said that this was so because of creation of awareness, enforcement of law for people to construct pit latrines, and closing up of dirty eating places (hotels).

For those happy with the private clinic said that it offers quick medical services than the government health centers.

For those very happy with the NGO's such as Plan International and KWAHO said that they provide free drugs to the health centers and assist the community in construction of water tanks and pit latrines.

Moderately happy with the government health center said that the services are very slow and the nurses are not available always.

Moderately happy with the Administration/chief said that they were too slow to create awareness to the people and only talked about cholera after the disease killing many people and spreading rapidly.

Moderately happy with the private clinic said that they charge high on the drugs especially when there is an outbreak of cholera.

Those who indicated very unhappy with the private clinic said that the drugs are very costly especially when there is a cholera outbreak, the patient must pay before he/she is treated and the charges are generally high.

#### J. EXERCISE 4: ROLE PLAY

The participants role-played the coping mechanisms during the outbreak of cholera (mode of treatment and prevention).

##### ACTORS.

1. Son (patient).
2. Father (parent)
3. Government (health center doctor).
4. Chief of the area
5. Private clinic staff.

The son complains to the father that he is feeling stomachache, diarrhoea and vomiting. The parent (father) decides to look for money to take his son to the nearest health center (which is a private clinic). He only manages to get Kshs. 10, but does not give up but takes his son to the private clinic.

At the private clinic, the clinical officer asks the father which disease the son is suffering from. The parent narrates all the symptoms to the clinical officer. Without checking the patient, the officer asks the parent ... "do you have Kshs. 5000 before I start treating your son: "but the parent boldly answers, "I have only Kshs. 10". The son is denied treatment at the private clinic due to lack of enough money.

The parent picks his sick son and proceeds to the government health center. When he arrives at the government health center, the doctor asks him ..... "what is wrong with your son?" The parent answers ..... "He has been diarrhoea and vomiting for two days". From there on the doctor examines the patient, treats him and gives the parent more drugs to be administered later and then discharges the patient. Then the doctor instructs the parent of the patient to take the patient home and proceed to the chief's baraza.

At the chief's baraza, the chief warns the people on the outbreak of a very dangerous disease called cholera.... "wananchi wangu wote, kuna ugonjwa mbaya sana ambao unauwa kwa masaa sita..... Unaitwa kipindupindu .... Nataka make honjo mjihadhari....."

The chief tells them on how to prevent the spread of the disease. He introduces an officer from Plan International, and tells the people on how the NGO will assist them in putting up pit latrines and water tanks. Then warns them that whoever will not follow the rules will be arrested and charged in court. After that, the chief dismisses the people and tells them to pass the message all over the location.

**DEMOGRAPHIC, LOCATIONAL CHARACTERISTICS  
AND INCIDENCE OF DISEASE.**

Participant	Age	Marital status	Education level	Location of household
A	64	Married	Std 8	7 miles from the Lake & 1 km from the river.
B	20	Single	Std 8	5 km from the lake & 100 m from the river
C	21	Single	Form 4	5 km from the Lake & 200m from the river
D	23	Married	Std 8	5 km from the lake & 300 m from the river.
E	29	Married	Form 4	6 km from the Lake & 400 m from the river
F	24	Married	Std 8	5 km from the Lake & 5 m from the river.

**Other specific characteristics include:**

**Participant A's household members.**

Gender	F.A	F.C	F.C	M.C	M.C
Age	63	20	18	16	14

Participant A said that his family has never suffered from cholera but the neighbours have been suffering from it. His brother was also sick of cholera and died in 1972. His family consumes water from the river.

Participant B said that he has never suffered from cholera but his brother had it in 1989. There has not been death in their family due to cholera. The family uses water from the river.

Participant C said he has never suffered from cholera but some of his family relatives suffered from it in 1999. The family consumes water from the river.

Participant D said that he suffered from cholera in June 1999 but was treated and recovered, no one has ever died in his family due to cholera. The family uses water from the river for domestic use.

**Participant E's household members.**

Gender	F.A	M.C	M.C
Age	20	2	1

Participant E said that his family has never suffered from cholera but his father suffered in 1989 but was treated. No case of death due to cholera in his household. The family uses water from a river.

Participant F's household members: The participant's wife is aged 20 but they have no children. The participant suffered from cholera in 1998. His brother also suffered from cholera in May 1998. The family uses water from a river.

**EXERCISE 1:** The participants drew a sketch map of George Aringo's homestead showing its location, pit latrines and health units (see chart).

### INDICATORS OF WEALTH.

The participants said that the indicators of wealth in their community include: having a vehicle; a permanent house; grade cow; above 3 acres of cultivatable land; rental houses and formal employment such as of Secondary teacher, Judge e.t.c.

Based on these wealth indicators, they said that their community could be categorized into four: the rich, middle class, poor and the very poor.

Indicators for rich people in their community include: owning a motor vehicle, having a permanent house, having plots, prominent businessmen, having grade cows, having educated and working children, having formal employment such as of teachers/judges, having many trees for timber sale and having above 3-4 acres of cultivatable land.

The middle class have about 2 acres of cultivatable land, one grade cow or 3 zebu cows, has educated children up to primary level, has a bicycle and a semi- permanent house.

The poor persons are those who have no cows, have grass-thatched houses, no bicycle, and no children and do not have land.

The very poor have no houses, have nothing, have no water and are beggars.

### C. TIME ACTIVITY PATTERNS.

Table of normal daily schedule for different household members:

F.A	M.A	F.C	M.C
6 a.m – 9 a.m – wakeup, do general house cleaning, fetch water and prepare breakfast.	6 – 9a.m – go to the shamba/work/business premises.	6 a.m – 7 a.m – wake up, break fast & go to school up to 5 p.m or earlier.	6 – 7 a.m – wake up, break fast & go to school up to 5 p.m or earlier.
9 a.m – 1 p.m – go to the shamba/business/ work.	9 a.m /p.m – shamba work.	After 5 p.m they fetch water, wash utensils and cook food.	After 5 p.m, they look after cows, assist to clean the compound and even farm work.
1 a.m - 4 p.m, return home and prepare lunch, wash utensils, relax and sometimes go back to the shamba.	1p.m – 2 p.m – lunch	9 p.m – supper and sleep.	9 p.m – supper and sleep.
5 p.m – 8 p.m – prepare supper	2 p.m – 5 p.m – relax, look after cows.		
8 p.m –9 p.m – supper and sleep.	5 p.m – 8 p.m- supper, sleep.		

#### **D. KNOWLEDGE OF DISEASE (CHOLERA).**

The participants said that cholera is caused by dirty water, houseflies, lack of latrines, lack of body cleanliness and “kuenda choo ovyo ovyo”.

The symptoms of cholera include: severe diarrhoea of blood and watery substances, vomiting fluids which are yellowish, fatigue, general weakness, sunken eyes, pale eyes, joint pains and, “inamaliza mtu damu kwa sababu macho inakuwa nyeupe sana”.

They said that cholera epidemic is common during the dry season because, “when there is too much sun all the water sources are dry and some water sources are stagnant. Due to scarcity of water, people end up consuming water that is available without boiling.

The participants acquire information on cholera outbreak from the chief’s barazas, the public health officers, posters usually pinned by health Institutions, through radios and informal network.

#### **E. ATTITUDE, PRACTICE AND IMPACT.**

The participants said that cholera is a very severe disease because, it is deadly and costly to treat. Some people even die before they reach to the health facility and that there are no drugs to treat the disease at home. When people are sick of cholera, transportation is so bad that some people even use bicycles and wheelbarrows to carry the sick.

They said that the government should meet the cost of treating cholera because local herbs cannot treat the disease and the drugs are very expensive to the common mwananchi. They also said that cholera is a disease of the poor but not the rich and therefore the poor should be assisted.

With regard to prevention, the participants said that this should mainly be the task of the community because by doing so they will be reducing the cost of treating the disease thereby reducing the government’s burden. On its part, the government should put directives on how people can prevent the spread of cholera.

The participants said that cholera is treated by use of tetracycline. There is no any traditional herb for treating cholera. But before taking the sick to the health facilities, they treat him/her using salt solution.

Their mode of preventing cholera is by boiling water, construction of pit latrines, and general cleanliness of the homestead, wash utensils, and wash hands with warm water. They said, “wakati cholera inaingia ndipo tunaosha mikono na maji moto”.

#### **F. VULNERABILITY AND ADAPTABILITY OF THE DISEASE.**

They said. “hiyo ugonjwa haichagui mtu. Ikiingia huwa imeingia na watu wote hukamatwa. Haichagui mzee au mama au watoto”.

They said that they are vulnerable to cholera because of poverty. Due to poverty most of the people lack proper means of transporting patients to the health facilities. They also said that the distance between health facilities and homes is very long. They are also vulnerable due to negligence and lack of concern on the prevention such as construction of pit latrines, boiling water and washing hands before meals. They are also vulnerable because they lack safe drinking water.

The participants came up with eight coping mechanisms and ranked them as follows:



Coping mechanism	Rank
Boiling water	2
Construction of pit latrines	1
Keep the home clean	8
Construction of bore holes/use borehole water	7
Covering food	4
Washing hands after use of toilet	5
Washing hands with warm water before meals	6
Seeking medication from health facilities	3

On intervention, they said that the government provides free drugs when there is an epidemic, it also creates awareness. It also gives quarantines and directives on funeral matters such as to bury the victims as soon as possible. The NGO's such as Plan International assist in supply of drugs to hospitals while KWAHO constructs pit latrines and water tanks.

They said, "watu wanachimba choo halafu KWAHO inawapatia materials ya kujenga".

### G. EXERCISE 3: PME BASELINE TABLE.

The participants indicated their opinion on whether they were very happy, moderately happy or unhappy with the services rendered by the government health facilities; administration, NGO's and private clinics (see chart).

All the participants said that they were very happy with the services of the government health facility because of its immediate treatment and provision of free drugs during the epidemic.

Three participants said that they were very happy with the government's administration (chief) because he enforces construction of pit latrines during the outbreak of cholera. He also creates awareness and avails health officials in barazas to educate the people on the outbreak of cholera.

One person was very happy with the private clinic because it is near and therefore very accessible when there is an outbreak.

All the participants said that they were very happy with Plan International because it provided drugs to the health center. They were also very happy with KWAHO because of construction of latrines and water tanks.

**Three participants were moderately happy with the chief because of his delay in the creation of awareness. They only start creating awareness when the outbreak starts.**

Four of the participants were moderately happy with the private clinic because of high charges of treatment and inexperienced staff in treating cholera.

One person was very unhappy with the private clinic because they cannot treat somebody if he has no money and that they also take advantage of the outbreak of the disease to exploit the most infected people.

**H. EXERCISE 4: ROLE PLAY.**

**The participant's role-played their coping mechanisms during cholera outbreak.**

**Actors: father, son (patient), village elder, medical officer, chief.**

The father finds that his son is very sick and lying on the bed and asks him what the problem is. The son complains of vomiting and diarrhoea. The father then gives him some herbs to see whether he could get well. But the son continues to vomit, diarrhoea and general weakness.

The son then demands to be taken to the health facility instead of being given some medication at home. The father then gets hold of his son and goes to the village elder.

After the father informs the elder about the son's sickness, the elder advises him to take the son to the health facility quickly.

At the health facility, the medical officer asks, "What is wrong". The father replies that his son is very sick.

The medical officer makes diagnosis and gives him treatment. He then informs them that there is a chief baraza and they should attend because it concerns cholera outbreak in the area.

At the baraza, the chief greets the community and informs them that the agenda of the meeting is cholera outbreak. He informs them of the danger of cholera and warns them saying, " Kuna shida ya kipindupindu! hapana kunywa maji ovyo ovyo, chemsha maji, mtu akishikwa na cholera panatumia dawa ya kienyeji, peleka watu kwa hospitalini na pia muchimbe choo na mchimbe maji na msipofanya vile tumesema hapa mtaona!, ahsanteni sana kwa kuhudhuria na mfuate maagizo!".

**FEMALE FGD (KOMBEWA) GROUP 3:14<sup>TH</sup> AUGUST 2003**

**A. DEMOGRAPHIC, LOCATIONAL CHARACTERISTICS AND INCIDENCE OF DISEASE.**

Participant	Age	Marital status	Education level	Location of the household
A	38	Married	Std 7	20 km from the Lake & 20 m from the river.
B	49	Married	Std 7	20 km from the Lake & 20 m from the river.
C	24	Married	Form 2	20 km from the Lake & 20 m from the river.
D	45	Married	Std 6	20 km from the Lake & 20 m from the river.
E	43	Married	Std 6	30 km from the Lake & 1 km from the river.
F	25	Married	Std 8	14 km from the Lake & 1 km from the river.

**Other specific characteristics include:****PARTICIPANT A's HOUSEHOLD MEMBERS.**

Gender	M.A	F.C	M.C	F.C	M.C	M.C	F.C
Age	41	18	16	13	11	9	7

Participant A said that two of her children aged 11 and 9 respectively suffered from cholera in April in 1998. She said, " ilikuwa masaa ya jioni na nikashangaa watoto wakakonjoa na tena kuangalia nikutapika na kuhara". She has never lost a member of her household due to cholera. She consumes water from the river and a borehole.

**PARTICIPANT B's HOUSEHOLD MEMBERS**

Gender	M.A	M.C	F.C	M.C	M.C
Age	60	29	26	23	17

The participant said that her husband suffered from cholera in April 1998. However, she has never lost a member of the household due to the disease. Her household consumes water from a river.

**PARTICIPANT C's HOUSEHOLD MEMBERS.**

Gender	M.A	F.C	M.C
Age	30	2	9 months

She said that her family has never suffered from cholera and none has died. Her family uses water from the river.

**PARTICIPANT D's HOUSEHOLD MEMBERS**

Gender	M.A	M.C	M.C	M.C	F.C	F.C
Age	Don't know	28	23	22	19	15

The participant said that she is a second wife in a family of two wives. None of her household members has ever suffered cholera or even died due to it. Participant D's household members uses water from the river.

**PARTICIPANT E's HOUSEHOLD MEMBERS.**

Gender	M.A	M.C	F.C	M.C	M.C
Age	55	25	21	19	17

There has been no incidence of cholera but at the neighbour in April 1998. The family uses river water.

- B. **EXERCISE 1:** The participants drew a sketch map of Christine Auma Atieno's household showing its location, distance from the Lake/river, latrine and health units (see chart).

**C. WEALTH INDICATORS**

The participants agreed that a wealthy person in their community is one who has a permanent house, a vehicle, some plots, several acres of land, many cows and is able to educate children.

They said that their community can be classified into three: tajiri, maskini, halafu maskini ya Mungu.

According to the participants, the indicators of “tajiri” (rich) include, having about 15 cows (zebu) or more, having a lot of money, having a large piece of land, having one vehicle or more, having a shop(s) many plots, a permanent house and many children who are also educated.

The poor (maskini) are characterized by a semi-permanent house or grass thatched house, a small land which is cultivated by use of hands, has a bicycle, has one cow or none, does not have enough food to eat and has children whom he is not able to educate beyond std 8.

The “maskini ya Mungu” (the poorest) have a very bad house which even has a leaking roof, no good beddings and clothes, has difficulty in getting food to eat, has no property and some have no children. Most of them are widows.

#### D. TIME ACTIVITY PATTERNS

**Table of normal daily schedule for different members of the household.**

F.A	M.A	F.C	M.C
6 -9 a.m - wake up, sweeps the house, fetch water, prepare breakfast for the family.	6 - 9 a.m- wake up, clear the compound, milking, breakfast.	6 a.m - wake up, breakfast and go to school up to 5 p.m.	6 a.m - wake up, breakfast and go to school up to 5 p.m.
9 a.m - 2 p.m - prepare lunch.	9 a.m - 1 p.m - go to the farm or work.	5 p.m - 9 p.m- undertake domestic chores,	5 - 9 p.m - look after cows, preps, supper and sleeps.
2 - 6 p.m - domestic chores, wash children, fetch firewood and go to the market to look for food.	1 p.m - lunch but some don't come for lunch at home.	supper/studies and then sleeps.	
6 - 9 p.m - prepare supper, eat and then sleep.	2 - 8 p.m - look after cows & go out to relax.		
	8 - 9 p.m- supper and sleep.		

#### E. KNOWLEDGE OF DISEASE (CHOLERA)

The participants said that the disease is caused by dirty water, lack of latrines, eating fruits with dirty hands and houseflies.

The symptoms of cholera are: “kuhara zaidi ya kiasi mpaka unahara maji meupe” vomiting water excessively, dryness and wrinkling of the skin, fatigue, cannot be able to walk and one can diarrhoea for two continuous days. They said, “ mtu anahara mpaka hata kama ako na minyoo inatoka”.

They said that cholera usually strikes during the rainy season because, “this time the runoff (dirty water) which even contains human waste because some people have no pit latrines but use bushes is swept in the river which they also get water for domestic use from”.

The participants said that they acquire information about cholera from medical officers who usually inform them in collaboration with the chief during barazas. They also get information from the radio and also from infected neighbourhoods.

## F. ATTITUDE, PRACTICE AND IMPACT OF THE DISEASE.

The participants said that cholera is a very dangerous disease in the community because it kills very easily. They said, “ hata sisi wenye tumezoea kula kwa matanga huwa tunaogopa sana”. They said that cholera is a deadly disease because it kills people at once and spreads quickly.

The participants said that the government should meet the cost of treating cholera because it is a costly disease and it comes when “ we do not have money”.

However, they said that the community should do prevention of the disease because, serikali haiwezi kuchemshia watu maji au kuchimba choo”.

With regard to mode of treatment, they said that some people use herbal medicine to treat cholera because of lack of knowledge of alternative treatment of the disease. They said, “ kwa yule ambaye hajaona mtu akigonjeka kipindupindu huwa anatomia madawa ya kienyeji”. But those who know the disease usually take the patients to the health facilities but after self-medication using salt solution.

They said that the type of medicine used to treat cholera is tetracycline and water.

The participants said that they prevent cholera, by: boiling water, construction of latrines, eating clean food and staying in a clean environment.

## G. VULNERABILITY AND ADAPTABILITY OF DISEASE.

The participants said, “kipindupindu huangukia mtu yeyote hata awe mzee au mtoto”. However they said that adult males and females are the ones who mostly succumb to cholera outbreak because, “they move anyhowly, go to funerals and eat in the funerals thus being exposed very much to cholera than children”.

The participants said that they are very vulnerable to cholera because “they usually lack the means, to take the sick to the health facilities because some homes are very far away from the health services”.

They also lack money to hire vehicles and “hata baisikeli ya kubeba mgonjwa peke yake hauna”. They said, “hata wakati mwingi unakuta mgonjwa amebewa na wheelbarrow kupelekwa hospitali”.

## H. EXERCISE 2: COPING MECHANISMS.

The participants came up with 8 coping mechanisms, which they ranked as follows and also by use of a wheel (see chart).

Coping Mechanism	Rank
1. Seek immediate medical attention	2
2. Self medication (salt solution & capsules)	1
3. Boiling water for drinking	3
4. General house cleanliness	6
5. Construction of pit latrines	8
6. Cover food to prevent house flies	5
7. Avoid unhealthy and dirty food	7
8. Wash hands with warm water before meals.	4

With regard to interventions, they said that the government creates awareness on the outbreak of cholera especially in the chief barazas. Plan International also supplied cholera drugs to the health centers and were provided freely. The Kenya Water for Health Organization (KWAHO) assisted people to construct water tanks although this was not done during the outbreak. KWAHO has created awareness on cholera but usually to some people but not all. It has also constructed boreholes for them.

### I. EXERCISE 3: PME BASELINE TABLE.

The participants indicated their opinion with regard to the government health facility, the private clinic, the administration (chief) and the NGO's (Plan International & KWAHO). They indicated whether they were very happy, moderately happy or very unhappy with each of them (see chart).

All the participants were very happy with the government health facility because of good attention and nice treatment, availability of beds and availability of food for patients.

All the participants were very happy with the administration (chief) because he enforced people to construct pit latrines and also created awareness on the disease.

All the participants were very happy with the NGO's (Plan International and KWAHO) because the plan International provided free drugs and hired medical staff especially when there was an epidemic and the medical staff was on strike. Plan International also helped to provide beds, bed sheets and curtains to the health center.

The participants (All) were very unhappy with the private clinics because of poor treatment, " tamaa tu ya pesa lakini matibabu mbaya!" many people treated in the private clinic did not get well and some died. The costs were also very high ranging from Kshs. 750 per dose.

#### Female FGD (Kombewa) Group 4: 14<sup>TH</sup> August 2003

##### A. DEMOGRAPHIC, LOCATIONAL CHARACTERISTICS AND INCIDENCE OF DISEASE.

Participant	Age	Marital status	Education level	Location of household
A	20	Single	Form 2	3 km from Lake & 1 km from the river
B	23	Married	Form 4	1 km from Lake & 5 km from the river
C	27	Married	Form 4	15 km from the Lake & 3 km from the river
D	20	Single	Form 2	5 km from the Lake & ½ km from the river
E	50	Married	None	13 km from the Lake & ½ km from the river.

Other specific characteristics include:

#### Participant A's household members

Participant A is single and has no child. She has never suffered from cholera but her cousin was sick of cholera in the year 2002.

**Participant B's household members.**

Gender	M.A	F.C
Age	38	½

Participant B said that her family has never suffered from cholera except her aunty who suffered from the disease in the year 2000. The participant was unable to remember the month when her cousin had cholera. In the year 2001, her aunt died due to cholera.

The participant said that her family usually uses borehole water for domestic purposes.

**Participant C's household members.**

Gender	M.A	F.C	M.C
Age	32	6	2 months

Participant C said that she has never lost a household member due to cholera but a female cousin in December 2001. there is no any member of the household who has ever suffered from cholera. The participant said that her household consumes water from a well.

Participant D's household members: The participant is not married but has a girl child aged seven months. She has never suffered from cholera but her grandmother suffered from the disease in March 2000 but survived.

**Participant E's household members.**

Gender	M.A	F.C	F.C	M.C
Age	55	34	32	29

Participant E said that she is the second wife in a family of two wives. She has 18 children but said she could not remember their ages. Nine of her children passed away and in the total of nine who remained, five are females and four are males. She said that her family has not suffered from cholera at all and no incidence of death due to the disease. The participant said that her family has a borehole from which they get water for consumption.

- B. **EXERCISE 1:** The participants drew a sketch map of Juliana Aruwa's household showing its location, distance form the Lake/river and health units (see chart).

**C. WEALTH INDICATORS**

The participants agreed that the indicators of wealth in their community comprises of:

1. Having too much money
2. Has piped (tap) water
3. Has a permanent house
4. Many plots
5. Vehicle
6. Many cattle & a large piece of land

Based on the above indicators, the participants said that their community could be categorized into three, the rich (wealthy), middle level (poor) and lastly the poorest (too poor).

The rich (wealthy) category of their community are those who have between 20 – 30 cows, 5 – 10 acres of land, many plots, a vehicle and a permanent house. The rich also have tap water and are able to educate their children with ease. The rich have a lot of money i.e. "tajiri ni yule mwenye pesa mingi".

The middle level (the poor) are those who don't have much money "mwenye yuko na pesa kiasi". This category also comprises of those who have a semi-permanent house, a bicycle, about 3 –5 cows, cultivates some land for subsistence only and has children who are not well educated as those of the rich.

The poorest category is that of those people "who do not have anything", do not have good house but have a grass thatched one, do not have land and face food crisis. They have little resources to feed and educate their children.

#### D.TIME ACTIVITY PATTERNS

**Table of normal daily schedule for different members of the household.**

F.A	M.A	F.C	M.C
5 – 9 a.m- wake up, milking, breakfast, wash clothes and clean the house.	6 – 9 a.m – wake up, go to the farm, and take breakfast towards 9 a.m while in the shamba.	6 a.m – wake up, breakfast, school.	6 a.m – wake up, breakfast, school.
9 a.m – 12 p.m – shamba/business.	9 a.m – 1 p.m- shamba	7 a.m – 5 p.m – schooling.	7 a.m – 5 p.m – schooling.
12 – 1 p.m – prepare lunch, take lunch and then start domestic work.	1 p.m – lunch	5 p.m – Assist to fetch water and other household work.	5 p.m –fetch water, relax, studies.
6 p.m – 9 p.m – prepare supper.	1 – 5 p.m – relaxes or goes out to look after cows.	9 – 10 p.m – sleep	9 – 10 p.m – sleep
9 – 10 p.m – sleep.	6 – 9 p.m – return home, take supper.		
	9 – 10 p.m – sleep.		

#### E. KNOWLEDGE OF DISEASE (CHOLERA).

The participants said that cholera is caused by: dirty water, contaminated food, living in a dirty house, lack of latrines, food which is not well cooked, lack of a rack to place clean utensils and uncovered food.

The participants said that the symptoms of cholera are: vomiting of prolonged whitish fluids, loose stool (diarrhoea) normally of watery substances with spots of blood, loss of weight and loss of appetite. They said, "mtu huwa ana hara na kutapika".

They said that cholera is most common during the dry seasons because "there is no water and most people fetch water from rivers which are contaminated. They reported that the disease is most common in April and August.

The participants reported that they acquire information concerning cholera outbreak from health officers who usually move around and sensitize people about the danger of the disease. They also acquire information through announcements by chiefs at chief baraza. They also tend to share information amongst themselves (informal network) and their children are also informed at schools.

#### F. ATTITUDE, PRACTICE AND IMPACT OF DISEASE.

The participants said, "kipindupindu ni ugonjwa hatari sana hapa kwa sababu huwa inakuja mara moja na kwa masaa chini ya mawili huwa imeua watu". The disease also weakens somebody and therefore becomes less productive.



The participants reported that they would prefer that the government takes care of all the costs of treating people who suffer from cholera because most of them are poor hence cannot afford medical costs. The distance from home to the hospital is also too long and so most of the people are unable to afford transport and medical cost. Some even die before reaching to the hospital.

They all agreed that the responsibility of preventing cholera should/ought to be the responsibility of the community because it is the people who should maintain their own cleanliness of the compound, boil drinking water and also construct latrines.

On the mode of treatment, they said that when there is an outbreak of cholera, they normally start by self-medication using salt solution as first aid. They said that in most cases, they rush those suffering from cholera to the hospital for treatment because, “in the hospital, the patients are given various drugs and added water”.

The participants were unable to remember the drugs given to treat cholera. They said that they prevent cholera by:

1. Living in clean houses and environment
2. Boiling drinking water
3. Constructing pit latrines
4. Constructing racks for placing clean utensils
5. Covering food after cooking & washing hands before meals.

#### **G. VULNERABILITY AND ADAPTABILITY OF DISEASE.**

They said that cholera mostly infects the grown ups more than children and they are also the ones who mostly die. They said that this is because adults tend to be very mobile e.g. in funerals and in the market places where they eat anything thus the ease for them to contract the disease.

Children are less infected by the disease because they are mostly confined at home. Between male and female adults, cholera catches both equally. “Huwa haichagui huyu ni mzee au ni mama”.

They said they are vulnerable to cholera because: of poor nutrition and lack of food to keep their bodies strong during the outbreak, they are also vulnerable due to the long distances from homes to the health facilities, negligence on the symptoms of cholera (failure to seek medical attention at once when infected), lack of money to hire vehicles to transport the infected to the health facilities and high cost of drugs that treat cholera especially in cases where one needs to buy the drugs.

#### **H. EXERCISE 2: COPING MECHANISMS.**

The participants agreed and ranked the following coping mechanisms in order of importance: (see chart).

<b>COPING MECHANISM</b>	<b>RANK</b>
1. Keeping the surrounding/ house clean	5
2. Boiling drinking water	7
3. Having clean latrines/construction of latrines	6
4. Covering food	8
5. Eating well cooked food	9
6. Washing hands before meals	4
7. Self-medication using salt solutions	1
8. Seeking medical attention (rush to hospital)	2
9. Maintaining well balanced diet after treatment.	3

On interventions, the government usually announces through the radio whenever there is an outbreak of cholera. The chief through barazas also create awareness. The public health officers also sensitize people on how best to prevent themselves e.g. on washing hands before meals and covering food. When the

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outbreak is very serious, the government also provides free drugs to the people through the health centers.

The participants said that there is no any NGO/CBO that has ever come to their aid when there is cholera outbreak.

# **I. EXERCISE 3: PME BASELINE TABLE**

The participants indicated whether they are usually very happy, moderately happy or very unhappy with the government health centers and the administration (chiefs) based on how these institutions intervene during cholera outbreak (see chart).

Very happy with the health center: two of the participants indicated that they are usually pleased with the services rendered by the health centers because they provide free treatment, those treated do recover and they also create awareness about cholera.

Those moderately happy with the health centers: Three of the participants said they were moderately happy because they were charged some fee for their patients, the medical staff refused to treat without money and slow rendering of services.

All the participants were very happy with the chief/assistant chief because of creation of awareness on the outbreak of cholera especially on the need to construct pit latrines and to rush patients to the health facilities.

**SOSIOT FEMALE FGD: 15<sup>TH</sup> AUGUST 2003.**

## **DEMOGRAPHIC, LOCATIONAL CHARACTERISTICS AND INCIDENCE OF DISEASE.**

<b>Participant</b>	<b>Age</b>	<b>Marital status</b>	<b>Education level</b>	<b>Location of household</b>
A	31	Married	Form 4	Hill side
B	27	Married	Form 4	Hill side
C	30	Married	Form 4	Hill side
D	24	Married	Form 4	Hill side
E	27	Married	Form 4	Hill side
F	22	Married	Form 4	Hill side

**Other specific characteristics include:**

**Participant A's household members.**

Gender	M.A	F.C	M.C
Age	34	7	1 ½

Participant A said that her daughter suffered from malaria in June 2003 but was treated and recovered. She also said that two children of her sister -in-law also suffered from malaria in June 2002 and admitted for two days. There has not been any incidence of death in her family due to malaria.

**Participant B's household members.**

Gender	M.A	F.C	M.C
Age	33	6	5

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She said that her son was sick of malaria in July 2003 but was treated and recovered. Her two children also suffered from malaria in August 2002 but were not admitted. There hasn't been any case of death due to malaria.

**Participant C's household members.**

Gender	. MA	M.C	M.C	F.C	F.C
Age	42	15	10	8	5

Participant C said that none of her family members has suffered malaria this year but in June 2002, all her children suffered from the disease and were treated and recovered. There has not been any incidence of death in her family.

**Participant D's household members:**

Gender	M.A	F.C
Age	34	1

She said that her husband suffered from malaria in July 2003 while she suffered in July 2002 of the same. No incidence of death due to malaria.

**Participant E's household members.**

Gender	M.A	F.C
Age	29	1

Participant E said that there has not been any case of malaria or even death associated with it in her household. However, her brother suffered from malaria in July 2003 and was admitted.

**Participant F's household members.**

Gender	M.A	F.C
Age	32	3

There has not been any case of malaria in her household this year but her sister was admitted in July 2002 due to malaria.

- A. **EXERCISE 1:** The participants drew a sketch map of Lorna Tanui's household indicating its location, stagnant waters and health units (see chart).

**B. WEALTH INDICATORS.**

The participants said that the indicators of wealth in their community comprise of tea plantations, number of grade cows, formal employment, good business, owning a motor vehicle, large size of land and owning a permanent (stone) house.

Based on these characteristics, the participants said members of their community could be categorized into three: the rich, the poor and the poorest (the poor of the poor).

The indicators of the rich are: over two acres of tea plantation, one or two grade cows that produce milk, formal employment (working class), one with a supermarket/wholesale, shop/big hotels/butcheries/rental, land of more than twenty acres and a big permanent house.

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The poor category of people are characterized by about ¼ acres of land, about three zebu cows, a donkey and a hand cart, a small business e.g. of selling vegetables, mostly having a semi-permanent house and some have jobs but lowly paid.

The poor of the poor are characterized by: a grass-thatched and mud house, casual labouring even for food, unable to educate their children beyond primary level and their children even lack food and good clothing.

### D. TIME ACTIVITY PATTERNS.

**Table of normal daily schedule for different members of the household.**

F.A	M.A	F.C	M.C
6-8 a.m - wake up, milk cows, prepare breakfast and prepare children for school.	7.30 - 8 a.m -wake up, take breakfast, look after cows and commands what the wife should do.	6 a.m - wake up and prepare to go to school.	6 a.m - wake up and prepare to go to school.
8 - 11 a.m - prepare lunch	8 a.m - 1 p.m- farming/harvesting tea leaves.	Get back home at 5 p.m and assist mothers to do household chores.	Get back at home at 5 p.m and look after the cows.
1 -5 p.m - some relax and others go to the market to buy food and some to fetch water/firewood.	1 - 2 p.m - lunch	Sleep at 10.00 p.m after supper.	Sleep at 10.00 p.m after supper.
5 - 8 p.m - prepare supper and take supper.	2 - 9 p.m - go out to relax, visit friends, drinks beer/watch videos		
8 - 10 p.m - retire to bed.	9 - 10 p.m - supper and sleep.		

### C. KNOWLEDGE OF DISEASE (MALARIA).

They all agreed that malaria is caused by mosquitoes.

They said that the symptoms of malaria are: headache, fever, vomiting e.g. of yellow fluids and also loss of appetite. The other symptom is excess shivering.

They all said that malaria normally occurs after the heavy rains (June and July) i.e. immediately when the rains subsides. This is because of "too much stagnant water and bushy plantations of maize and banana near their houses which act as breeding points for mosquitoes."

They said that they acquire information about malaria from radios and the health officers. They said that the government health officers usually create awareness to the community on how to prevent malaria. They also get information concerning malaria outbreak from their friends/neighbours. A Tenuk community health service, which is located at Sosirot, also disseminates information concerning malaria in the marginalized rural areas of Sosirot. However, none of the participants has benefited from its services.

### D. ATTITUDE, PRACTICE AND IMPACT OF DISEASE.

All the participants said that malaria is a very severe disease because "it strikes at once and it kills, it comes abruptly and does not get out quickly. It also interferes with the work". They said, "hata kazi haiwezi kufanyika kwa boma malaria ikishaingia."

They said that they would wish the government to assist them in treating malaria because “most of us are poor and cannot afford the cost of treating malaria especially in an epidemic”.

However, they said that prevention of malaria should be the responsibility of the community because “haina garama mingi kama ile ya kutibu malaria”.

They said that their mode of treatment of malaria comprises of taking the sick to the health facilities and self-medication e.g. buying of panadol. They said that they do not use herbal medicine in treating malaria because they know malaria really kills people and therefore requires modern medicine. They said, “madawa ya kienyeji haiwezi kumaliza malaria mara moja. Hata siku hizi watu wanaogopa madawa ya kienyeji kwa sababu haiponyi”. They said that they do self-medication before going to the health facilities because, “we are usually not sure about whether the symptoms being experienced are for malaria. This also happens because of lack of enough money to go to the hospital”.

They said that they use fansidar and panadols to treat malaria.

On prevention of malaria, four out of six participants said that they use nets, which are treated to prevent malaria. They said that bed nets should be treated after every six months using power tabs. Other methods that they use to prevent malaria are: drainage of stagnant water and clearing bushes, some of them said that they ever used mosquito coils but were affected by it i.e. they had breathing problem. They said they do not use spray because even if one sprays, the mosquitoes will have to come back after a short time after spraying.

#### **G. VULNERABILITY AND ADAPTABILITY OF DISEASE.**

The participants said that children of 10 years and below suffer from malaria more often than adults because, “ watoto hawana nguvu ya kutosha”. Their resistance to the disease is low. Children also sleep carelessly hence do not cover themselves nicely at night. Children also tend to play near stagnant water/bushes at night thereby exposing themselves to mosquitoes.

They said that female adults suffer from malaria more than male adults because, “some men are selfish. They do not buy nets for children and the wife but only buy theirs. Women also tend to sleep late than men thus being exposed more to mosquitoes than men”.

The participants said that they are vulnerable to malaria because of poverty. They said that they lack money to buy nets, to take their patients to the hospital and also lack of balanced diet hence becoming weaker when they are sick..

#### **H. EXERCISE TWO**

The participants ranked six coping mechanisms as shown below:

<b>Coping mechanism</b>	<b>Rank</b>
1. Drainage of stagnant water	2
2. Clearing bushes	3
3. Using treated bed nets	
4. Disposing off empty tins/cans	4
5. Rushing the sick to hospital	6
6. Self-medication	1

**N/B:** See the wheel drawn representing the six coping mechanisms in the chart.

With regards to interventions, the participants said that the government through the health center has provided free medicine to the sick during the epidemic. The public health officers have also made

announcement through the radio asking people to prevent malaria and seek medical attention in case of signs of malaria. The government health officials have also sprayed some households within the area. The private clinics have also helped to treat malaria during the epidemic but the charges are high. The participants said that no NGO has come to their aid during the epidemic.

### **I. EXERCISE 3: PME BASELINE TABLE.**

The participants indicated their opinion on the intervention by the government and the private health institutions during the epidemic. They indicated whether they are very happy, moderately happy or very unhappy (see chart).

It provided free medication during the epidemic

Awareness/advice on how to prevent malaria

Some said they were very happy with the private clinics because:

- a. Treatment even without all the cash (money) but to pay at a later date
- b. Availability of the medical staff all the time
- c. Advice to the patients on how to prevent malaria

Some were moderately happy with the government health centers because: Although it provided free drugs, they are mostly supposed to pay money before treatment and without money no treatment. They are turned away even if seriously sick.

Some said they were moderately happy with the private clinics because of they are mostly supposed to pay money before treatment and without money no treatment. They are turned away even if seriously sick. High cost for treatment e.g. Kshs. 1,800 for quinine and “water” for three days.

After being treated at the private clinic, no full recovery due to poor treatment.

### **J. EXERCISE 4: ROLE PLAY**

The participants role played the coping mechanisms during the out-break of malaria:

Actors included: patient, mother to patient, neighbour to the patient, nurse and the father to the patient.

The patient (child) starts to complain to her mother about her sickness i.e. headache, high body temperature. The mother then asks the child to explain properly about her feelings and when it started. The mother then gets shocked of her child’s sickness and goes to call a neighbour for help.

This time the child is very sick and already vomiting. The neighbour hold the patient on one side and the mother supports her on the other side and takes her to the health center.

The patient now tells the nurse about her feelings and even indeed practically vomits and expresses the feelings of headache and coughing. She says, “ninakichwa na ninatapika”.

The nurse then makes diagnosis and gives her some fansidar drugs. The mother then complains to the nurse that the child is still vomiting.

The nurse checks the patient again and suggests that she is now an admission case. But the patient shouts that she cannot be admitted. But she is then admitted and the mother sends the neighbour to go to inform the father to the child.

The father rushes to the hospital but the wife asks him, “Why have you come even without porridge yet you can see our child is now admitted”. The father to the child then goes back home to prepare porridge and on bringing it, the child refuses to drink because of lack of appetite.

After some days, the patient is then discharged.

A. DEMOGRAPHIC LOCATIONAL CHARACTERISTICS AND INCIDENCE  
OF DISEASE

Participant	Age	Marital status	Education level	Location of household
A	59	Married	Std 5	Hill side
B	54	Married	Std 7	Hill side
C	27	Married	Form 4	Hill top
D	51	Married	Std 7	Hill side
E	50	Married	Std 3	Valley bottom
F	54	Married	Std 6	Hill side

**Other specific characteristics include:**

**PARTICIPANT A's HOUSEHOLD MEMBERS.**

Gender	F.A	F.C	M.C	M.C	F.C	F.C	F.C	M.C
Age	34	27	24	22	20	18	16	14

Participant A said that he suffered malaria together with his wife and one child between April and August this year. The child was even admitted in April this year. The participant and one of his sons also suffered from malaria almost at the same period in 2002. No one has ever died in his family due to malaria.

Participant B said that his wife was born at around 1953. He has five female children and two males. He was not able to recall when each of them was born. He said that malaria Caught him in July 2003 and was admitted in a private hospital. He has never lost any member of his family due to malaria.

**PARTICIPANT C's HOUSEHOLD MEMBERS**

Gender	F.C	M.C
Age	24	9 months

Participant C said that her child had malaria in July 2003 but was treated and recovered. He has never lost a member of his family due to malaria.

**PARTICIPANT D's HOUSEHOLD MEMBERS.**

Gender	F.A	M.C	F.C	F.C
Age	47	16	14	12

The participant said that there was abut of malaria in April and he got sick but was not admitted. in 2002, two of his children suffered from malaria (around June). He said that there is no any relative or member of his family who has ever died of malaria.

**PARTICIPANT E's HOUSEHOLD MEMBERS**

Gender	F.A	M.C	F.C	M.C	M.C
Age	43	30	29	27	10

Participant E said that he suffered from malaria in June 2003 and was treated. In 2002 (June), his wife was admitted at Kericho District Hospital for three weeks due to malaria.

**PARTICIPANT F's HOUSEHOLD MEMBERS**

Gender	F.A	F.A
Age	54	45

He said that the wife who lives at Kericho has 8 children while the other one who lives in Nakuru has 5 children. The participant said that the wife who lives in Kericho had malaria in June 2001 and was admitted for six days. He said that malaria is rare in his household and none of his family members has died of malaria.

- B. **EXERCISE 1:** The participants drew a sketch map of John Malakwen's households showing its location, presence of stagnant waters and health centers (see chart).

**C. WEALTH INDICATORS.**

The participants agreed that the indicators of wealth in their community include:

Large size of tea plantations, many grade cows, able to grow a lot of maize, has a good house (permanent), owns a vehicle(s), has well educated children and has a very good business.

Based on the above indicators, they said that their community can be categorized into three: tajiri (the rich), tajiri nusu (middle class), maskini (the poor) and maskini ya Mungu au maskini ya mwisho (the poorest).

The rich are those who possess a large piece of tea plantation (about 100 acres), about 10 grade cows, about 6 acres of maize plantation, a permanent house, having a large business, a motor vehicle and well educated children.

The middle class are those who own about one acre of tea plantation, at least one grade cow, at least one acre of maize plantation, a semi-permanent house, a bicycle, a handcart and one who is able to educate children up to College level.

The poor have a grass-thatched house, about four goats, has chicken, some have land but lack the capital to properly cultivate, they have a small land (about one acre). In addition, "ni watu wa vibarua" and cannot afford uniform for their children.

The poorest have no land, works on temporary basis, live from hand to mouth and are always begging.

**D. TIME ACTIVITY PATTERNS**

**Table of normal daily schedule for different members of the household.**

F.A	M.A	F.C	M.C
5 - 8 a.m - milking, breakfast and prepares children for school. 8 a.m - 12 p.m - shamba 12 p.m - 1 p.m - back to the shamba to cultivate/ plant vegetables.	5 - 6 a.m - wake up, go to the shamba, look at the cattle and survey the farm. 7 a.m - 1 p.m- farming 1 - 2 p.m - lunch 2 - 5 p.m - back to the shamba	6 a.m -wake breakfast and go to school.  The grown ups assist the mothers to fetch firewood, water and other domestic chores.  9 - 10 p.m - sleep	6 a.m - wake up, breakfast and go to school.  The grown ups look after cows. 9- 10 p.m - sleep



5 - 7 p.m - preparation for supper.	5 - 6 p.m - relaxes with friends/look after cows		
7 - 8 p.m supper	6 - 8 p.m - supper		
8 - 9 p.m - sleep.	9 - 10 p.m - sleep		

#### D. KNOWLEDGE OF DISEASE (MALARIA)

With regard to causes of malaria, they said that, “ during rainy seasons, there is too much water and therefore mosquitoes breed too much in stagnant waters. Unslashed bushes encourage the breeding of mosquitoes. Throwing empty cans/ containers lead to the breeding of mosquitoes”. Some participants also said that “ chipsey cooking fat” also causes malaria. They said, “ukikula mafuta ya chipsey inaamusha malaria mara moja”. They also said that drinking water from a different stream also leads to malaria i.e. “mabadiliko ya hali ya anga na unapokunywa maji ya sehemu ingine huleta malaria”.

The participants said that the symptoms of malaria include: fatigue, pain of the joints, too much vomiting, shivering, too much (high temperature), severe headache (kichwa kuuma kwa uchungu sana), stomach ache, difficulty in breathing, the eyes turn yellow, stiffness of the neck and lack of appetite.

They said that malaria is more common during the rainy seasons around April to July. This is when mosquitoes breed too much.

The participants said that they get information on malaria from the radio, the public health officers and the children are informed by teachers in schools. They said that the chiefs rarely call barazas to inform people about malaria epidemics.

The public health officers move around especially during the outbreak and teach them on the measures to take such as on prevention and going to the hospital. They also get information through friends and neighbours (informal network) The participants said that there is no any NGO concerned with malaria in the area.

#### E. ATTITUDE, PRACTICE AND IMPACT

The participants said that malaria is a very dangerous disease and infact the most deadly one in the community. They said, “ni ugonjwa hatari sababu wakati inakuja humaliza na kuuwa watu sana”. They said that it is also a costly disease to the people.

They said that the government should assist in the treatment of malaria because when the outbreak occurs the people do not have enough money to treat their patients.

On prevention of malaria, they said that this should be a shared responsibility. The community needs to keep the compound clean and drain stagnant water while the government needs to supply the people with nets and spraying of swamps.

#### Their modes of treatment include:

Seeking immediate medical attention. They said, “One can even sell properties to treat the patient”.

Self-medication by buying tablets such as fansiders and malariaquine.

They said that they do no longer use traditional medicine before medical treatment.

Some of the participants said that after being treated in the hospital they resort to herbal medicine.

They all said that they treat themselves quickly to avoid loss of life.

The most common drugs used by the participants include: panadol, fansidar, malarquine and metakalfin.

**The participants mode of prevention of malaria include: slashing the compound to remove bushes, drainage of stagnant water, putting spray diesel or kerosene on stagnant water, and two of the participants said that they use mosquito coils and that one participant also uses a treated bed net.**

#### **F. VULNERABILITY AND ADAPTABILITY OF DISEASE.**

The participants said that malaria mostly affects children of seven years and below because, “the children are still weak and fragile. Watoto hawana nguvu sana”.

In most cases, malaria affects women than men because, “people believe that men who take alcohol acts as prevention of malaria”.

The participants said that they are vulnerable to malaria because of:

Lack of money to seek medical treatment i.e. poverty

The distance from home to the nearest health centers is also far to most of the people especially during the epidemics.

Lack of proper knowledge on the best drugs to treat malaria.

Poor means of communication to create awareness on the outbreak of malaria and lack of drugs in most local health centers.

The participants came up with four coping mechanisms in the event of malaria epidemics (see chart for the wheel).

<b>Coping mechanism</b>	<b>Rank</b>
<b>Clearing bushes in the compound</b>	<b>2</b>
<b>Drainage of stagnant water</b>	<b>3</b>
<b>Seek medical attention</b>	<b>4</b>
<b>Self-medication (buying drugs)</b>	<b>1</b>

On interventions they said that the administration (chief) does not do anything even when there is malaria epidemic.

They said that the government usually provides drugs free of charge when there is an epidemic. the government also sprays some people’s houses free of charge and mainly in stagnant and swampy area. The public health officials also create awareness on prevention of malaria.

The participants had no idea of any NGO or CBO in their area that assist during the epidemic.

**H. EXERCISE 4: PME BASELINE TABLE**

The participants indicated their opinion on what they felt about the intervention by the government and private health institutions; they indicated whether they are very happy, moderately happy or very unhappy (see chart).

Those who said they were very happy with the services of the government (Sosiot health center) said so because:

1. When one takes a person to the health center even without money, one gets treatment (free medication).
2. Referral to specialized services such as Kericho District hospital in case of complication of the illness.
3. Spraying of houses during the epidemic and creation of awareness on malaria outbreak. Those who said are moderately happy with the private clinics said so because:
  - a. The services are very costly, “Kama mgonjwa analala hata siku moja anaitishwa Ksh. 2,000 na ati sisi hapa ni maskini”.

Those who said he very unhappy with the services of the private clinic said so because of:

- a. Some are unqualified staff yet they treat the patients
- b. They do not give a full dose to the patients. “Ni biashara wanafanyia kwa wagonjwa”.

**Kabianga Females FGD: 16<sup>th</sup> August, 2003****DEMOGRAPHIC, LOCATIONAL CHARACTERISTICS AND  
INCIDENCE OF DISEASE.**

Participant	Age	Marital status	Education level	Household location
A	23	Married	Form 4	Hill top
B	26	Married	Form 4	Hill side
C	26	Married	Form 4	Hill top
D	23	Married	Form 4	Hill top
E	28	Single	Std 8	Valley bottom
F	24	Married	Std 6	Valley bottom

**Other specific characteristics include:**

Participant A's household members only include the husband aged 28 years but they have no any child yet. In June 2003, both of them suffered from malaria but were not admitted in the hospital. The participant's mother-in-law suffered from malaria in June 2002 and was admitted for about two weeks. In July 1998, the participant lost a cousin and this was due to malaria.

**Participant B's household members:**

Gender	M.A	F.C
Age	29	5

Participant B said that her family suffered from malaria between May and June 2003 but with no admissions. Her mother-in-law suffered from malaria in May 2002 and was admitted for one week. There has not been any incidence of death in her family that can be associated with malaria.

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**Participant C's household members:**

Gender	M.A	M.C
Age	29	3

The participant said that the whole of her family suffered from malaria around May 2003 but no one was admitted.

The participant was sick of malaria in June 2002 but was not admitted. She said that there has not been any incidence of death in her family, which can be associated with malaria outbreak.

**Participant D's household members.**

Gender	M.A	M.C
Age	28	7 months

The participant said that she got sick of malaria in June 2003 and was admitted in the hospital. She had also suffered from the same disease in May 2002 but was not admitted. Her mother suffered from malaria in May 2003 but was not admitted in the hospital. There has not been any death case due to malaria in her family.

**Participant E's household members.**

Gender	M.A	M.C
Age	None	5

Participant E said that there has not been any case of malaria or even death to her family in the last two years. She said that there have not been any cases of death due to malaria even amongst her close relatives.

**Participant F's household members.**

Gender	M.A	M.C	M.C	F.C	M.C	.MC
Age	30	11	11	6	5	1 month

The participant said that all her children were affected by malaria in June 2003 but none was admitted in the hospital. However, her brother suffered from malaria in June 2003 and was admitted for two weeks. In her family, there has not been any case of death due to malaria.

**B. EXERCISE I:** The participants drew a map showing the location of Christian Chirchir's household (SEE CHART).

**C. WEALTH INDICATORS.**

The participants said that members of their community could be categorized into four: the rich, the middle class, the low class and the poor. They said that a person's well being is indicated by the type of business, number of grade cows, large plantations of tea, size of land, type of house and ability to educate one's children up to even University level.

The rich people in their community have big businesses such as wholesale shops, hotels among others. The wealthy people have about 30 grade cows; about 30 acres of tea plantations, one or more vehicles, and a permanent big house which even has electricity. The rich people are also able to educate their children up to university level and some take their children to study outside Kenya.

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The middle class members of the community have 5 – 10 acres of tea plantations, 20 –30 acres of land, one vehicle, 8 – 10 grade cows and a permanent house, which could be having solar. This class of people is able to educate its children with ease.

Low class people have a small permanent house, one acre of tea leaves, a kiosk, about 3 grade cows and about 5-10 acres of land. They are able to educate their children up to form four or lower levels.

The poor group of people owns a grass-thatched house, a zebu cow and one acre of land or less but without tea plantations. This group of people keeps on drinking local brew and most of them are employed as casuals within the area by the wealthier ones.

### D. EXERCISE 2: Time Activity Timetable:

Table of normal daily schedule for different members of the family.

F.A	M.A	F.C	M.C
5 – 8 a.m – Wake up, prepare breakfast, and prepare children to go to school and other domestic chores.	6 – 8 a.m- wake up, take breakfast and some go to the shamba while others go to work (those employed).	6.00 a.m – They wake up and go to school after breakfast.	6.00 a.m – They wake up and go to school after breakfast.
8 a.m – 5 p.m – Some go to their business premises while others do farm work/casual labours.	They normally come back home between 6- 9 p.m.	They normally come back home at 4-5 p.m.	They normally come back home at 4-5 p.m.
5 p.m – Prepare supper.	9 – 10 p.m supper and sleeps.	They assist in cooking, wash utensils and other household works. They normally sleep at 9.00 p.m	After school they help in picking tea and look after cattle. They sleep at 9.00 p.m.
9 p.m – 10 p.m – retire to bed.			

### E. KNOWLEDGE OF DISEASE (MALARIA).

The participants said that they believe that mosquitoes cause malaria.

They said that the symptoms of malaria include: high fever, high body temperature, fatigue, and lack of appetite, mild headache and feeling cold.

The participants said that malaria is most common after the heavy rains i.e. just between the end of the rains and the start of the dry spell. They said that this happens because “this is the breeding season for mosquitoes because of stagnant water.

Mosquitoes also tend to breed in the banana plantations due to watery places within them. The participants agreed that change of weather is associated with malaria outbreak.

They said that they acquire information on malaria through informal networks i.e. from other community members. They also get information from health officials such as doctors and the public health officers. Their children are also given information about malaria epidemics when they are at school. The participants said that there are no community based awareness programs concerning malaria in their region.

## F. ATTITUDE, PRACTICE AND IMPACT OF THE DISEASE.

The participants said that malaria is a very severe disease in the area because “it is a number one killer disease”. It also makes them incapacitated hence very negative on their productive work and the economy in general. They said that it is also a dangerous disease because it is costly to treat.

They said that the government should cater for treatment of malaria because during epidemics, it is costly to most of the households. It is a heavy burden. However, the community should take charge of prevention because the government cannot do everything for them.

They said that normally people tend to treat themselves before going to the hospital/health centers. They all said that they don’t use herbal medicine because it doesn’t fully treat malaria.

The type of medicine that they use to treat malaria include: oroda, fansidar, malaratab, panadol and halfan.

With regard to prevention, three out of the six participants said that they use treated nets to prevent malaria. One of the participants said that she uses spray as a repellent of mosquitoes. All the participants said that they drain stagnant water and clear bushes in the compound to prevent malaria.

One of the participants said that in her village, about two people passed away between May and June 2003 due to malaria.

## G. VULNERABILITY AND ADAPTABILITY TO DISEASE.

The participants said that most of those affected by malaria are children aged 0-5 years old. This is because children tend to play near stagnant waters hence exposed to malaria. The participants also said that children have weak bodies (not resistant) to malaria.

Between men and women, women are the most affected by malaria because women have very weak bodies since they do much work than men.

The participants said that they tend to be vulnerable to malaria epidemics due to lack of money for buying drugs and for seeking medical attention. They are also vulnerable due to lack of sufficient medical facilities to take care of malaria epidemics.

There is also lack of sufficient drugs in the local dispensaries. Other causes of their vulnerability are: lack of reliable means of transportation to the hospital because the hospital is far away, high cost of medication, mainly by the private clinics, and lack of enough food to keep their bodies strong to be able to fight malaria.

## H. EXERCISE 3: COPING MECHANISMS.

The participants were requested to indicate their coping mechanisms during malaria epidemics and further rank them starting from the most important to the least important as follows:

Coping mechanism	Rank
Self medication (buying drugs)	1
Seek immediate medical attention	2
Drainage of stagnant waters	4
Clearing bushes/empty cans/ tins.	5
Sleeping under treated nets.	3

With regard to interventions, the participants pointed out that the government provides free drugs when there is malaria epidemic. One of the participants also said that a relative was once given a mosquito net when she was being discharged from Kericho District hospital where she had been admitted due to

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malaria. The government public health officers have also created awareness on prevention of malaria. The government has also helped to create awareness through the radio on how to deal with malaria epidemic. The government has also created awareness of malaria outbreak through chief barazas.

The participants lamented that the NGO's world has not been concerned with malaria epidemic in the region. The CBO's have also not been involved in malaria epidemics in the area.

The private clinics are only involved in the treatment of malaria at a fee.

One of the participants said that she had seen some people from "power tab" who were moving around selling their nets and this way and through the advertisement, people get educated on the importance using treated mosquito nets for prevention of malaria.

#### I. EXERCISE 4: PME BASELINE

The participants were requested to demonstrate (own opinion) on how they felt about the various Institutions that play an intervention role during malaria epidemics (see chart).

Three out of six participants said they were very happy with the government because they were treated and recovered as well as low cost of treatment.

Five of the participants were very happy with private clinics because there is normally no overcrowding in the health services. The private clinics/hospitals also provide good services without harassment.

Three participants said they were moderately happy with the government (health center) because of giving half dose drugs, which was not enough to treat malaria. The government health services are also too crowded with long queue, slow services and also request a person to buy drugs and other equipments like syringes and injections.

One person was very unhappy with the private clinics due to high costs of treatment. One of the participants said that she lost a cousin who was being attended to in the hospital and this is an indication of poor services.

**Kabianga Males FGD: 16<sup>th</sup> August 2003**

#### DEMOGRAPHIC, LOCATIONAL CHARACTERISTICS AND INCIDENCE OF DISEASE.

PARTICIPANT	AGE	MARITAL STATUS	LOCATION OF HOUSEHOLD	EDUCATIONAL LEVEL
A	32	Married (one wife)	Hill side	Form 4
B	35	Married (one wife)	Valley bottom	Form 4
C.	30	Married (one wife)	Hill top	Form 4
D.	35	Married (one wife)	Hill top	Std 7
E.	31	Married (one wife)	Hill top	Form 3
F.	28	Married (one wife)	Hill side	Std 7

**Other specific characteristics are:**

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**Participant, A's household members by age and gender**

Gender	Female Adult	Female Child	Male Child	Female Child
Age	28	12	8	3 ½

He said that his wife suffered from malaria in January 2003. He bought drugs for her from a chemist and she recovered. In April 2003, two of his children also had malaria and he bought drugs for them. In July 2003, the whole of his family was "hit" by malaria and were treated at Kabianga health center. He has never lost a member of his household due to malaria but he lost his mother due to malaria in June 2003.

**Participant B's household members by age and gender**

Gender	F.A	F.C	M.C	M.C	M.C
Age	27	13	11	9	6

The participant said that he suffered from malaria in August 2003 and was treated at Kabianga health center. All the children also suffered from the same disease around May 2003 and he bought drugs for them.

His wife suffered from malaria in June 2002 and was admitted at Kericho Nursing home for two weeks. There hasn't been any case of death due to malaria in his family.

**Participant C's household members by age and gender**

Gender	F.A	F.C	F.C	M.C	M.C
Age	27	11	7	5	2 ½

All his children got sick of malaria in April 2003 and were treated in a private clinic but without admission. However, his mother was admitted due to malaria for one week in April 2003. In April 2002, one of his children also suffered from malaria but was treated and recovered. He said that two children of his brother died due to malaria in June 2002.

**Participant D's household members by age and gender.**

Gender	F.A	M.C	F.C	M.C
Age	28	14	11	8

He said that none of his family members died due to malaria. In August 2003, his child suffered from malaria and was treated at Sosiot health center.

**Participant E's household members by age and gender**

Gender	F.A	F.C	M.C
Age	28	9	7

The participant said that his wife and children suffer from malaria every year. In February and July 2003, his wife suffered from malaria while the female child suffered from the same disease in July the same year. There has not been any case of death due to malaria in his family.

**Participant F's household members by age and gender**

Gender	F.A	M.C	F.C
Age	26	9	6



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The participant said that malaria is not very common in his household. In July 2003, one of the children (female) was affected by malaria and was treated at home i.e. bought drugs. In April 2002, the wife suffered from the disease and was treated at the health center and discharged. The participant has not lost any relative due to malaria.

#### EXERCISE ONE:

The participants drew a sketch map of Reuben Arap Koe's household showing its location, presence of swamps and health units (see the chart).

#### IDENTIFICATION OF INDICATORS OF WEALTH

The participants said that their community could be divided into three categories depending on how wealthy a person is. The three categories are:

Matajiri (the rich)  
Watu wa katikati (middle class men) and  
Masikini (the poor)

According to the participants, the wealthy people (the rich) have vehicles and nice houses (a permanent house). A rich person in the community has a large plantation of tea, usually more than one acre. A wealthy person has more than ten grade cows and more than five acres of land.

They said that the middle class people have about 3 acres of land, ½ an acre of tea plantation, at least one grade cow, some chicken and possibly a small kiosk. In addition, a middle class person has a semi-permanent/grass thatched house and either bicycle or motorcycle. A middle class person has about six children who act as a source of labour. He/she is able to educate his children but with difficulties in paying school fees. The participants described a poor person in their community as one who has no tea plantation and has a grass thatched house. A poor person normally works for the rich i.e. "yeye hufanyia tajiri kazi" and some are beggars and living from hand to mouth. The poor are usually unable to educate their children beyond Primary school and have no cows and if they have any, "Ni ng'ombe ile tu ya kukodishwa na mtu ikupee maziwa na mwenyewe anaweza kuichukua wakati wowote"

#### TIME ACTIVITY PATTERNS

Table of normal daily schedule for different members of the household.

FEMALE ADULT	MALE ADULT	FEMALE CHILD	MALE CHILD
5 – 7.30 am  The wake up, prepare breakfast and prepare children for school.	5 – 7 am – They wake up, assist to milk cows and cut grass for cows.	During school time, they wake up at 6.00 am and by 7.00 am they are at school up to 5.00 p.m	Same as females
8.00 am – 11.00 am	7.00 a.m – 12.00 p.m Farming which includes tea picking	They are at school up to 5.00 p.m	Same as females

They go to the farm and some go for “kibarua” within the neighbourhoods			
12.00 p.m – 1.00 pm	2.00 pm – 8.00 pm. Go to relax with friends	They assist with farm work, household chores, look for firewood and fetch water. They sleep between 8.00 – 9.00 pm or at 10.00 pm for those doing studies	The male child is culturally not allowed to perform domestic chores.
Prepare lunch	8 – 9 p.m – takes supper and sleep.		They take supper at 8.00 – 9.00 p.m and then sleeps between 9.00 & 10.00 pm

### KNOWLEDGE OF DISEASES (MALARIA)

The participants said that malaria is caused by mosquitoes. However, some participants said that there is some believe among some members of the community that malaria is associated with witchcraft i.e. “macho mbaya huwa pia inaleta malaria”. All the participants said that malaria also occurs when maize plants produce pollen grains (flowering). One of the participants also associated malaria with stress/headache due to domestic quarrels, while some of the participants said that malaria is caused by cooking fat. A hangover resulting from excessive drinking of beer was also associated with malaria.

The participants said that the symptoms of malaria include: fever, high body temperature, severe headache, joint pains, stomach ache, feeling cold and shivering, lack of appetite, diarrhea and vomiting of yellowish/greenish substances. Others include the eyes changing to yellow, drying of lips, dizziness and sometimes loss of memory (kushikwa na wazimu).

They said that malaria is very common after a heavy spell of rain, usually between April and August. This is the time when mosquitoes are very many.

When there is rain, there is too much stagnant water hence breeding of mosquitoes. They said, “maji maji huwa inasimama kila pahali na hata swamps zinakuweco wakati wa mvua na hii ndiyo huleta mbu”. During the dry season there is also abit of malaria because of bushes formed by tealeaves and these act as breeding zones for mosquitoes.

The participants said that they get information on malaria from their chiefs and assistant chiefs. They said that the chiefs normally tell people to clean the compounds whenever there is an epidemic. The local health officers also do alert people on the outbreak of malaria. The radios also provide information to them about malaria epidemics. In schools, the teachers sensitize the pupils about malaria epidemics. They also noted that there is a Catholic Mission health service, which also sensitizes people on the outbreak of malaria. Finally, the other source of information is through informal networks. They said, “sisi huelezea majirani wetu kama tumepatwa na malaria”.

### ATTITUDE, PRACTICE AND IMPACT OF DISEASE.

The participants said that malaria is a very severe disease in the area. They said, “mtu asipotibiwa mara moja hata anaweza kufa kwa sababu malaria imeua watu wengi”. They said that since January this year they had lost about 18 people in Kabianga sub location due to malaria.

They said that the government should assist in treatment during malaria epidemics because, “watu wengi ni maskini na hawana pesa ya kutibu malaria. Pia hii malaria huja mara moja na kuwa huwa inatupata tukiwa hatuna pesa za kutosha za kutibu watu.

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On prevention of the disease, they said that both the government and the community should join hands because it is an epidemic. The community should buy nets, keep the compound clean and drain water while the government should assist in spraying mosquito infested areas and drainage of swamps.

Most of the participants said that they do self-medication first whenever there is malaria. Some even stock some panadols in their homes for use whenever they feel they have symptoms of malaria. They then rush their patients to health centers after self-medication. Two out of the six participants also said that they use herbal medicine before seeking biomedical treatment.

Most of the drugs mentioned by the participants for treating malaria are: panadol, metakalvin, malaria tab and fansiders.

Those who use herbs said they call it chemororiot herbal medicine which they boil and give to the sick who “vomits malaria” afterwards.

They said that they prevent malaria by: draining stagnant water; emptying all cans/tins; keeping the compound clean from all bushes; sleeping under the net (one participant only); burning of cow dung to chase away mosquitoes from the house (only one participant does that).

### G. VULNERABILITY AND ADAPTATION OF DISEASE

The participants said that 18 people had died since January this year in kabianga sublocaiton out of which 10 were children. This was due to malaria. They said that children are the most affected because they tend to play so much (hide and seek games) in the bushes and near stagnant water, usually in the evening and this exposes them to mosquitoes. Children also sleep carelessly i.e. don't cover themselves with blankets at night hence get exposed to mosquitoes. Sometimes, the parents (mothers) tend to share malaria drugs amongst the sick children so as to save money thus leading to under dosage.

Between men and women, women are the most affected by malaria mainly because they are weak especially when pregnant. One of the participants said that he believes malaria can be spread by the man to the wife through sexual intercourse. The other participants were however not sure whether this argument held water.

The participants said that they are very vulnerable to malaria due to lack of knowledge on the symptoms of malaria and also ignorance on the modes of treatment. They said that they are also vulnerable due to poverty, “watu wengi hapa ni maskini na kwa hivyo wanakosa pesa za kutosha kutibu malaria”. They also said that lack of balanced diet makes their bodies weak to malaria infection because they are used to ugali and sukumawiki day in day out.

### H. EXERCISE TWO.

**The participants ranked the coping mechanisms during malaria epidemics from the most important to the least important as follows: (This information is also contained in the chart).**

<u>COPING MECHANISM</u>	<u>RANK</u>
Seek medical attention from hospitals/health services	2
Self-medication (buying of drugs)	1
Sleeping under mosquito net (one participant)	7
Using /burning cow dung as a repellent (one participant)	9
Spraying the houses (one participant)	8
Clearing the bush in the compound	3
Disposing of empty cans/tins	4
Draining stagnant water	5
Informal networks (telling each other on how to prevent malaria)	6

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With regards to intervention, they said that the government normally provides drugs through cost sharing. During epidemics, the government also provides information through the public health technicians and chiefs barazas. They said they have not had any NGO coming to their aid and even had no knowledge of any NGO that helps during malaria outbreak. There was also no any CBO that assists the community during malaria outbreak. There was no any educational program conducted by any institution to sensitize the local population on malaria.

### I. EXERCISE 3: PME BASELINE

The participants were requested by the facilitators to demonstrate their opinion on how they felt about the intervention provided by the government, and the private clinics. They indicated whether they were very happy, moderately happy or very unhappy and the reasons.

**N/B:** This information is also in the chart.

All the participants said that they were happy with the government health center (kabianga) because it performs lab test (BS) for malaria, provides full dose for malaria and advises the community on what to do when there is an outbreak of malaria in the area i.e. awareness creation.

Five out of the six participants were moderately happy with the private clinic because of slow recovery or even no recovery due to lack of full dosage for malaria. The private health services is also money minded hence high charges and when one has less money cannot be given full dose for malaria i.e. “mtu huwa anapewa dawa inayotoshea pesa aliyonayo”.

All the participants were very happy with the government (chief baraza) because of creation of awareness on the importance of taking patients to the health centers. They also advice people to clear bushes and drain stagnant water in their compounds.

One participant was very unhappy with the private clinics because, “haja ya watu wa private ni pesa na pia hawana staff ambao wanasoma kabisa” i.e. they are money minded and have some untrained staff.

### Suggestions

The participants suggested that the government should subsidize or provide the community with mosquito nets because this is a tea growing area and is always bushy hence many mosquitoes which keep on infecting people with malaria.

### KAITUI FEMALE FGD:16<sup>TH</sup> AUGUST 2003

#### A. DEMOGRAPHIC, LOCATIONAL CHARACTERISTICS AND INCIDENCE OF DISEASE

Participant	Age	Marital status	Education level	Location of household
A	34	Widowed	Form 4	Hill side
B	46	Widowed	Std 7	Hill top
C	40	Married	Std 6	Hill top
D	25	Single	Form 4	Valley bottom
E	34	Married	Std 6	Hill side
F	Cannot remember	Widowed	Not educated	Hill side

**Other specific characteristics include:**

Participant A's household members:

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Gender	F.C	F.C
Age	12	10

Participant A stated that her children suffered from malaria in July 2003. She said, " Indeed one of my children got well last week!" "One of my children had been admitted in the hospital in July 2003 for four days. In 2002, both of her children suffered from malaria and she got sick of malaria too. This happened between May and June. However, she has never lost any member of the household due to malaria.

Participant B's household members.

Gender	M.C	M.C	F.C	M.C	M.C
Age	27	24	19	14	12

With regard to incidence of malaria, participant B said that in June 2003, she and her two children suffered and one of the children was admitted in the hospital for four days. In July 2002, they were also affected by malaria and this time, the participant is the one who was admitted for four days. In 1997, she lost her son due to malaria. However, she was not able to remember the month when this happened. In 2002, she also lost her sister (around September) and this was caused by malaria.

Participant C's household members:

Gender	M.A	F.C	M.C	F.C	M.C	F.C	M.C	M.C
Age	61	25	20	19	17	15	13	6

Participant C is a second wife. She said that three of her children were infected by malaria in May 2003 but no one was admitted. In June 2002, three of her children together with the participant had malaria. Participant C said that she has never lost any member of the family due to malaria.

**Participant D's household members.**

Gender	M.C
Age	5

This participant said that her child suffered from malaria in June 2003 and was admitted for two days. In 1994, the participant lost her mother due to malaria.

**Participant E's household members.**

Gender	M.A	M.C	M.C	F.C	F.C	F.C
Age	40	13	10	9	7	5

Participant E said that her second born had serious malaria in June 2002 and was admitted at Kericho District hospital for three weeks. Her family has not suffered malaria this year. There has also not been any case of death in her family associated with malaria.

Participant F said that she has ten children i.e. four females and six males. The participant said that she could not remember their ages. Being the first wife in a family of two wives, she said that she also doesn't remember the age of her husband. She said that none of her family members has suffered from malaria this year but in the last five years she lost four children through malaria. She lost the first one in 1999, two in 2000 and the other one in 2002.

## B. EXERCISE I:

The participant drew a map showing the location of the household of Leah Cheseng'ei: (see chart).

### C. INDICATORS OF WEALTH

The participants said that the indicators of wealth in that community are: about five grade cows; six to eight acres of land; three acres or more of sugar plantation, a car, a booming business such as wholesale shop and a permanent house.

The participants said that members of their community could be categorized into three based on their well being: the rich, middle class and “mtu wa chini” (low class). They said that the rich people are those who have a permanent (stone) house and those who are able to educate their children to high levels. The rich also have good (large) businesses, and sugar plantations covering more than three acres. The rich people possess more than five acres of land and have 5 grade cows or more.

The middle class members of the community possess about an acre of sugar cane plantation and an acre of maize. They also possess about one grade cow, a semi-permanent house; a bicycle or motorbike. They said that this category of people are able to educate their children but through straining i.e. “ huwa wanaweza kufundisha watoto wao, lakini kwa kujikaza tu”.

The low class (mtu wa chini) people are those who even do not have cultivatable land or have a very small portion, have grass thatched houses and have no cows. This class of people usually earns their living by working as casual labourers in the neighbourhoods i.e. in sugar plantations or elsewhere of the wealthier people in the area.

### D. TIME ACTIVITY PATTERNS

**Table of normal daily schedule for members of the household:**

F.A	M.A	F.C	M.C
6-9 a.m – wake up	6 – 7 a.m – wake up, take breakfast	6 p.m – wake up, breakfast and to go to school up to about 5 p.m. when not in school they wash utensils, assist their mothers in other household duties. They also do studies.	6 p.m – wake up, breakfast and to go to school up to about 5 p.m. when not in school they wash utensils, assist their mothers in other household duties. They also do studies.
Prepare breakfast, prepare children for school, wash children for school, wash utensils and other household chores.	7 – 10 a.m- go to the shamba		
9 -11 am – go to work or go to the shamba	10 – 11 a.m get back home for lunch.		
11 a.m – 2 p.m prepare and take lunch.	1 – 2 p.m – lunch	8 – 9 p.m- sleep after supper.	After school, they look after the cows, then relax but do preps at night.
2 pm. – 3 p.m look after cows.	2 – 6 p.m – most of them go out to relax. “Wengine hata huenda kunywa pombe”. Most of them don’t go back to the shamba in the afternoon.		
3 – 5 p.m – fetch firewood and prepare supper.	8 – 9 p.m – supper and sleep.		8 – 9 p.m- sleep after supper.
8 – 9 p.m – sleep.			

### E. KNOWLEDGE OF DISEASE (MALARIA)

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The participants said that malaria is caused mainly by mosquitoes. They also said, “lakini sio mbu peke yake ambayo huleta malaria sababu kwa sehemu zingine hakuna mbu na malaria ni mingi. Kwa hivyo wengi wetu tunaamini pia ya kwamba mafuta ya kupikia huleta malaria”.

The participants said that the symptoms of malaria includes: vomiting, high body temperature, mild headache, stiff neck, back ache, joint pains, fever, fatigue and some people vomit yellowish/ greenish fluids.

They said that malaria is mostly common during the rainy season because, “ there is too much stagnant water all over and this acts as the breeding point for mosquitoes”.

With regard to source of information on mosquitoes the participants said that they acquire it from the public health officers, through radio, health center when they go for treatment and their children usually get it from the school.

### F. ATTITUDE, PRACTICE AND IMPACT OF DISEASE

All the participants said that malaria is a very severe disease in the area. They said “ni ugonjawa mbaya sana kwa sa babu ni ya kila mwaka. Ni ugonjwa hatari sana kwa sababu inaua pia malaria ni ugonjwa ya kila mtu”.

They all said that the government should pay for treatment of malaria because, “malaria drugs are too expensive and the people in the area are poor and therefore cannot afford”.

However, malaria prevention should be a community responsibility because, “ the government cannot come to our own homes to drain water or clear the bushes”.

On modes of treatment, they said that they do buy drugs to treat fever and also seek medical attention. They said that malaria is a dangerous disease hence the need to go to hospital immediately. There is also the issue of awareness i.e. they have been advised to rush people to the health facilities because malaria epidemic is dangerous.

Those who buy malaria medicine said that the most common one is panadol and fansidars. They said that most of those who buy drugs from the canteens are the low class people perhaps because they don't have money to go to the health facilities. The participants said that they don't use herbal medicine to treat malaria because malaria is too strong for it.

They said that they prevent malaria by slashing bushes in the compound and draining stagnant water from the compound. They said, “ we would wish to sleep under bed nets but we cannot afford to buy them”.

### G. VULNERABILITY AND COPING MECHANISMS

The participants said that malaria catches children more than the adults because, “ children's bodies are weak (low immunity) hence low resistance to malaria”.

Between males and females, they said, “ the women are the most hit by malaria because you get some mothers who are pregnant others are anaemic, hence lack of immunity to malaria”.

They said that they are usually vulnerable to malaria due to: financial problems “ we are unable to afford medication when malaria strikes”, distance to the health facilities “ those who stay away from the health centers lack means of transportation to those services,” and lack of balanced diet to increase the immunity of people to malaria.

### H. EXERCISE 3: COPING MECHANISMS

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The participants came up with four coping mechanisms that they utilize in times of malaria epidemics. They also ranked the four mechanisms in terms of their importance.

<u>Coping mechanisms.</u>	<u>Rank</u>
Seek medical attention	2
Self medication	1
Clearing bushes in the compound	4
Draining stagnant water	3

N/B: After ranking, the participant drew a wheel (see chart).

On interventions the participants said that the government creates awareness of the disease through radio, chiefs also inform the community on how to prevent the spread of malaria. The government also provides free drugs through the health centers when there is a malaria epidemic.

They said that there is no any NGO or CBO that has intervened during malaria epidemics. The private clinics do assist in treatment of malaria but one must have money to pay before treatment.

#### **I. EXERCISE 4: PME TABLE**

The participants used symbols and indicated their responses and reasons why they were very happy, moderately happy or very unhappy with the services provided by various Institutions during the epidemic (see chart).

All the participants said that they were very happy with the government (Health center services) because:

1. "Mgonjwa alipona" i.e. the sick recovered
2. "Wakiona hawawezi huo ugonjwa wanakwambia peleka Kericho" i.e. if the health officers find the patient to be in bad condition, they request them to take their patient to Kericho District hospital.
3. Low charges on drugs
4. Proper services because they provide good drugs that treat malaria quickly

Some participants were moderately happy with the private clinics because the patients recovered but the cost was too high.

Some participants were very unhappy with the private clinics because:

- a. There was no proper medication to treat the patients i.e. they are even given less dose (half dose).
- b. High charges on treatment. They said. " wanalipisha pesa mingi na unapewa tu panadol"
- c. Poor mode of treatment (kutibiwa vibaya)

#### **J. ROLE PLAY**

The participant's role-played coping mechanisms when there is outbreak of malaria and also indicating vulnerability.

The actors were: patient/child; MOH Dispensary officer, private clinic staff; neighbour and the parent to the patient.

Parent –she goes to the neighbour in her village and informs her that her child is suffering from serious malaria yet she has no money to take her to the health facility. The neighbour then sympathizes with her



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and then assists her with some money. The neighbour advises her to take the child to government health facilities because it is cheaper. After receiving the money from the neighbour, the parent gets back to the child and takes her to a private clinic thus ignoring the neighbour's advice.

At the private clinic, the parent explains the child's sickness. The child also try's to explain to the health officer by touching joints that are paining and all over sudden pretends to vomit. The child also explains that she was also diarrhoeating. The child is then given drugs to last for a day and for the amount of money at hand.

Since the child did not recover, the parent then takes her to MOH dispensary. The patient/child explains to the staff of stomachache, and coughing and then saying it must be malaria. The MOH health officer treats the patient by giving full dose.

-The patient/child recovers.

- The parent goes back to the neighbour and tells her of the poor services her child got from the private clinic. The neighbours then quarrels the child's parents for having wasted money going to a private clinic in spite of having given her advice to take the patient to a government health facility for proper treatment.

**Kaitui Male FGD: 17<sup>TH</sup> August, 2003**

**A. DEMOGRAPHIC, LOCATIONAL CHARACTERISTICS  
AND INCIDENCE OF DISEASE.**

Participant	Age	Marital status	Education level	Location of household
A	70	Married	Std 8	Hill side
B	44	Married	Form 2	Valley bottom
C	26	Married	Form 2	Hill side
D	62	Married	Std 6	Hill side
E	45	Married	Std 7	Hill side

**Other specific characteristics include:**

**Participant A's household members.**

Gender	F.A	F.A	M.C	M.C
Age	50	43	46	35

The participant has two wives ages 50 and 43. He has six male children and three females. He was not able to remember their years of birth except the first two shown in the table. Participant A said that he suffered from malaria in July 2003 and he just treated himself and recovered. One of his wives had malaria in July 2002. None of his family members ever died of malaria but in July 2003, he lost about seven relatives. Some of them were his sisters and this was due to malaria. He said, " mwezi wa saba ni mbaya sana hapa kwa malaria".

**Participant B's household members.**

Gender	F.A	M.C	M.C	M.C	M.C	M.C
Age	41	27	24	21	15	9

Participant B said that he personally got malaria in June 2003 but treated himself and recovered. He said that three of his children "were hit by malaria even admitted in June 2003 and were even admitted in the hospital". In July 2002, the participant and one of the children were admitted in the hospital for four days

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due to malaria, while his wife was admitted for three days in the same month due to malaria. He said that one of his sons died in July 2002 due to malaria.

**Participant C's household members.**

Gender	F.A	M.C
Age	20	2 ½ years

The participant said that he suffered from malaria in July 2003 and did self-medication. His wife had suffered malaria in August the previous year (2002) and admitted for four days. Participant C said that he has not lost any member of his family due to malaria. However, he noted that within his village, at least five people had passed away between March and August 2003 due to malaria.

Participant D's household members.

Gender	F.A	F.A
Age	41	30

Participant D has two wives aged 41 and 30 as shown in the table. He has six males and four females whom he was unable to recall the years of birth. He said that he suffered malaria in July 2002 and did self-medication. In August 2003, two of his grand children had malaria but were treated and recovered. In the last three years, he has lost four children who are his relatives due to malaria. He has not lost any member of his household due to malaria.

**Participant E's household members**

Gender	F.A	F.C	M.C	F.C
Age	32	22	12	8

Participant E said that he suffered malaria in June 2003 and bought some medicine and recovered. His children had malaria in May 2003 and were treated in the health center and recovered. He has not lost any family member due to malaria.

**B. EXERCISE I**

The participants drew the map of Mr. Mathew (Matayo) Chirchir's household showing its location, water points and health units (see chart).

**C. INDICATORS OF WEALTH**

The participants said that the wealthy/ well being of a person in their community is determined by aspects such as: sugar plantations, number of grade cows, children, size of land, owning vehicles, booming businesses, permanent houses and also formal employment.

The participants agreed on three categories of people in their community based on their wealth possessions. These are:

1. The rich (wealthy): have about ten acres of sugar plantations or more; a permanent (stone) house, about five grade cows or more, about 100 acres of land or more; a motor vehicle (s), piped water, big shop/ rental houses, permanent formal employment and ability to educate children.
2. The middle class (watu wa katikati/ possesses a grade cow, about two acres of land, operate a joint business of growing sugarcane, a semi-permanent house, has a bicycle (boda boda), able to educate children and has oxen cart.

3. The participants said that they do not have a label of poor person in their community i.e. “ni gumu sana hapa kwetu kuita watu maskini, lakini kuna watu wa chini (low class)”. These have possibly one zebu cow, about two goats, mud-grass thatched house, not able to educate children, have about 0.5 – 1 acre piece of land, do not have sugarcane, live hand to mouth and usually earn their income by working as casual labourers in other people’s households.

#### D. TIME ACTIVITY PATTERNS

Table of normal daily schedule for different members of the household.

F.A	M.A	F.C	M.C
5 -7 a.m - wake up, prepare breakfast, milk cows, prepare children and do other household chores.	5 a.m - 6a.m-wake up, breakfast.	6 - a.m wake up and prepare to go to school up to about 5 p.m.	6 - a.m wake up and prepare to go to school up to about 5 p.m.
7.30 - 11 a.m - does farm work	6 a.m - 12 p.m, go to the farm/ look after cattle.	Those not in schools do household/farm work.	Those not in school look after cattle/ farm work.
11 a.m - 2 p.m prepare and take lunch.	12 - 2 p.m- lunch	After school, they do household work/studies.	Those who are at school do assist to look after cattle after school/relax/ studies.
2 -4 p.m - go back to the shamba/do other household work.	2 - 4 p.m go back to survey what has been done by others, look after cattle.	8 - 9 p.m supper and sleep.	8 - 9 p.m supper and sleep between 9 and 10 p.m
4- 6 p.m, back home and start to prepare supper.	4 - 8 p.m - Relax and visit others.		
7 - 8 p.m take supper.	8 - 9 p.m supper		
9 p.m , sleep.	9 - 10 p.m sleep.		

#### E. KNOWLEDGE OF DISEASE (MALARIA)

They all said that malaria is caused by mosquitoes. However, some of them added that malaria is associated with chewing of sugarcane. i.e. “wengine hapa tunaamini ya kwamba kula miwa huleta malaria, lakini hii maneno sasa sio watu wengi sana ambao wanaamini sasa”. “Ilikuwa maneno ya zamani kidogo kwa sababu miwa bado ilikuwa kitu kigeni kwa area yetu”.

Some other participants said that water from a different area is not appropriate with the body and so if taken, and then one gets malaria i.e. “ wengi tunaamini ukinywa maji kwa area nyingine utapata malaria”.

With regard to symptoms of malaria, the participants indicated flue, mild headache, re/yellowish eyes; high body temperature (joto nyingi kwa mwili), fever, and vomiting some yellowish fluids.

The participants said that malaria is most common in May/June/July/August during rainy seasons and when maize is flowering.

This is because, “ during the rainy season there are very many bushes around where mosquitoes hide and also when there is too much stagnant water for mosquitoes to breed”.

The participants said that they acquire information about malaria from the health specialists in the health center. The public health officials announce to the people that there is malaria outbreak in the area. They do so in collaboration with the chiefs in chief barazas.

They also get information through radio and from their children who are informed in school.

## **F. ATTITUDE, PRACTICE AND IMPACT.**

All the participants said that malaria is a severe disease because it kills many people, it incapacitates them such that they lose appetite and therefore weak. They said that malaria is very negative to the community it is very costly for people to handle it.

The participants said that the government should pay for treatment of malaria because “most of the people are poor and lack money to treat. It is also an abrupt disease to treat. It is also an abrupt disease which comes when they are not prepared”.

For prevention of malaria, the participants said that they should be responsible in order to prevent deaths.

When they are caught by malaria, they said that they normally buy drugs and a few of them use herbal medicine. They said that they do this in order to observe the illness so that they don't rush to the hospital yet they don't have enough money. But when they realize it is worse, they rush the patients to the hospital because at that point they know that the disease is also a killer.

Most of them said that they use panadol, aspirin and malaria tab to treat malaria. They said that fansidar is not effective in treating malaria. The type of herbal medicine used to treat malaria is called moiroriot which they said once taken, then one can even stay three years without getting malaria.

They said that they prevent malaria by draining stagnant water, slashing the compound and emptying cans.

## **G. VULNERABILITY AND COPING MECHANISMS**

The participants observed that the children are the most affected by malaria because “ngozi yao bado nyororo. Hawana kinga kamili. Damu ya watoto bado haijakomaa”. Basically, they reported that children have lower immunity than adults.

Based on gender, they said, “malaria huwa inakamata tu kila mtu”. They said that it affects men and women equally because mosquitoes do not choose men or women.

They reported that their vulnerability to malaria is caused by:

- Lack of effective drugs because some of those drugs that they buy from kiosks are sometimes expired.
- Lack of money to take the patients to the hospitals.
- To most of them the health facilities are far and the means of transportation poor because of bad roads. They said that some even stay as far as about 20 – 40 km i.e. in remote areas with very poor/impassable roads and this makes it difficult to take the very sick ones to the hospitals.

## **H. EXERCISE 2: COPING MECHANISMS**

The participants came up with four coping mechanisms when there is malaria outbreak/ to prevent malaria. They then ranked them as follows ranging from the most important to the least important.

COPING MECHANISM	RANK
Self – medication (buy drugs / herbal)	1
Seek immediate medical attention in health centers/ private clinics.	2
Drainage of stagnant water	4
Clearing of the compound	3

N/B: The participants also represented these coping mechanisms in the form of a wheel (see chart).

With regard to interventions they said that the government has not done much in the past but this year it sprayed mosquito-infested areas in selected households in the area. The government does not provide free malaria medicine but does provide them through cost sharing. Due to inaccessibility of some areas, the public health officials may not have managed to create awareness on malaria outbreak. However, in the chief's barazas the public health officials do inform/teach people about malaria outbreak.

The private clinics around also intervene by treating people but at a cost. Unfortunately, the participants reported that there is no any NGO or CBO that intervenes in any way when there is malaria outbreak.

### I. EXERCISE 3: PME BASELINE TABLE.

The participants expressed their feelings on whether they are very happy, moderately happy or very unhappy with the interventions by the government (health facility).

Those who selected very happy appreciated their patient's recovery from malaria.

Those very happy with the private clinic said so due to:

- Treated and recovered fully
- Even without money, one can be treated on agreement of partial payment.
- Nearness of the clinic to the people.

Those very happy with the Administration/Chief said that this was so because of creation of awareness about the outbreak of malaria.

Those who were very unhappy with the government (health facility) said so because:

- No treatment without money
- One participant said that his patient was given half dose because of having had no money to buy the full dose.

Those who were moderately happy with the private clinic said, "Spent a lot of money in the private clinic (Kshs. 2,0000 but never recovered and had then to go to the government health center.

Those who indicated very unhappy with the government (Health facility) said:

1. Was told to go and buy drugs but when he wanted to go to buy, he was told that he could buy the drug from the same health facility (Kericho District Hospital) but this was through back door (corrupt).
2. Sell drugs to patients without any transparency (corruption takes place).

**J. EXERCISE 4: ROLE PLAY.**

The participants' role-played the coping mechanism during the outbreak of malaria (modes of treatment and prevention).

- Actors : 1. Son (patient), 2. Father (parent)
3. Private clinic staff 4. Government health center staff/doctors
5. Chief of the area.

The parent decides to inform the chief about the sickness of his son. At the chief's home the parent accompanied by the sick son explains to the chief how malaria is bad in the area this month. The chief just informs the parent to the sick child that he is aware of the outbreak but informs him that he should take the child to the health facility quickly.

The parent accompanied by his sick son decides to go to the private clinic which is the nearest. The parent explains to the private clinic staff that the son is suffering from joint pains, headache and flue, which he suspects, is malaria. The private clinic health staff carefully does his diagnosis by even asking the patient, "unaumwa na kichwa?" after diagnosis the staff asks the parent, "do you have Kshs. 1,000?" The parent says he has Kshs. 500. The staff tells the parent that he will inject his son once i.e. for only Kshs. 500 and he would give the other injection and other drugs when they come back with the full amount of money. The parent goes home with his son but no recovery. The parent then goes with his son to the chief and complains of how the private clinic is providing poor services. The chief then only advises him to take the child to a government health facility for better treatment.

On arriving at the government health facility, the doctor tells the father and son (patient) to sit down and relax. The doctor then ask the parent, "what is the problem?" the parent responds, "My child is sick". The doctor then ask, "when did you get sick?" and then the patient explains. The patient then further gives his complaint i.e. fever, headache and feeling cold.

The government doctor then does diagnosis. He checks the temperature of the patient (he demonstrates by putting a pen to represent a clinical thermometer in the patients mouth). He then acts using a pen and paper to note the conditions, which he checks carefully. He then tells the patients to go for injections at the injection room and to pick the drugs later.

The parent and the son (patient) then go home very happy after the good medical attention.

**LIST OF PARTICIPANTS - KISUMU.****A. Kombewa Male FGD Group 1**

Name	Code	Location details
1. Joel Juma	A	Upper Kombewa
2. Jacob Ogalo	B	Upper Kombewa
3. Josephat Adiang'o	C	Upper Kombewa
4. Peter Ogada	D	Upper Kombewa (he is a businessman).
5. Jacob Nyariro	E	Upper Kombewa
6. Patrick Odondo	F	Upper Kombewa

**B. Kombewa Male FGD Goup 2.**

Name	Code	Location details.
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**C. Kombewa Female FGD Group 3**

Name	Code	Location details
1. Christine Auma Otieno	A	Lower Kombewa. She is Chairlady to Friends Women Group.
2. Gladys Atieno Amon	B	Lower Kombewa
3. Everline Achieng Aringo	C	Lower Kombewa
4. Tabitha Achieng Were	D	Lower Kombewa
5. Margaret Achieng Mbeo	E	Lower Kombewa
6. Florence Anyango Mbeo	F	Lower Kombewa

#### D. Kombewa Female FGD Group 4

NAME	CODE	LOCATION DETAILS
1. Everlyne Atieno	A	Lower Kombewa
2. Millicent Oduor	B	Lower Kombewa
3. Juliana Aruwa	C	Lower Kombewa
4. Lilian Atieno	D	Lower Kombewa
5. Wilfrida Aoko	E	Upper Kombewa. She is the Chairlady of Kinda women self-help group.

#### E. ASATI Beach Male FGD.

Name	Code	Location details
1. George Onyango	A	Asati beach
2. Charles Atito	B	Asati beach. (he is a Committee member of the beach.
3. Joshua Ochieng	C	Asati beach
4. George Ochieng	D	Asati beach
5. George Osaka	E	Asati beach
6. Aloise Opiyo	F	Asati beach

#### F. ASATI Beach Female FGD.

NAME	CODE	LOCATION DETAILS
1. Teresia Nyambok	A	Asati beach
2. Benta Okongio	B	Asati beach
3. Gaudecia Obar	C	Asati beach. She is a tailor and chairlady to Kanyosewa women group
4. Mary Awour	D	Asati beach
5. Rose Akinyi	E	Asati beach

#### LIST OF PARTICIPANTS - KERICHO

##### A. Kaitui Male FGD

Name	Code	Location details
1. Simon Arap Siele	A	Kapsegut sub location
2. Musa Arap Rotich	B	Kapsegut sub location
3. Reuben Tanui	C	Kapsegut sub location
4. Mathews Chirchir	D	Kapsegut sub location
5. Josiah Sang	E	Kapsegut sub location. He is a village

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		representative Kasegut sub location.
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**B. Kaitui Female FGD.**

Name	Code	Location details
1. Sarah Kerich	A	Kasegut Sub location
2. Leyah Cheseng'eyi	B	Kasegut Sub location (Chairlady to Chemalo women's group).
3. Grace Chirchir	C	Kasegut sublocation
4. Lilian Chebii	D	Kasegut sublocation
5. Josephine Maiyo	E	Kasegut Sub location
6. Grace Chirchir	F	Kasegut sub location

**C. Kabianga Male FGD.**

NAME	CODE	LOCATION DETAILS
1. Reuben Arap Koe	A	Kabianga sub location (Kanu youth leader & Chego youth bursary group)
2. Daniel Siele	B	Kabianga sub location
3. Joseph Arap Sang	C	Kabianga sub location. He is AGC church leader.
4. Andrew Rono	D	Kabianga Sublocation
5. Jonathan Bett	E	Kabianga sub location
6. Bernard Cheruiyot	F	Kabianga sub location

**D. Kabianga Female FGD**

NAME	CODE	LOCATION DETAILS
1. Mercy Rotich	A	Kapcheichi sub location
2. Bonice Keter	B	Kapchetichi sub location (she owns a shop)
3. Joan Tuwei	C	Kabianga sub location
4. Christine Chirchir	D	Kabianga sub location
5. Alice Brin	E	Kabianga sub location
6. Gladys Cherui	F	Kabianga sub location

**E. Sisoit Male FGD.**

NAME	CODE	LOCATION DETAILS
1. John Malakwen Byegon	A	Waldai sub location
2. Kipkeino Metto	B	Waldai sub location
3. Paul Koech	C	Waldai sub location. He is secretary to
4. David Keter	D	Kaboson self-help group.
5. James Too	E	Waidai sub location
6. Wilson Kipkenui Tigoi	F	Waidai sub location
		Waidai sub location

**F. Sosiot Female FGD.**

NAME	CODE	LOCATION DETAILS
1. Lilian Tuwei	A	Waidai sub location. She is a Primary School teacher.
2. Caroline Kirui	B	Waidai sub location
3. Lorna Tanui	C	Waidai sub location
4. Betty Lang'at	D	Waidai sub location. She is a church leader of African Gospel church.



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5. Josephine Ng'etich	E	Waidai sub location
6. Betty Rono	F	Waidai sub location

## **OUTPUT 5: PROCEEDINGS OF THE STAKEHOLDERS MEEETINGS, HELD IN KISUMU AND KERICHO, KENYA, 16-17 OCTOBER, 2003**

### **Aims of this Meeting:**

- To consult with community stakeholders in identifying:
  - risk groups in the community;
  - coping mechanisms; and
  - adaptation strategies for cholera/malaria epidemics.
- To identify alternatives strategies that can accommodate the possible changes in risk for cholera/malaria epidemics.
- To select preferred adaptation strategies for cholera/malaria epidemics.
- To seek the participation and engagement of stakeholders of the community stakeholder group in designing and implementing strategic action plans for the preferred strategies for cholera/malaria epidemics.

### **Structure:**

<b>TIME</b>	<b>ITEM</b>	<b>LEAD PERSON</b>
<b>9.00 – 9.15 am</b>	Introduction – incl. Aims of project and meeting	<b>Maggie Opondo</b>
<b>9.15 – 9.45 am</b>	Overview of cholera/malaria from the climate, health, and economic perspectives	<b>Andrew Githeko Dan Olago Maggie Opondo</b>
<b>9.45 – 10.00 am</b>	Discussion of overview [Question and Answer Session]	<b>Participants and Andrew Githeko Dan Olago Maggie Opondo</b>
<b>10.00 –10.15 am</b>	<b>BREAK</b>	
<b>10.15 – 10.45 am</b>	Discussion and Identification of risk groups	<b>All Participants</b>
<b>10.45 – 11.15 am</b>	Selection of Preferred Adaptation Strategies	<b>All Participants</b>
<b>11.45 – 12.15 am</b>	Implementation <ul style="list-style-type: none"> <li>• Participation of stakeholders?</li> <li>• Design of Strategic Action Plans (SAPs)</li> <li>• Implications:               <ul style="list-style-type: none"> <li>- costs – fundraising</li> <li>- time plan</li> <li>- materials etc</li> </ul> </li> </ul>	<b>All Participants</b>
<b>12.15 – 12.45 am</b>	Way Forward	<b>All Participants</b>
<b>12.45 – 1.00 pm</b>	Closing Session	<b>All Participants</b>

### **Activities:**

1. Which groups in your communities are usually most at risk in the event of a cholera/malaria epidemic?
2. What coping mechanisms and adaptation strategies are undertaken when there is a cholera/malaria epidemic?
3. What are the five most important and relevant coping mechanisms and adaptation strategies for different risk groups identified?
4. What is good and bad about each of the five identified coping mechanisms and adaptation strategies? (i.e. reflect/discuss on what is good or bad about these coping mechanisms and adaptation strategies (Goal is to produce 10-20 criteria)
5. Draw up a matrix with the coping mechanisms and adaptation strategies across the top and the criteria down the side on the flipcharts.
6. Discussion on how well each criterion is fulfilled by each coping mechanisms and adaptation strategies using the following questions:
  - (i) Which is the best?
  - (ii) Which is the next best?

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- (iii) Which is the worst?
  - (iv) Which is the next worst?
  - (v) Of the two remaining, which is better?
7. Ranking of the alternatives according to the evaluation criteria set by the participants.

**COMMUNITY STAKEHOLDERS MEETING REPORT: 16<sup>TH</sup> OCTOBER 2003, KEMRI, KISIAN-KISUMU.**

**The meeting had a total of twelve participants whose characteristics are as follows:**

NAME	DESIGNATION/INSTITUTION
1. Peter Adino	Retired Social Development assistant and is currently a farmer.
2. Gordon Owiti	Leader of Marathon Youth Group
3. Calesine Nambaka	KWAHO - Program officer in- charge of hygiene and education.
4. Juliana Aruwa	Leader of Mariwa women group
5. Collins Otunga	Pastor of Glad Tidings Church
6. Florence Licha	Teacher - Nyamulgun Primary School
7. Atito Omondi	Deputy Head teacher and KNUT representative - Nyagunda Primary School
8. Walter O. Ongoro	Public Health Technician - Kombewa sub-District hospital
9. Peter Mwoso	Community own resource person (Corp) - Plan International and Community Development facilitator and secretary to a CBO called Othony Great Community Development Association
10. Chritabel Obok	Sub-Chief - Asat
11. Dorka Agoro	Leader of a women group - Asat
12. Jechoniah Otunga	Chairman - Beach management unit - Asat

The meeting started at 9.30 a.m. Dr. Opondo welcomed the participants and led in self-introduction. She also outlined the aim of the meeting and then welcomed Dr. Githeko to present a brief overview of cholera and climate.

After Dr. Githeko's presentation, Dr. Opondo presented on the coping strategies for cholera based on the questionnaires and FGD's conducted in the region. She then invited Dr. Olago to give a presentation on Climate change. After the three presentations, the participants were expected to ask questions but none of them asked. The participants then took a break.

After break, Dr. Opondo guided them into a discussion and identification of cholera risk groups, selection of preferred adaptation strategies and the way forward.

### **Communities mostly at risk of cholera**

The participants agreed that there are four risk groups in their community. These are:

1. Beach community - fishermen
2. The old - 60 years and over
3. The poor

They defined the poor as those who cannot afford the basic needs on a day to day basis. The basic needs are e.g. food i.e. they have one meal a day, live in grass thatched houses and have an average income of Kshs. 20 per day such go to the market and budget the buy commodities such as kerosene for Kshs. 2, cooking fat for Kshs. 3 e.t.c totaling to Kshs. 20 for the whole family.

One of the participants added that due to poverty in terms of lack of food, such people even tend to eat at funeral of cholera victims yet they are not supposed to eat food at such funeral. One participant added that cholera is related to poverty i.e. the poor use one sufuria for multi-functional use and this has impact on cholera epidemic.

4. Children within the households (1 -3 years old).

One participant observed that all the people at the beach are not poor. Most of the people left in the community are poor because the rich people leave the rural areas for cities. The participant also said that as a gauge of poverty in the area i.e. Asat, most of the people are poor because of the type of settlement that is grass-thatched houses.

It was however observed that it will be difficult to define poverty because in some cases, some people have 20 cows, 12 sheep and several canoes yet their houses are grass thatched.

### **Coping mechanisms and adaptation strategies.**

The participants observed that boiling of water is not a very common practice in the community. Some of the participants said that “ instead of using the term boiling of water, we can use the term use of safe and clean water such as chlorinated water because most of the people in the community do not boil water. Most of the participants stated that there is need to mobilize people on how they can practice boiling of water. Some said that boiling water is cheaper than any other method.

One of the participants said, “boiling water is the best but people don’t boil it even when fetched from the river”. She wondered whether there was a way we could advise them not to use river water for cooking or drinking. However, she added that in Kombewa, there are many boreholes dug by KWAHO and so people can use such water. They said that the boreholes are just near Kombewa market and the water from these boreholes is sold at one shilling per 20-litre jerrican.

Some participants said that boreholes are only given to some groups of people and therefore some community members usually don’t like paying the one shilling because that money would only benefit certain individuals. Therefore there is need to change such attitude through health education. They said that some people also believe that water directly from the river is safe and that since they have used such water for long time, then it is always safe.

A participant from KWAHO said that during their campaign, they don't insist on boiling borehole water because they (KWAHO) normally undertake water quality control of these boreholes after every six months and if the water is found to be contaminated, they immediately stop its use.

However, they advise them that if the water container used is dirty, then there is need to boil the borehole water. Dr. Githeko also agreed on this issue saying that open water is usually unsafe while closed water is safe and therefore there is no need to boil though it should be left optional.

The KWAHO participants also said that it was difficult to convince some women in the area that filtering ocean water with a piece of cloth does not make it safe. She also said that there are very few boreholes near the lake but in spite of the awareness creation, the people in the area have not bothered to request for boreholes in the institution because of their attitude. The sub chief added that the people in the area believe that if they fetch lake water very early in the morning, then it is safe and that borehole water is salty.

Boreholes in the area are of 40 – 60 metres in depth and saltiness is contributed by the nature of the rock. Dr. Githeko said that older boreholes have better water quality i.e. salinity reduces with the age of the borehole when in use. But according to the KWAHO participant, there is no borehole in the area that has abnormal salinity (PH is 7-9) and they have always explained to the locals that salinity is not constant. One of the women group leaders said, “watu hawaelewi ni kwa nini watu hawaamini maji ya borehole”.

Dr. Olago wondered why some people who live inland (near the beach) tend to travel some distance to fetch borehole water as indicated by some participants. The chief responded saying that most of the people at Asat beach are foreigners and this is the reason why they have an idea of boiling water/borehole water. She said that some of the residents come from as far as Ugenya, Alego, Tanzania and Uganda hence they don't have beliefs such as those of the locals. One of the women leaders said, “watu wengi huko kwa beach hawaelewi habari ya kutumia maji ya borehole”.

The facilitator (Dr. Opondo) sought from the participants on how then can the people's beliefs and attitudes be changed. Some of the participants especially the public health technician and the officer from Plan International said that they normally contact identified community groups in their region such as those registered by the Ministry of Culture and Social Services but some of them tend to be reluctant especially when the need of involvement does not seem to help them directly.

Therefore, if the project targets individuals, it is usually very welcome. However, they said that there is need to target groups to prevent cholera. One of the participants was also very quick to note that during KANU regime, many groups in the community were being formed towards the election period mainly to get money from the politicians but after the elections, the “game got over”. Many groups were being formed without proper guidelines during the KANU regime.

He also said that NGO's also overburden women with activities (projects) e.g. “some want to give water to women but before the water is provided, a similar NGO comes up informing the same women of a project aimed at providing daily cows e.t.c yet they cannot cope”.

Dr. Olago said that in order to change people's beliefs and attitudes about borehole water, then we could do a demonstration of a glass of borehole water vi-a-vis river water so that they can practically see the difference. He also asked the participants how the attitude of pupils they teach is concerning borehole water. The teachers present said that in their area, they are surrounded by NGO's such as Plan International and these have provided water tanks in schools as well as boreholes in the community. In the school, they also have health clubs and they teach children how to use borehole water.

The children are therefore generally aware of the need of use of clean and safe water. Dr. Opondo asked whether it would then be possible to use children as agents of change at Asat. The chief said

that the distance between one borehole to the other was long. But Dr. Olago said that according to some participants, a borehole is only constructed when the community makes a request.

The public health technician said that people also need to know the waterborne diseases and how they are transmitted because some people even believe that cholera is transmitted through air. He therefore said that education on diseases should be a priority before other interventions are put in place. This was supported by among others, the Pastor who said that people are just ignorant of the disease due to lack of education.

Concerning pit latrines, the participants said that Asat Beach area has a big problem with latrines. One of the participants from Asat said that, “people are forced to use pit latrines because they are used to them. They are only forced to use pit latrins by the authority”. The public health technician said that the pit latrins at Asat are not clean and well maintained and therefore people prefer to use the bush.

A retired civil servant said, “We cannot modify the pit latrines yet people are not ready to use them because digging pit latrins is one thing but use of these facilities is another”.

Dr. Githeko gave an example of a certain smart and well-educated man who had constructed three pit latrins in his rural home because elders don’t mix with children. So he had a latrine for the in-laws, himself and the children. This shows that in spite of education, he had not changed his attitude. He also asked the participants about the geology of the area and they said that in some places, they can only dig two metres and they get water or murram hence it is difficult to dig latrins.

The participant from KWAHO said that in the area, the issue of collapsing pit latrins is a reality. This has made her institution to come up with a new technology known as ecological sanitation(Ecosan), which is still on pilot stage. It is a technology of erecting a chamber with bricks and then putting a container for faecal matter and that of urine so that the faecal matter can be recycled for manure and urine as urea. Though it is on pilot, the community has responded very well. She said that they have one in the chief’s camp at Kombewa, and in their office and twelve in the community.

They even don’t smell at all because one has to add ash. She said that the community seems to have accepted it very well based on the applications they are receiving everyday in their office. Its cost is slightly lower than that of a local pit latrine i.e. about Kshs. 9,000 but if they use locally available materials, the cost could go down to Kshs. 5,000. Currently, the communities are supposed to cater for 45% of the cost.

Dr. Githeko said it would be a good technology because it cannot encourage breeding of mosquitoes inside it which in some cases have discouraged people in some places to use pit latrines because of their biting nature though not necessarily for malaria.

The public health technician said that at the beach, there are some public latrines dug by Plan International and because they are few, the landlords have not been putting up latrines yet they keep on adding rental houses. Therefore, the administration and the beach management should make sure that a pit latrine is dug by the landlords before a new house is built. The public health act should be implemented.

### **STRATEGIC ACTION PLANS (SAPS).**

After a long discussion, Dr. Opondo then proposed that we try to intervene for the communities at the beach since it came out clearly in the debate that they were more at risk of contacting cholera disease and also because it would take up much more time to do so for all the risk groups identified by the participants.

Concerning borehole water, the participants said that there is need for community awareness which should stress the point that Lake Victoria is now a “polluted” fresh water lake because some of the people use its water directly because of the belief that it is a fresh water lake. Community awareness should be designed to include seminars, barazas, and schools e.t.c.

Dr. Olago said that there was need to encourage the people at the beach to construct boreholes near the beaches and create awareness that the lake water is polluted. The public health technician observed that since there are few boreholes, there was therefore need to encourage people to boil the lake water, which is readily available.

To this regard, Dr. Olago said that we can use a control method with few families that are given incentives to boil water and then check on whether they report going to health centres because of any diarrheal disease. This way the others can learn from it. He said that the demonstration of borehole water and lake water would have to face a laboratory research.

The participants said that there was also need to encourage people manning boreholes to even reduce charges to about one shilling for a 40 litres jerican. The money collected from borehole is used for maintenance purposes.

There is also need to train people on storage systems such as use of narrow water jars. The people should also be encouraged to wash hands with soap or ash at critical times i.e. after visiting toilets, after farm work, before handling food and after handling children.

Some people use water in a container to wash hands and the same water is also used by other people. Therefore, people should be made aware of the need to use running water to wash hands. Dr. Githeko said that we should translate cleanliness into hygiene.

According to the participants, 20 litres of water is boiled at Kshs. 20 because of scarcity of firewood. Therefore, there is need to encourage alternative methods.

Regarding pit latrines, the participants agreed on the need to adopt the KWAHO ecological sanitation technology, which should be modified so as to make it acceptable by every member of the community including Muslims.

There is need to target specific grouping for SAPS. These include: the community health workers (CHW) under the Ministry of Health. In each sub – location in the area, they have about 30 CHW's and each of them goes to households to disseminate information. The churches also have groups e.g. cell groups of Glad Tidings church. There are others also in the Catholic Church, A.C.K church e.t.c and they can be used to disseminate information very easily. We can also use beach management units (BMU) and if it is a real cholera problem we can disseminate the information at the funerals.

Finally Dr. Githeko sought to know whether the people fishing at night “help” themselves in the lake. The participants said that the fishermen have no option when they are at the middle of the lake fishing other than just helping themselves in the lake.

Dr. Olago said that the fishermen's waste in the lake is indeed too minute compared to the Kisumu sewerage system and its lake pollution. A participant from Plan International said that they had discussed on the use of containers by fishermen in the lake and then dispose it afterwards. But according to the Luo customs, touching one's faeces is a sign of being an outcast.

COMMUNITY STAKEHOLDERS MEETING REPORT 17<sup>TH</sup> OCTOBER 2003 KERICHO

NAME OF PARTICIPANT	DESIGNATION/INSTITUTION
1. William Kirwa	Clinical officer and in-charge of Sosiot Health Centre
2. William Kiripan	A.C.K Evangelist - Sosiot
3. Paul Koech	Youth Group representative
4. James Kimeto	Retired Civil servant (Public Health officer)
5. Paul Keter	Belgut community health organization
6. Benjamin K. Tele	Chief-Sosiot
7. Elizabeth Kerich	Teacher cum women leader
8. Lilian Tuwei	Teacher
9. Monicah Yegon	Nurse - Kabianga
10. Emmy Chepkoril	Community worker - Kabianga
11. Susan Morogo	Public Health Technician - Kabianga
12. Richard Kirui	Lab Technician (Private sector)- Kabianga
13. Leah Chesengeny	Women Group leader -Kaitui
14. Kimutai Arap Kiriouki	Councillor - Kaitui
15. Rebecca Kirui	Women Group leader - Kaitui
16. Mrs. B. Kemei	Staff - Sosiot Health Centre
17. Lydia Chelangat Rop	Staff - Sosiot Health Centre
18. Moses Ole Kiriungi	Public Health officer - Sosiot

The meeting commenced at 10.37 a.m. Dr. Opondo welcomed the participants and invited them to introduce themselves. She also outlined the aim of the meeting and the goals of the research project. Dr. Opondo then presented the brief findings of the study based on the questionnaire administered and FGD's carried out in the area concerning malaria epidemics.

After her presentation, Dr. Githeko briefly presented the factors affecting malaria with particular reference to highland malaria. He also related malaria epidemic to climate change. Dr. Olago also put emphasis on the presentations made by Dr. Opondo and Dr. Githeko.

Dr. Opondo then moderated a discussion on identification of risk groups and selection of preferred adaptation strategies (SAP's)



## **IDENTIFICATION OF RISK GROUPS**

**The participants agreed that the risk groups in the area include:**

1. **Children below the age of 5:** These constitute about 8% of the population.
2. Expectant and mostly single mothers
3. **The poor:** The participants said that the poor constitute about 20% of the population. They are characterized by:
  - a. Earning less than Kshs. 100 per day
  - b. Have one meal a day
  - c. Have grass thatched huts which are small roomed
  - d. Have 8 – 10 children
  - e. Are not employed or are casual labourers and are peasant farmers

Peasant farmers virtually live hand to mouth and are controlled by climate changes and have no storage for any item, indeed some even sleep in granaries, especially children because there is nothing to store in these granaries. The poor have no cows and grow crops for their consumption and only own about one acre piece of land.

4. **Changaa brewers and drinkers:** These constitute about 5% of the population. At Kaitui, the bars are more than the shops and changaa in the area is even worse. Some said alcoholism at Kaitui could even be 50% of the population. They said that an area could even be having two changaa breweries but very many consumers most of whom are unemployed.
5. Some changaa is even distributed at Kabianga area all the way from Kisii District. Consumption of this illicit brew is on the increase due to laxity of the law enforcers e.g. it was less when KANU youth wingers were in place. It is also on the increase because bottled beer is expensive. This has also led to a lot of intake of sapphire, a product of Keroche Industries, which is even worse because it is being sold by anyone, and to anyone including children.
6. **The very old (60 years plus):** these comprise of about 1% of the population. Most of them hardly go to health facilities because of poverty.
7. **Children in Secondary schools:** They are exposed to malaria mosquitoes when at school because of studies e.g. up to 10.00 p.m.

### **Coping mechanisms**

Dr. Opondo said that most (40%) of the people interviewed in the region indicated that clearing of bushes is a major coping mechanism.

However, Dr. Githeko said that clearing of bushes may not prevent malaria but could even increase malaria. Clearing of bushes was being advocated as a way of controlling yellow fever, he said. He further noted that malaria mosquitoes like to live in houses and only go out to lay eggs. Dr. Githeko therefore cautioned that mosquito control is not equivalent to malaria control.

Then Dr. Opondo said that since majority of the people believe that clearing bushes is a coping strategy, then there is need to come up with another strategy. The participants agreed on the need for public health education through barazas, schools, ANC clinics, churches, women groups e.t.c in order to eliminate such beliefs.

Drainage of stagnant water had also been mentioned by those interviewed as an important coping strategy i.e. people dig trenches to drain stagnant water. Dr. Githeko said that there is no big problem in most of the areas surveyed with regard to malaria because most of the houses affected by malaria are those in the valley bottom.

He said that most of the areas in the region are 1800 m above the sea level and therefore most of malaria is in the valley bottom and in the valleys, there is self – drainage.

He added that the large natural swamps should be left as they are because there is natural drainage. We should not affect the swamps because they can be breeding zones for malaria mosquitoes in cold areas, mosquitoes would like warm places such as cleared swamps.

With regards to insecticide treated bed nets, the participants said, “due to poverty, the bed could even not be there”. Some people also don’t like bed nets because they feel entangled inside and also feel warm when inside the net. The participants said that most of the poor people are not able to afford nets and use insecticides. Some people also lack knowledge of use of nets and also their treatment.

Spraying of houses is also difficult due to poverty. They also said that some bed nets were given out at the health centres but were of low quality such that mosquitoes even get through. The government should therefore come up with minimum standards of bed nets.

The participants said that bed nets are very expensive for large families. In some families, some children have no beds and therefore seek accommodation in the neighbourhood. In this case, it will be difficult to buy nets for such children. The government should therefore subsidize the bed nets.

The public health officer said that in the community, some of the people have never accepted that malaria is caused by mosquitoes but still believe that it is caused by flowering maize, eating a lot of sugar, cooking fat or drinking water from rivers of certain sources (low areas – Soin). Therefore, there is lack of knowledge of malaria because of myths. All the participants agreed to this view.

The participants also said that people are unable to distinguish malaria and other general fevers and therefore they tend to resort to self – medication. Therefore, Dr. Opondo asked the participants whether there was need for public health education because of myths about malaria. The participants said that to avoid self-medication, there is need to encourage people to go to health units through public health education.

Dr. Olago sought to know whether there was a problem of blood tests in the community i.e. do people fear blood tests? The participants said that this is normally done and the community has no problem with it.

Dr. Githeko made a note that when eucalyptus trees are planted at the valleys, they reduce mosquitoes by about 90%. However, these trees drain a lot of water but they can be maintained only to a certain level e.g. size of use for firewood and then cut and plant others.

The councilor said that when he was young, some decades ago, people living in the highlands could not go to live in the lowlands because of malaria and that many people were not getting children in these lowlands due to death caused by malaria. But until recently, due to use of drugs, the lowlands are now being inhabited by those from the highlands.

The participants observed that in Kaitui, there are few health units and those available are not adequately medically equipped. The whole Soin division is affected by this problem and particularly areas such as Kaitui, Kooitaburot and Kapsorok. The area is generally lowland. The division does not have a single health center but has dispensaries. It is an area with six chiefs but poverty is widespread. The local people in the division are so poor that they cannot even manage to raise money to purchase a microscope for lab use worth Kshs. 35,000. They rely on sugarcane growing and burning of charcoal. The participants said that most of the people into that region are the ones who dominate ward two of Kericho District hospital. They said that many of the people in the area even die before reaching Kericho hospital.

In general, the participants said that use of a local radio could help to disseminate information about malaria epidemic (creation of awareness). They also said that the problem of doctors being corrupt and then allowing substandard goods such as nets should be solved.

The procurement policy of health should be tied to drugs due to corruption. The participants also said that NGO's could be introduced in the area to try chemicals used for in-door spraying as a coping strategy.

## **OUTPUT 6: PROCEEDINGS OF THE STAKEHOLDERS MEETING, HELD AT MAKERERE UNIVERSITY FACULTY OF FORESTRY, UGANDA, 22<sup>ND</sup> JULY, 2003**

### **Aims of this Meeting:**

- To create awareness and seek involvement of national stakeholders in the AIACC project.
- To establish networks and strengthen links with community stakeholders where the research was conducted.
- To identify focal points in various national institutions for the AIACC project.

### **Structure:**

<b>TIME</b>	<b>ITEM</b>	<b>LEAD PERSON</b>
<b>9.15 am</b>	Introduction of participants	
<b>9.15 – 9.30 am</b>	Overview of AIACC AF 91 project	<b>Prof. Mugambi</b>
<b>9.30 – 9.45 am</b>	Progress Report of the Project – Challenges and Accomplishments	<b>Dr. Kirumira</b>
<b>9.45 – 10.05 am</b>	Discussion of presentations [Question and Answer Session]	<b>All Participants</b>
<b>10.05 – 10.20 am</b>	BREAK	
<b>10.20 – 10.35 am</b>	The Cholera Situation in Uganda	<b>Dr. Bwire</b>
<b>10.35 – 10.50 am</b>	The Malaria Situation in Uganda	<b>Ms. Twesigomwe</b>
<b>10.50 – 11.10 am</b>	Discussion of presentations [Question and Answer Session]	<b>All Participants</b>
<b>11.10- 11.25</b>	Water and Climate Change	<b>Mr. Kizza</b>
<b>11.25- 11.40</b>	Overview on Climate Data Collection and Analysis	<b>Dr. Olago</b>
<b>11.40 – 12.00 am</b>	Discussion of presentations [Question and Answer Session]	<b>All Participants</b>
<b>12.00 – 1.00 pm</b>	Plenary Session - To establish the Way Forward	<b>All Participants</b>

### **1 Introductions**

The chairman Professor E. Mugambi opened the meeting by welcoming members and asking them to introduce themselves.

### **2. Background to the project**

Prof. Mugambi made a presentation of the background to the project in which he outlined the objectives, the key participating countries and institutions, and the source of funding of the project.

### 3. Progress Report

Dr Edward Kirumira made a presentation on the progress of the project in which he highlighted the activities that have been accomplished, and the challenges that have been experienced over the period.

#### **Involvement of other actors**

It was agreed that the involvement of the various institutions in a project of this kind was an opportunity for them to collaborate and form networks on important issues. The presenter pointed out that the involvement of the Uganda National Academy of Sciences, to which all academics are potentially members, is an opportunity that must be seized and utilized for the dissemination of the findings of the study.

The people of Kabale and Gaba where the study was conducted were especially acknowledged for all the assistance that they extended to the project. The individuals and institutions that have in various ways contributed to the study were also thanked, and it was hoped that stronger linkages with various stakeholders could be made so as to make the research more action oriented.

The presenter said that to a given extent, the research is action oriented because of the exchange that is generated among the participants and with the community, but there is need to do a lot more in this respect. On the involvement of other actors, he said the initial step was to identify focal persons in the various agencies where secondary data could be collected. He also added that the invitation of the various stakeholders to this meeting was a manifestation of the commitment of the project to involve other people and institutions

Dr Olago informed participants that the project would aim to produce policy briefs that are regional as well as those that are country-specific. This will contribute to the formation of an integrated regional policy and interaction process.

#### **Challenges of data collection**

One participant advised that in light of the difficulties faced in secondary data collection, the project could make use of the weekly disease summaries that are published in the newspapers as one source.

It was also agreed that since the various institutions must be generating their own data, they should be approached to assist so that the project does not have to generate data that has already been compiled. The focal persons that have been identified in these institutions could be made part of the process in order to help with both data collection and interpretation.

#### **Dissemination**

It was observed that while many researchers go to a lot of effort to collect data, the problem is that people do not get to know about the data collected; especially the people at the grass roots. This is why some districts like Kampala do not act on the findings of research. An example was given of KCC which had almost abandoned the Vector Control Department, but which could use the information generated by this research to reinvigorate that department.

It was observed that projects are faced with the challenge of making research findings more friendly and understandable to the end users. There is also need to devise measures to see how recommendations can be translated into action.

It was therefore agreed that the need to include some focal persons in the study be further addressed, and that the project would endeavor to devise more user friendly methods of data dissemination.

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### **Capacity building**

It was agreed that this was a very important aspect of the project, and that it should be emphasized. It was also reported that one of the Research Assistants was due to travel to Nairobi in August for training in GIS.

It was also reported that preparations were underway to have one member of the team to undergo socio-economic scenario training.

## **4. Cholera situation in Uganda**

Dr. Godfrey Bwire made a presentation on the cholera situation in Uganda.

### ***Reactions to the presentation:***

#### **Conditions for cholera**

It was observed that to concentrate on El Nino as the main factor in cholera is to over simplify the issue, and that there is need to concentrate on how cholera is caused. Is it climatic conditions? Many people are at risk because of relying on ground water that is contaminated by run-off, and also contaminated by faeces because many people have no latrines. Many people also cannot afford to get clean and safe water. So there is need to broaden the scope because many people live in conditions that put them at risk of exposure to cholera.

The presenter informed members that there are places like Sese Island that seem to have the right conditions for cholera, where the water table is very close and people do not have latrines, but do not actually have the disease. This is because cholera outbreak is dependent on a high dose of the bacteria. Instead, Sese has a very high prevalence of dysentery.

#### **Preparedness for Cholera**

Participants were informed that preparedness by the Ministry of Health enabled it to keep the cases low after year 2000. This preparation involved reactivating the cholera task force, sensitization of the people about the disease, and awareness creation so that people could use safe water and also avoid buying food and drinks sold in the open.

It was observed that cholera preparedness needs to be dealt with as a national issue instead of leaving it to local governments. These local governments do not have enough money. This preparedness should include activities like upgrading some of the slum areas and ensuring water quality surveillance. Government should stop dealing with cholera in crisis situations.

#### **Water quality**

It was reported by a participant from the department of hydrology that rural safe water coverage had improved from 29% 10 years ago to 55%, and urban coverage had improved to 68%. However, in the urban area, the responsibility of government is to make water pipes available in a location, but not to connect it to people's homes.

## **5. Malaria situation in Kabale**

Ms Thereza Twesigomwe from Kabale made a presentation on the malaria situation in Kabale.

She first gave an overview of the socio-economic and demographic characteristics of Kabale, which is composed of the three counties of Rukiga, Rubanda and Ndurwa with the municipality. It has a total area of 1,827 sq km of which 1695 sq km is land, 48.5 sq km is water body, 79.4sq km is wetlands and 41.1 sq km marginal land. The population is 461,785 people according to the 2002 housing and population census with a population density of 253 persons per sq km. The highest population lives in the rural area and these are peasants who mostly rely on subsistence and commercial farming.

She also commented on the health facilities in the district which are: one regional referral hospital, six health sub district and other rural health facilities, which include NGO and private institutions and clinics. However, collective data in Kabale is not yet fully compiled due to the tragedy that happened when the office of the District Director of Health Services caught fire in 2002. All the data that was in that office was burnt and lost. Owing to the scarcity of data therefore, it is difficult to formulate a clear correlation between climate and malaria in Kabale.

### **MALARIA SITUATION IN THE DISTRICT**

On malaria situation in the district, she said that despite the lack of proper statistics, it is notable that malaria cases are increasing every year and this has been attributed to:

- Destruction of wetlands
- Population explosion
- Destruction of vegetation cover by both animals and man.

These factors have led to climate change paving way for increased malaria in the district. Malaria cases have been increasing annually. The most affected people being children and pregnant women, although other people are affected especially those with compromised immunity.

However, the government and other stakeholders have stepped in to reduce the effect of the epidemic through the following interventions:

- Training of health workers on malaria case management.
- Promoting the use of subsidized treated mosquito nets although most of the rural population still cannot afford them.
- Sensitizing the communities through mass media, home visiting and distribution of IEC materials to disseminate the message on the effect of malaria e.g., slashing/clearing bushes, closing windows before it is dark and other ways
- Giving of intermittent presumptive treatment of Fansidar to all pregnant women who attend the antenatal clinics in order to reduce the risks of malaria on pregnancy

### **Challenges**

- Some drugs have become resistant in the treatment of malaria such as chloroquine.
- Climate changes in the district, as the place is becoming warmer, it provides richer grounds for mosquito to grow.
- The district is very mountainous and the rural population is denied easy access to health facilities.
- Under utilization of health facilities which is attributed to self-prescription of anti-malaria drugs, and this leads to under-treatment. This may result into recurrent/chronic malaria.

### **Reactions:**

#### *Data destroyed by fire*

On the report that health data was destroyed by fire in the office of the District Director of Health Services, participants wondered whether it was possible to reconstruct this data from other sources such as the health units or other places where this data had been submitted.

The presenter reported that attempts are being made to do so but it was a lengthy and tiring process.

### **Drug abuse**

Participants wanted to know what measures are in place to control the use of drugs like fansidar.

The presenter informed participants that this was a really big problem because people engage in self-prescription and medication. Some people demand certain drugs from the health units. So control is a bit difficult and this is compromising the efficacy of the drugs.

### **Bed nets**

It was observed that the use of treated bed nets is a subject of controversy for commercial and political interests.

It was therefore agreed that there is need for better channels of communication to inform the people about the efficacy of using bed nets as a fight against malaria. It was reported that a WHO study revealed that reducing the man-to-mosquito contact was more cost effective than the treatment of malaria. A participant from the National Drug Authority also reported that the treated bed nets were tested and found usable in Uganda.

It was agreed that the numerous FM radio stations in the country would be a good channel for information dissemination, as well as the schools.

### **Climate change in Kabale**

Some participants wondered if the claim of climate change in Kabale is real or the changes observed are due to the changing land use. One wondered if the start and increase of malaria cases in Kabale may also be due to the changing land use patterns whereby new breeding sites and habitats for mosquitoes have been established.

## **6. Water and Climate Change**

Mr. Michael Kizza made a presentation on water and climate change.

### ***Reactions to the presentation:***

#### **Rainwater harvesting**

It was suggested that the cost notwithstanding, rainwater harvesting should be used more in people's homes because this would improve sanitation and therefore mean less vulnerability. Rainwater is already clean. However, there is also need to look at how water is disposed of after it is used, because this is usually a cause of danger to health.

## **7. Climate aspects of the project**

Dr. Dan Olago made a presentation on the climate aspects of the project.

### ***Reactions to the presentation:***

It was observed that LVEMP and FAO have done a lot of work in the area of climate since 1997. Ways should be found of convincing these agencies to share some of this information. It may be necessary to form partnerships with them as a way of showing them that the project does not simply seek to grab their data for private use.

There is also need to find ways in which locally available competencies can be used to contribute to the capacity of the project. For instance NEMA and the Water department have a lot of experience in GIS.

### **Way forward**

1. We should take account of the fact that data can no longer be obtained free of charge since it costs money to collect
2. Collaboration between stakeholders is an important issue. We need to attract the sympathy of influential actors by relating research to action. This will also give more credibility to our research.
3. We should plan on having more such meetings
4. Dissemination of findings is recommended as important, coupled with some sensitization
5. Additional funding could be sourced from SIDA because they have a component on water.



**List of participants**

<b>Name</b>	<b>Designation</b>	<b>e-mail/ telephone</b>
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Kiyimba Benard	Chairman Health Committee Gaba	Tel 075506836
Kirumira Mohamed	Ag Chief Health Inspector Kampala City Council	Tel 077447761
Bwire Godfrey	Senior Medical Officer, Control of Diarrhoeal Diseases, MOH	<a href="mailto:cddmoh@yahoo.com">cddmoh@yahoo.com</a> Tel 077418934

## **OUTPUT 7: PROCEEDINGS OF THE STAKEHOLDERS MEEETING, HELD AT MULEBA DISTRICT COUNCIL, TANZANIA, 15-16 JULY 2003**

### **1. INTRODUCTION**

The stakeholders' workshop was conducted in Muleba Town, Tanzania, between 15<sup>th</sup> and 16<sup>th</sup> July. The workshop timetable consisted of presentations and group participation, as part of the second fieldwork. The objective of the workshop was two fold, firstly to present the project and preliminary research findings of the project to the participants. The workshop was opened by the District executive Director for Muleba District. Two presentations were made concerning the brief outline of the Impacts of climate change, vulnerability and adaptations – and the AIACC Project, and preliminary findings from Bugarama and Chato Villages, respectively. The second objective was to solicit additional information from participants to, among other things, fill-in gaps in and complement the dataset collected during the first and second fieldwork. To achieve this, Workshop participants were given the opportunity to discuss and comment on the findings. This exercise enabled participants to understand the project better, scrutinise the report and identify additional information to be collected and/or included in the study. During the workshop, participants also made an attempt to address potential and/or ongoing interventional measures for malaria and cholera, both at the village (local) and district level. This proceeding presents various information sets obtained during the workshop.

### **2. GENERAL COMMENTS TO PRESENTATIONS**

This section presents the general comments from workshop participants on aspects related to malaria and cholera in the study area, that is, Muleba and Biharamulo districts.

#### ***2.1 Malaria situation in Muleba and Biharamulo Districts***

- It was pointed out by workshop participants that Malaria is a chronic problem in both Muleba and Biharamulo Districts. It was pointed further that during the dry season of 2003 malaria has been particular serious in Muleba district to the extent that at some of the Health centres (e.g. Kaigara, located in Muleba town) tents had to be used to accommodate hospitalised patients because they were too many compared to the available wards. Some of the offices used by the medical staff at the health centre had to be converted to wards so that more patients could be accommodated.
- It was pointed out by the health Officer for Muleba District that periods with much rainfall do not usually have many mosquitoes because their breeding grounds get disturbed by the heavy storms. These are usually cooler periods of the year. However, as temperatures pick up after the rains there mosquito population grows significantly.
- One of the reported key symptoms of malaria at hospitals and health centre level was anaemia.
- It was pointed out by participants that one of the factors leading to outbreak of malaria is poor nutrition, which makes people weak and vulnerable to malaria as well as other diseases. It was reported further that inadequate food provisioning is responsible for making many people, particularly children, succumb to malaria. This was reported to be the case particularly in the years when there is no good banana crop. Many people in Muleba district decline to eat other foods (e.g. maize meal) apart from bananas, except in periods of absolute food (i.e. banana) shortage.
- An inquiry was made on whether there are more incidences of malaria to people living close to rivers and/or water channels than those far from these water bodies. The response from the participants indicated that mosquitoes would only breed in stagnant waters and not in running waters. Hence it was unlikely that people living close to flowing rivers suffer more from malaria. Instead, in places like Muleba District (and hence Bugarama village), mosquitoes breed in the vegetation, particularly banana leaves that trap and accumulate water (during the rain season, and even dew) sufficient for mosquitoes to lay eggs and breed. This is also the case for places with stagnant waters (though because of the sloping terrain of Bugarama very few places would have stagnant water).
- The epidemic levels of malaria in the study area were attributed to, among other factors, the increasing resistance of malaria parasites to various medicines, including the recent prescription –

the SPs, and the fact that malaria patients, particularly children (>50%) are not taken to health facilities in time after they have started suffering from malaria (i.e. showing some disease symptoms).

- Participants mentioned that there are two types of mosquitoes based on their activity pattern. (i) Those which bite inside the houses and spend the rest of the time outside – the endophilis mosquitoes, and (ii) those which bite while outside and spend the rest of time inside the houses – exophilis mosquitoes. It was reported though that no study has ever been conducted in Muleba or Biharamulo district on the behaviour of mosquitoes.
- [Follow up to the above] A comparison on vulnerability to mosquito bite between men, women and children, revealed that women and children sleep much earlier in the evening which makes them more vulnerable to incoming mosquitoes because while asleep they can do very little to protect themselves from the mosquitoes, which are at the peak of their activity period. Men, who were reported to spend much of the evenings in the local pubs and usually come home late in the night, tend to be less exposed to mosquitoes bites. Consequently less vulnerable to malaria. Many households were claimed to be unable to buy mosquito nets sufficient for all household members. This is partly attributed to large families (big number of household members).
- Concerning treatment of malaria by local medications, it was noted during the workshop that some of the traditional medicines used in Muleba district are seem to be more effective in treating malaria than quinine. However, analyses of some of herbs used are still being done by the NIMR (National Institute for Medical Research).

## ***2.2 Cholera situation in Muleba and Biharamulo Districts***

- Concerning Cholera, it was pointed out that the disease has a common occurrence during the rainy season. However, there have never been cholera outbreaks in the mainland of Muleba District. It was reported that sporadic incidences that reached epidemic levels have only been recorded in the islands part of the districts, involving islands located in Lake Victoria. The last outbreak was reported to have taken place in the year 2002, and was associated with poor human waste disposal among the fishermen villages in the islands. Similar reasoning was advanced to being the cause for cholera incidences in Chato village in Biharamulo District.
- The islands parts of Muleba district were reported to be affected by recurrent cholera outbreak because of population increase than the islands can support and coupled by the poor sanitary measures undertaken by the fishing community. In these islands, water table is high and thus becomes difficult to apply pit latrines, which would otherwise be affordable to the majority of the residents in the islands. But also, in some places the islands are characterised by shallow soils on the bedrock.
- Further clarification on cholera in Chato village, indicated that cholera is not such a chronic disease in the area as often thought. It was pointed out that there were cholera outbreak in only a few years that was treated and overcome within three weeks of the outbreak. Experiences of the District health experts present at the workshop associated cholera outbreaks in Chato to the collapse of pit latrines during rainy season, which makes the waste to spread everywhere including flowing into the lake. It was reported that this is due to the fact that the area has sandy soils that when latrines are built the walls of the pits easily erode as the rain season progresses resulting in eventual collapse of the whole structure, thereby releasing their contents (wastes).
- It was clarified further that in the 1997/98 season only six (about 9.4%) people died in Chato area out of the 64 cases that were reported.

## ***2.3 General note on malaria and cholera***

- One of the immediate things to note from the study area, that was a concern among all participants, was the fact that the communities depend mainly on the government to provide health services.
- It is the opinion of participants to the stakeholders workshop that one study village for Malaria and Cholera, respectively, are not enough. It would have been useful if the study would cover two study villages for malaria and cholera, respectively. Participants suggested that perhaps the

other villages could be selected in the vicinities of other lakes, such as Lake Tanganyika so as to compare experiences with the Lake Victoria Basin.

- Concerning Chato Health Centre in Biharamulo, it was pointed out that the centre has recently been elevated to a hospital that will be functional very soon. It was pointed out also that though in for most of the times the centre has received medicines for various ailments (including malaria and cholera), the medicines have often been in short supply (sometimes the stocks lasting for only one week). However, with changing the status of the centre into a hospital there are expectations that more medical supplies will be delivered to the hospital.

### **3. DISCUSSION IN GROUPS - DAY 1**

Workshop participants were divided into two groups for in-depth discussion and brainstorming on various issues raised in the presentations as well as forging a way forward regarding strategies that can be used in addressing malaria and cholera problems at village and district levels. This section presents the discussions for the first day of the workshop, while section 4 addresses issues for the second day. For day one, the group discussions focussed on three key aspects.

- 1) Scrutinise the presented preliminary research report and identify weaknesses and information gaps
- 2) Identify and include addition information to improve on the report
- 3) To identify aspects addressed in the report that may need further research.

Results from group work are presented in the following sections.

#### **3.1 Group One**

##### **3.1.1 Weaknesses and information gaps in the preliminary research report**

- There was a concern that the presentation of the research results has come somewhat too early, since much of the collected data is yet to be analysed. The presentation could have been delayed until much of the analysis has been done so that clear patterns on vulnerability and adaptation could feature out more clearly.
- The sample size is too small, the study should have included at least two villages for each of the disease situations (malaria and cholera) in each of the districts.
- The information in the report seems to be one sided, based only on the field data.
- The issue of cleanliness of the environmental does not feature out well in the report
- Problem tree approach was not used in order to identify more problems and prioritise them

##### **3.1.2 Additional information to improve on the report**

- Other professional information need to be collected from district offices, e.g. from the Health, Meteorological, and Agriculture Departments to complement the field data. [Note: some of these information have already been collected, and analysis is underway]

##### **3.1.3 Aspects that need further research**

- Human behaviour and changes over time, particularly as related to how people address various disease situations (e.g. the absence of mosquitoes in smoky houses or close to fire places in the house).
- Need to research on population dynamics and how this influence on malaria and cholera
- Research on vector capacity for anopheles mosquitoes (e.g. how many people can one mosquito bite?), the species available in the study area.

#### **3.2 Group Two**

##### **3.2.1 Weaknesses and information gaps in the preliminary research report**

- Malaria incidences increases between May and August, not only in the months indicated in the report.
- The people of Chato village have not mentioned whether they make and use latrine. This is an important consideration regarding cholera outbreaks.
- People in Chato needed to mention the local medicines that they use in the control of cholera instead of making it a herbalist's secret. The idea is to have those medicines researched on.

### 3.2.2 Additional information to improve on the report

- How do people address the disease situation: Many people in the study area, particularly the poor, spend the little money they earn in drinking local brew instead of using it to attend health related issues for the household
- Many people also use their income for expensive clothing at the expense of the household's health
- It was reported that people in Bugrama village involve themselves in small businesses, e.g. of shops and kiosk, although majority also are farmers and keep livestock.
- Most often villagers buy medication for malaria from local shops instead of going to health centres/hospitals
- Many people in the rural areas use traditional measures to kill and/or deter mosquitoes. For example, burning fresh eucalyptus leaves and or animal dung in the house was reported to chase away mosquitoes from the house.

### 3.2.3 Aspects that need further research

- Need to research on malaria dynamics (i) in villages far from health centres and those close wetlands (locally known as *matingatinga*, in Chato area), (ii) in villages with recurrent outbreak, and (iii) in areas along the Lake Victoria coastline as well as in the islands within Lake Victoria.

## 4. DISCUSSION IN GROUPS - DAY 2

Activities for Day two focused mainly on (i) developing problem trees on malaria and cholera (as a follow up to discussions of day one) and (ii) brainstorming on strategies that can be used in the control of malaria and cholera both at village level and at the level of the district council. The exercise was undertaken in same groups as day one. In the following sections we present the outcomes from the group works.

### 4.1 Group one

#### 4.1.1 Problem Tree Analysis for Malaria

The problem tree as concerns malaria is presented in Figure 4.1, while that of cholera is presented in Figure 4.2.

#### 4.1.2 Strategies for the control of malaria and cholera at village and District Council levels

Table 4.1 presents the various strategies identified by participants to address the vulnerability to malaria and cholera situation the village and district level.

**Table 4.1 Strategies for the addressing the vulnerability and control of Malaria and cholera as Identified by Group One**

No	Village Level	District Level
Malaria		
1.	Communities to destroy all mosquito breeding grounds, by <ul style="list-style-type: none"> <li>- clearing vegetation in areas surrounding homesteads</li> <li>- Covering and/or draining all sites with stagnant water</li> <li>- Perforating all banana leaves that accumulate water</li> <li>- Burying all metal/plastic cans that can keep water for the mosquitoes</li> </ul>	To ensure the timely availability of anti-malaria drugs

2.	Communities to use mosquito nets impregnated with insecticides	To provide training on appropriate treatment for malaria.
3.	Sending malaria patients to health facilities for treatment	Put in place a suitable referral system.
4.	Encourage use of insecticides to kill and/or repel away mosquitoes.	Ensure that malaria drugs are available and cheap and easy to afford cost.
5.	Community to avoid using malaria drugs without prescription from physicians	Ensure that there is adequate recruitment of health staff in each zone
Cholera		
1.	Construction and use of improved toilets	Awareness campaigns on how to prevent cholera outbreaks
2.	Use of clean and safe water (boiled)	Outbreak preparedness – (districts need to have plans for controlling cholera in the event of outbreaks)
3.	Proper collection and disposal of wastes - Collecting solid wastes in pits and burying the pit when they fill-up - Burning the wastes, where possible	Provide equipments necessary to keep the environment clean and improve the hygienic conditions
4.	Protection and proper management of water sources	Recruit more health staff.
5.	Cost sharing in the management of water sources	

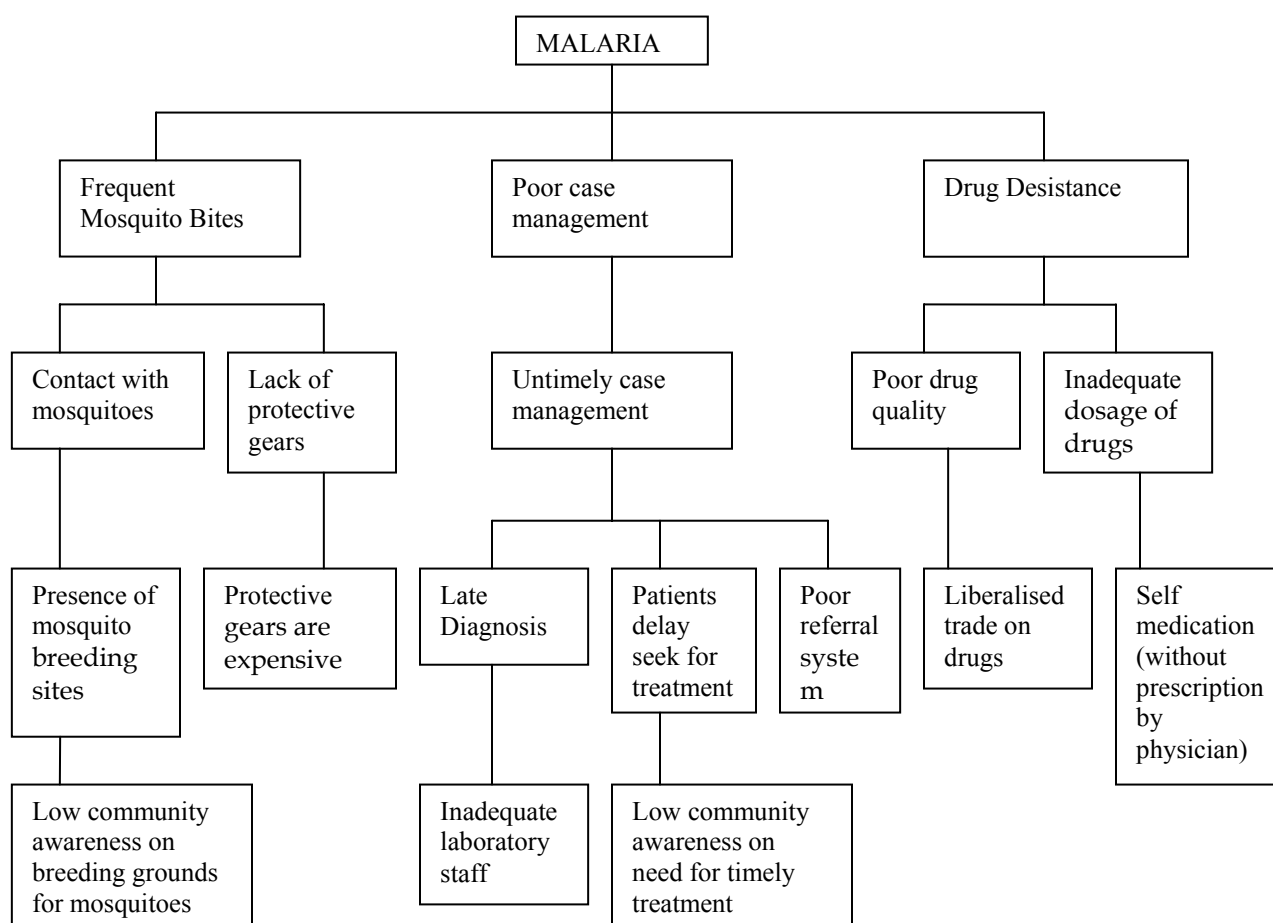


Figure 4.1. Problem tree related to malaria, as formulated by Group One

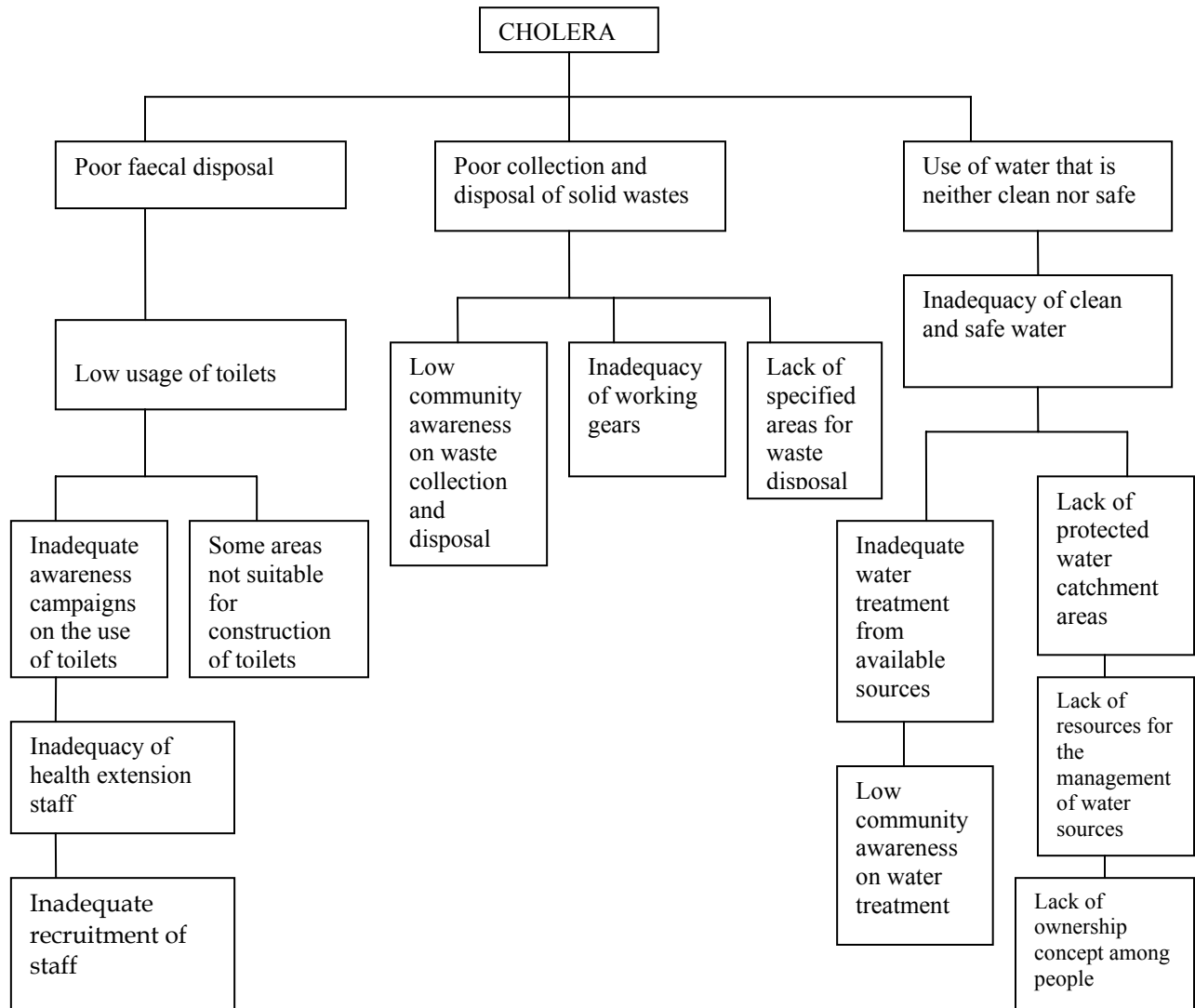


Figure 4.2. Problem tree related to cholera, as formulated by Group One

## 4.2 Group Two

### 4.2.1 Problem Tree Analysis for Malaria

The problem tree as concerns malaria is presented in Figure 4.3, while that of cholera is presented in Figure 4.4.

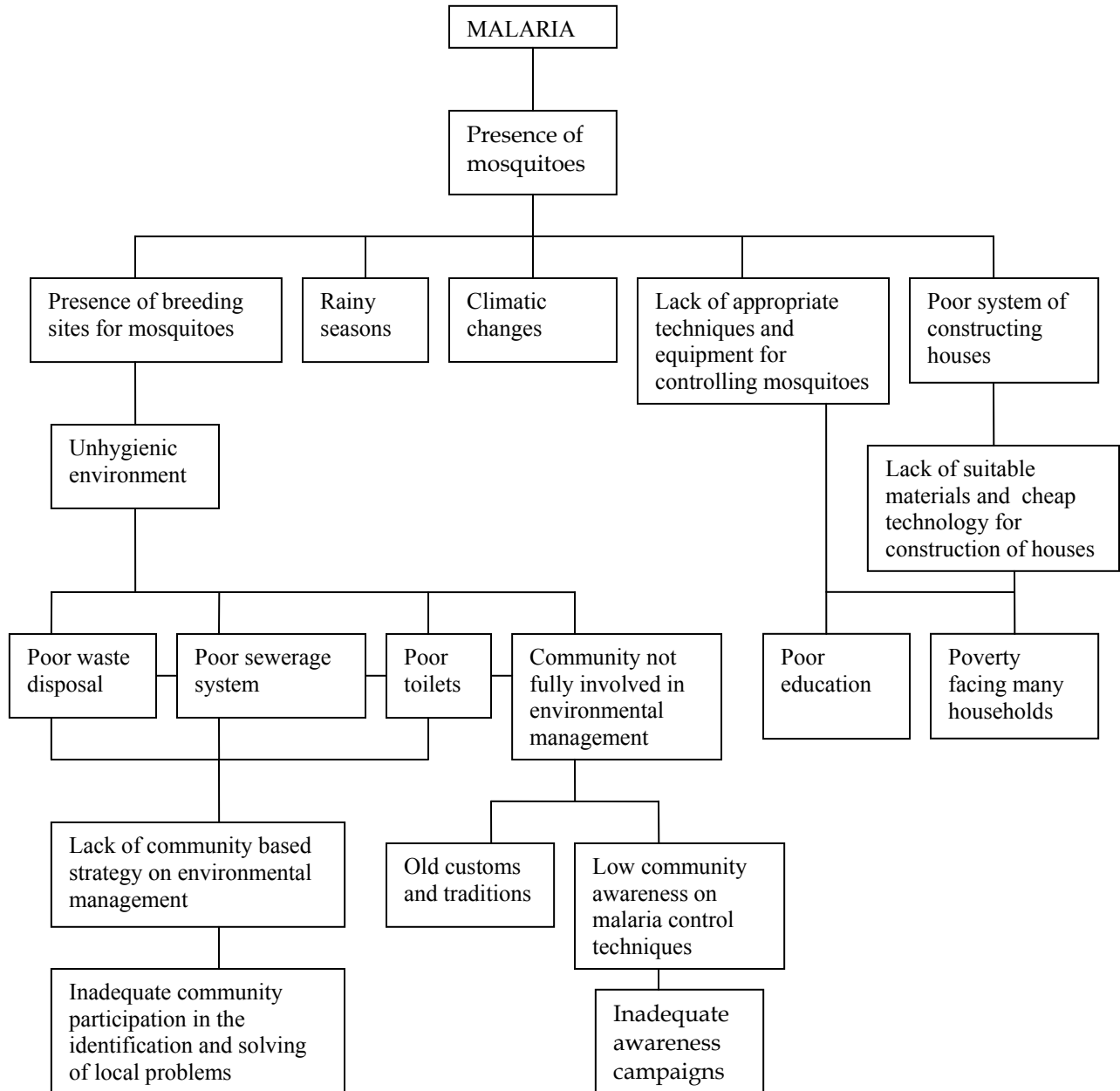


Figure 4.3. Problem tree related to malaria, as formulated by Group Two



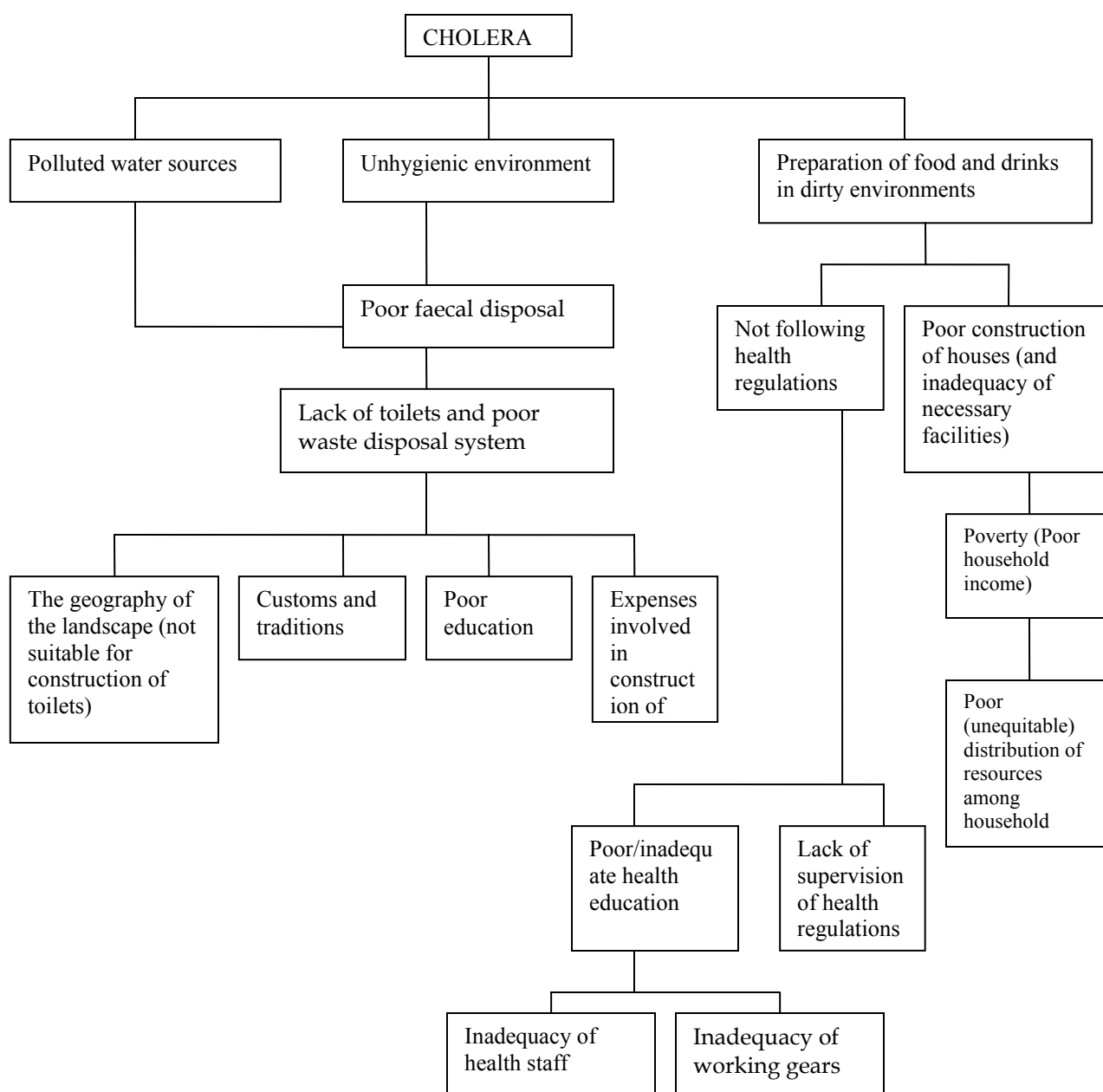


Figure 4.4. Problem tree related to cholera, as formulated by Group Two

#### 4.2.2 Strategies for the control of malaria and cholera at village and District Council levels

Table 4.2 presents the various strategies identified by participants to address the vulnerability to malaria and cholera situation the village and district level.

**Table 4.2 Strategies for the addressing the vulnerability and control of Malaria and cholera as Identified by Group Two**

No	Village Level	District Level
<b>Malaria</b>		
1.	Communities awareness on how to prevent malaria, with emphasis on the following: - clearing vegetation in areas surrounding homesteads - Covering with soil and/or draining all sites with stagnant water	To ensure the timely availability of anti-malaria drugs
2	Closing the doors early in the evening	Identify malaria outbreak areas and have district plans for malaria control
3.	Communities to use mosquito nets impregnated with insecticides	Undertake awareness campaigns on how to prevent malaria, and provide feedback to community leaders on local problems.
4.	Ensure timely treatment once one contracts malaria	Ensure that malaria drugs are available and cheap and easy to afford cost
5.	Eating balanced diets so that the body can healthy and able to fight malaria	Collect weekly, monthly and annual statistics on malaria situation
6.	Use of insecticides to kill mosquitoes in the houses.	To provide training on appropriate treatment for malaria
<b>Cholera</b>		
1.	Construction and use of improved toilets	Awareness campaigns on how to prevent cholera outbreaks
2.	Use of clean and safe water (boiling cooking and drinking water)	Outbreak preparedness
3.	Proper collection and disposal of wastes	Planning for cholera control strategies in cooperation with community leaders
4	Washing hands before taking any food/meals	Undertake environmental assessment to ascertain causes of problems and how to control the situation
5	Washing fruits before eating	
6	Washing hands every after visiting toilets	
7	Cleanliness of household utensils	Establish temporary camps for patients during cholera outbreaks
8	Community to report promptly when there is a cholera outbreak.	To ensure prompt response to cholera outbreak
9	Sick people to report promptly at health centres and hospitals for treatment	Undertake laboratory analysis to confirm outbreak

**APPENDIX 1. Workshop Timetable**

Time	Activity	Responsible
DAY 1 (15/07/2003)		
09.00-10.00	Registration	All participants
10.30-10.35	Self introduction	All participants
10.35-10.45	Opening remarks	District Executive Director, Muleba
10.45-11.15	Presentation 1: Impacts of climate change, vulnerability and adaptations to malaria and cholera - and the AIACC Project	Prof. P.Z. Yanda
11.15-11.30	Tea break	All participants
11.30-12.00	Presentation 2: Preliminary research findings on the impacts of climate change, vulnerability and adaptations to malaria and cholera in Bugarama and Chato villages	Dr. R.Y.M. Kangalawe
12.00-12.30	Discussion	All participants
12.30-14.00	Lunch	All participants
14.00-16.00	Group work	All participants
16.00-16.30	Presentation of Group work	All participants
16.30-17.00	Discussion	All participants
17.00-17.30	Tea break	All participants
17.30	End of Day 1	All participants
DAY 2 (16/07/2003)		
Time	Activity	Responsible
09.00-10.00	Group work	All participants
10.00-10.30	Tea break	All participants
10.30-13.00	Group work continued	All participants
13.00-14.00	Lunch	All participants
14.00-14.30	Group Presentation	All participants
14.30-15.00	Discussion	All participants
15.00-15.10	Closing workshop	District Health Officer, Muleba
15.20-17.00	Cocktail	All participants

## APPENDIX 2. List of participants

No	Name	Designation	Institution represented	Contact Address
1	Dr Pius Buchukundi	Medical Officer in Charge	Chato Health Centre	P.O. Box 50, Chato - Biharamulo
2	Mr. Gervas Nyongoli	Acting District Medical Officer, Biharamulo	Biharamulo District Council	P.O. Box 22, Biharamulo
3	Mr. Alistides Kamara	Acting District Health Officer, Biharamulo	Biharamulo District Council	P.O. Box 22, Biharamulo
4	Mr. William Bandeke	Acting Village Chairman	Chato Village	P.O. Box 181, Chato - Biharamulo
5	Mr. Julius B. Mazige	Health Attendant	Chato Village	P.O. Box 181, Chato - Biharamulo
6	Mr. Prudence Rwekaza	District Health Officer, Muleba	Muleba District Council	P.O. Box 10, Muleba
7	Ms. Margareth Kalokola	Representing District Executive Director, Muleba	Muleba District Council	P.O. Box 131, Muleba
8	Ms. Rosemary Binamungu	Acting District Medical Officer, Muleba	Muleba District Council	P.O. Box 10, Muleba
9	Ms. Florence Kayungi	Medical Officer in Charge	Kaigara Health Centre	P.O. Box 10, Muleba
10	Ms. Grace Mushashu	Clinical Officer in Charge	Kabare Dispensary	P.O. Box 10, Muleba
11	Mr. Sylvestre Lwabumbile	Village Chairman	Bugarama Village	Bugarama
12	Mr. Hulbano Nyegeza	Health Attendant	Bugarama village	Bugarama
13	Ms. Scholastika Rushagya	Nursing Officer/Midwife	Rubya Hospital	P.O. Box 133, Rubya - Muleba
14	Mr. Yusuf Abdulkadiri	Senior Health Officer	Muleba District Council	P.O. Box 10, Muleba
15	Mr. Musa Manamba	Driver	Chato Health Centre	P.O. Box 50, Chato - Biharamulo
16	Prof. Pius Z. Yanda	Researcher/Workshop Facilitator	Institute of Resource Assessment, University of Dar es Salaam	P.O. Box 35097, Dar es Salaam
17	Dr. Richard Y.M Kangalawe	Researcher/Workshop Facilitator	Institute of Resource Assessment, University of Dar es Salaam	P.O. Box 35097, Dar es Salaam
18	Mr. Dosteus Lopa	Research Assistant	Institute of Resource Assessment, University of Dar es Salaam	P.O. Box 35097, Dar es Salaam

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19	Ms. Margareth Bushesha	Research Assistant	Institute of Resource Assessment, University of Dar es Salaam	P.O. Box 35097, Dar es Salaam
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## OUTPUT 8: VALIDATION OF GCM DATA FOR LAKE VICTORIA BASIN STATION CLIMATOLOGY AND AN ASSESSMENT OF THE SKILL OF CLIMATE PROJECTIONS IN REPRODUCING THE ACTUAL FOR THE LAKE VICTORIA REGION

### 1. Introduction

The Lake Victoria region is encompassed within the three East African countries of Kenya, Tanzania and Uganda. The Lake is the largest and second largest fresh water lake in Africa and the world respectively. It has a unique climate and produces small-scale circulation patterns that tend to influence the climate of the surrounding areas. It also acts as an important source of wind and moisture for rainfall generation in the surrounding areas. The climate of the region is therefore of paramount importance. This can only be well understood if there is sufficient well-distributed climate data covering a long period.

Many attempts are being made to project climate conditions of the globe using General Circulation Models. Such projections are useful in determining the kind of climate change trends that are likely to be observed in different parts of the world. However, the model outputs need to be vetted to ensure the outputs are realistic. It is only through this kind of exercise that concrete conclusions can be drawn and critical decisions made on how to manage the environment. The model validation is, as explained above, carried out through statistical comparisons between the outputs and actual station data.

The objective of this exercise is therefore to validate the gridded rainfall climatology and actual rainfall climatology from the station network within the area of interest. The second objective is to validate GCM projections (which are also in the form of gridded data sets) with actual data to ensure that the models are simulating the station information accurately.

### 2. Data used

The gridded data set was obtained from the Climatic Data Research Unit (CRU) website <http://www.cru.uea.ac.uk/cru/data/hrg.htm>. The baseline climatology is based on 1961-1990 and is averaged in 0.5 by 0.5 degree grid boxes. The baseline climatology extracted from the website is labelled CRU CL1.0. In addition, interpolated GCM experiments to be used for validation of projections are on the same website. The experiments to be used in this exercise are labelled TYN SC2.0. The experiments contain time series of projected climate over the same grid boxes.

Actual rainfall data for the period 1961-1990 was obtained from the Drought Monitoring Centre- Nairobi. Nine stations locations are given in Table 1 below. around Lake Victoria were used in this exercise. The station names and their

**Table 1: Stations used in the analysis**

No	STATION NAME	COUNTRY	LATITUDE	LONG.	CORR. COEFF.
1	Kakamega	KENYA	0.283	34.783	0.9833
2	Kisii	KENYA	-0.667	34.783	0.9831
3	Kisumu	KENYA	-0.100	34.750	0.9481
4	Bukoba	TANZANIA	-1.333	31.817	0.9969
5	Musoma	TANZANIA	-1.500	33.800	0.9853
6	Mwanza	TANZANIA	-2.467	32.917	0.9543
7	Entebbe	UGANDA	0.050	32.450	0.9356
8	Jinja	UGANDA	0.450	33.180	0.9318
9	Kampala	UGANDA	0.317	32.617	0.9346

### 3. Methods of Analysis

The gridded data sets were extracted using a program that was generated in-house. The gridded rainfall data sets are archived in units of mm/day\*10. The extracted data sets were converted to mm. The extraction was done for 9 grid boxes each of which represented one station.

Mean monthly rainfall was computed for the 1961-90 period for each of the stations using the actual time series of the station data. Time series plots were drawn for each station in which the gridded monthly climatology was superimposed on the mean climatology from station data. This is important to facilitate a visual inspection of the type of differences that there are in the two data sets. In addition, correlations and correlation coefficients were computed between the gridded climatology and the station climatology. The results of the correlation analysis are summarised in Table 1 in terms of the correlation coefficients.

### 4. Results

#### Time Series Plots

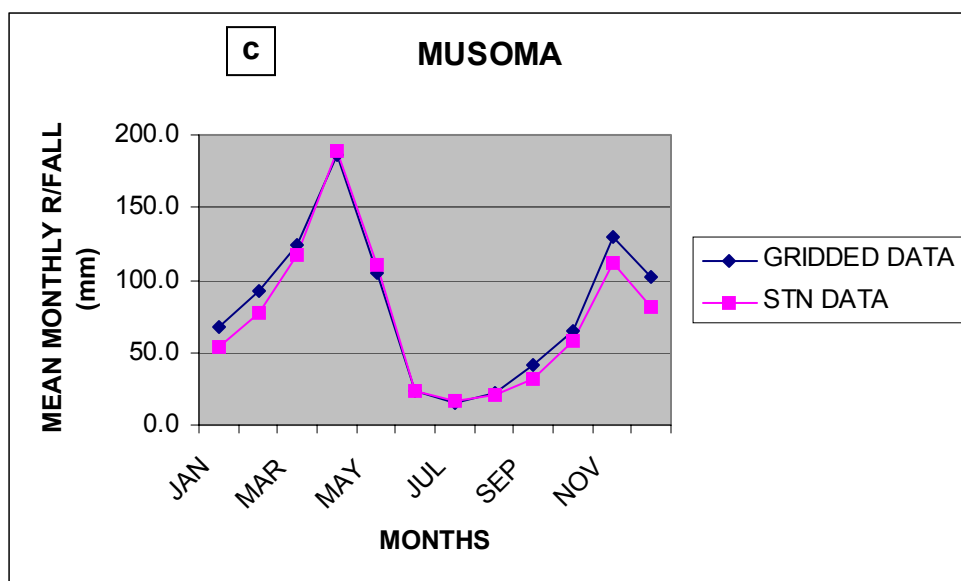
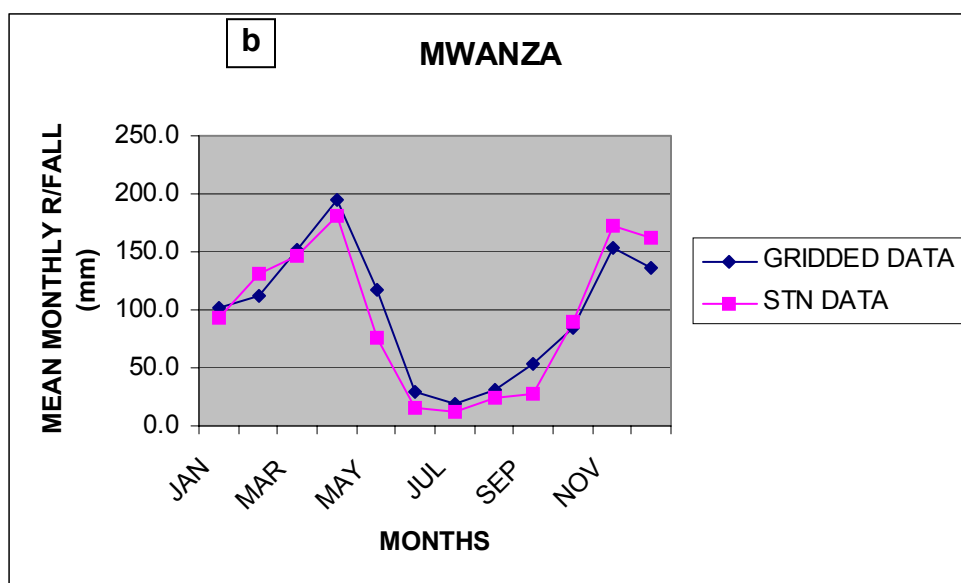
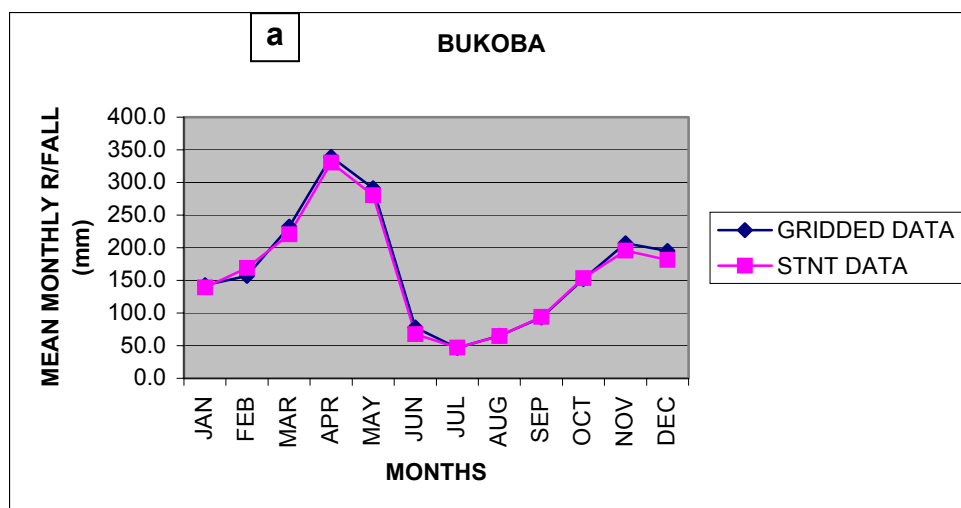
Figures 1(a) – (i) show time series plots of the gridded rainfall climatology on which the station climatology have been superimposed. It is evident from the time series plots that there is no coherent pattern in the differences between the two data sets. As would be expected, there are months when the gridded data overestimates/underestimates the actual. There are also some months when the difference between the gridded data sets does not vary from the station data. The gridded data set compares very well with the station data for Bukoba in Tanzania (Figure 1(a)). There is a tendency for overestimating the station climatology at Musoma in January, February, November, and December (Figure 1(c)). At Mwanza, the station climatology is overestimated during June and August and underestimated in February, November and December (Figure 1(d)). At Kakamega (figure 1(d)) and Kisii (figure 1 (e)), the gridded data set underestimates the station climatology for most of the months. This underestimation is more apparent at Kisii with deviations of about 50 mm during some months. At Kisumu (figure 1(f)), the gridded data set overestimates the station climatology during the relatively drier months of July to September and introduces a slight rainfall peak in August.

In Uganda, the gridded data set overestimates the station data during the long rains (March to May) season at Jinja (figure 1(h)) and Kampala (figure 1(i)). It underestimates the station climatology for Entebbe (figure 1 (g)) during the same season. The differences during some months are of the order of close to 100mm. At Entebbe, the peak rainfall month during the long rains season is depicted as April when the station climatology shows May as the peak.

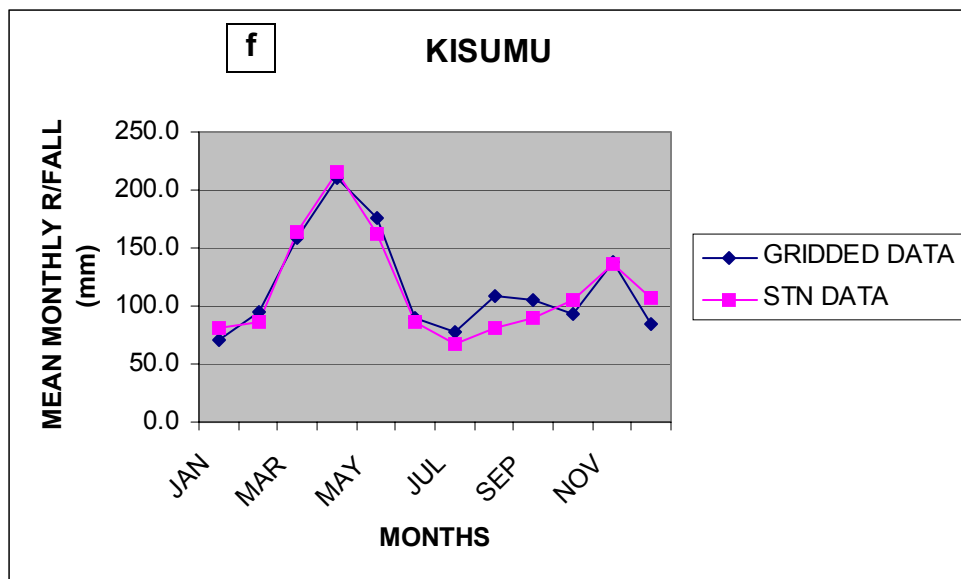
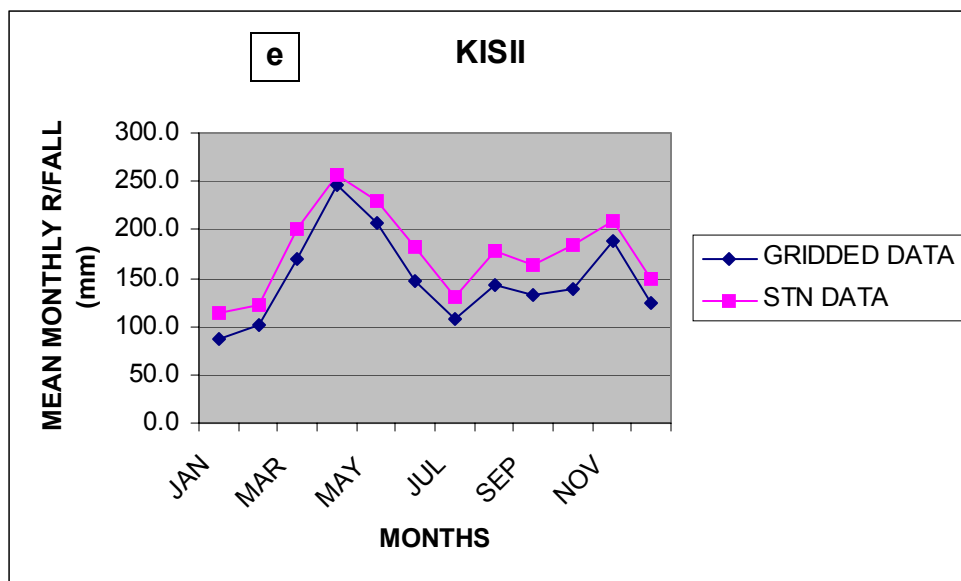
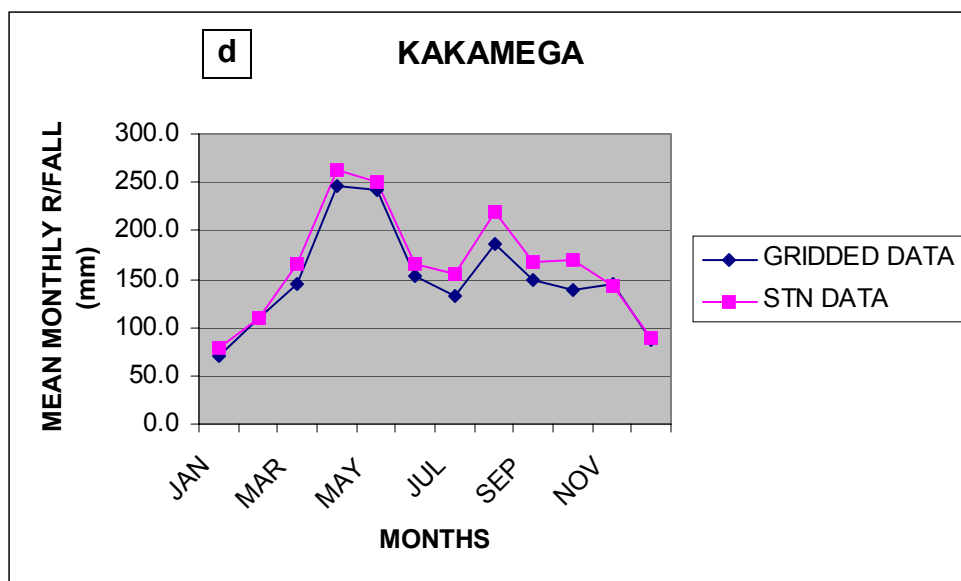
#### Correlations

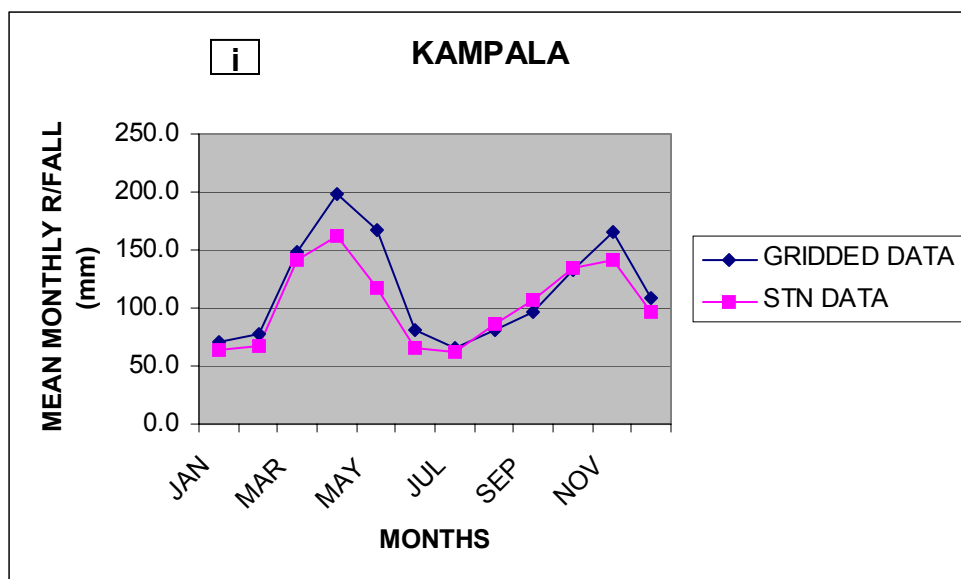
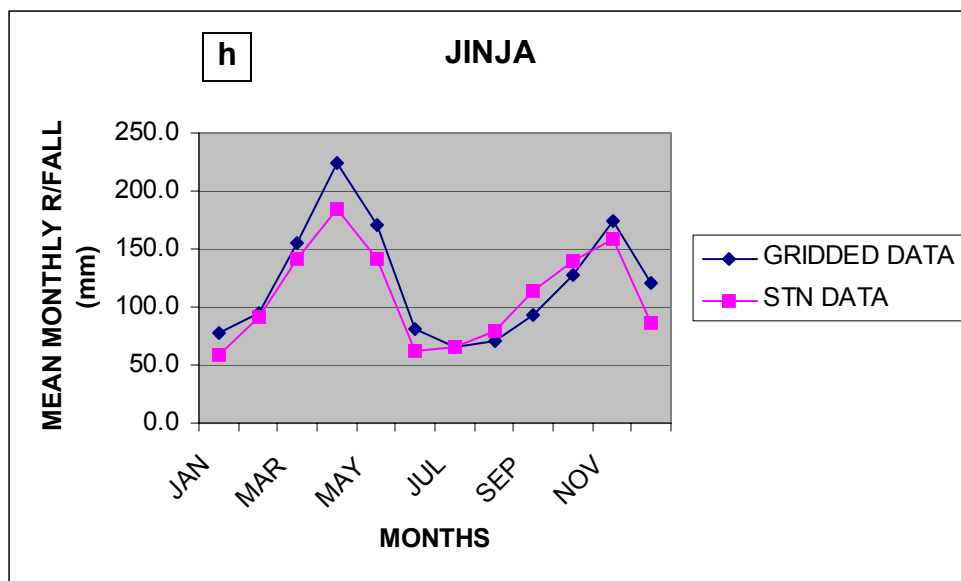
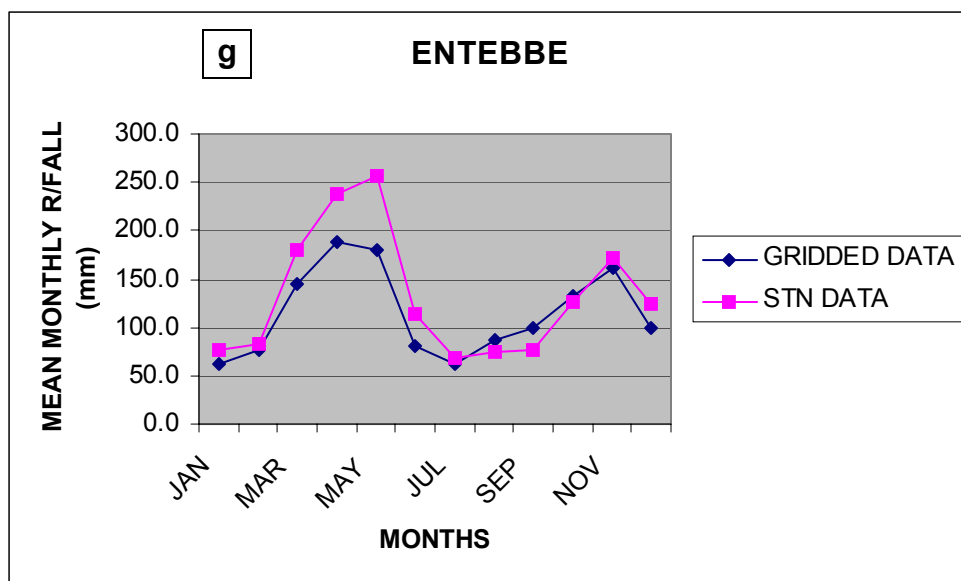
The correlation coefficients between the gridded data sets and the station climatology revealed high relationships (Table 1). All the correlations are greater than 0.9.

**Figure 1:** Time series plots of mean monthly rainfall from gridded data sets superimposed with the station climatology





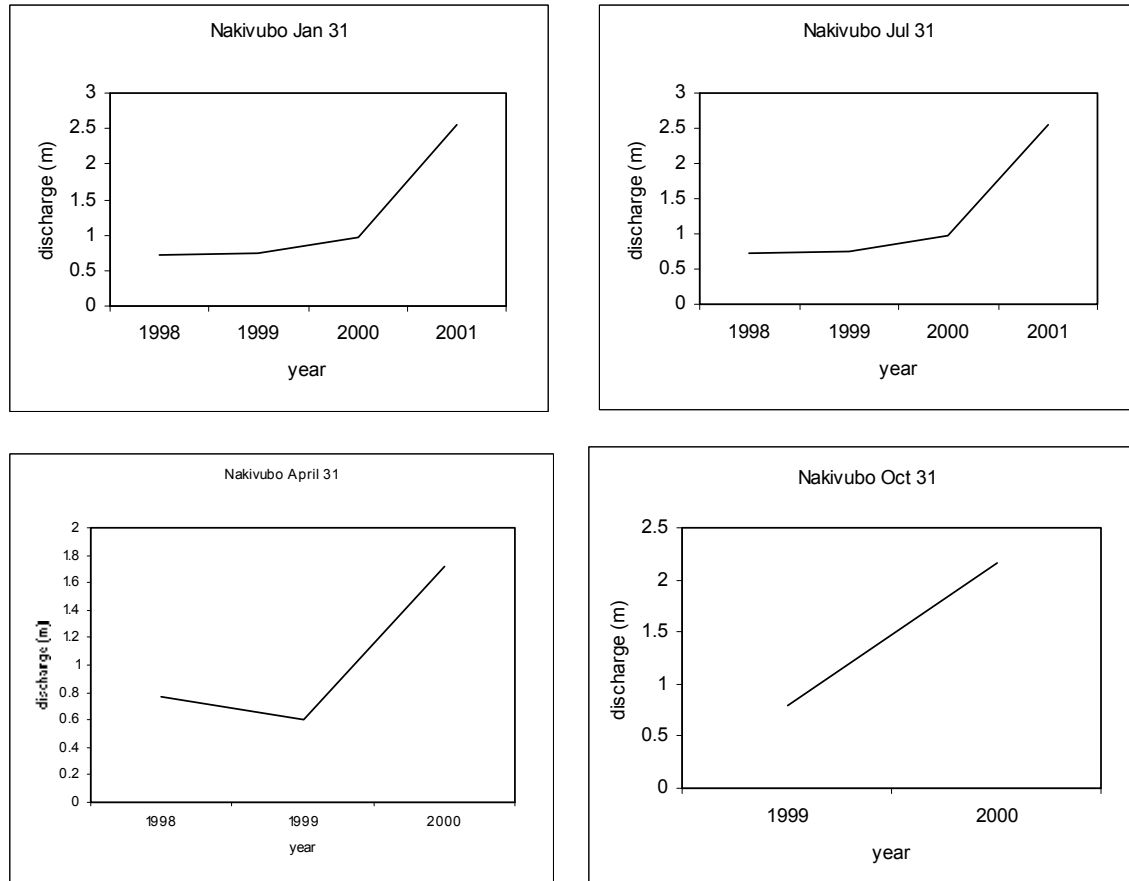




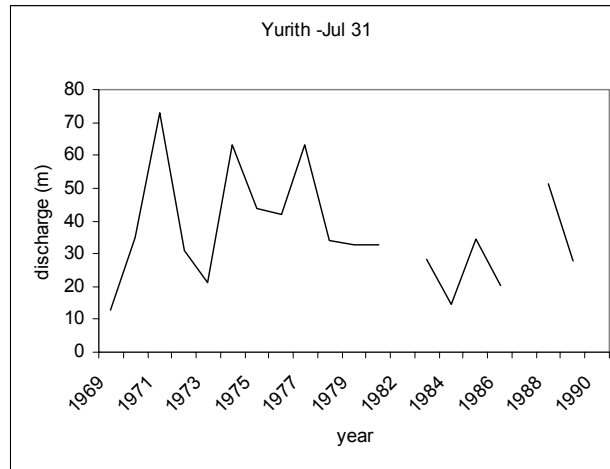
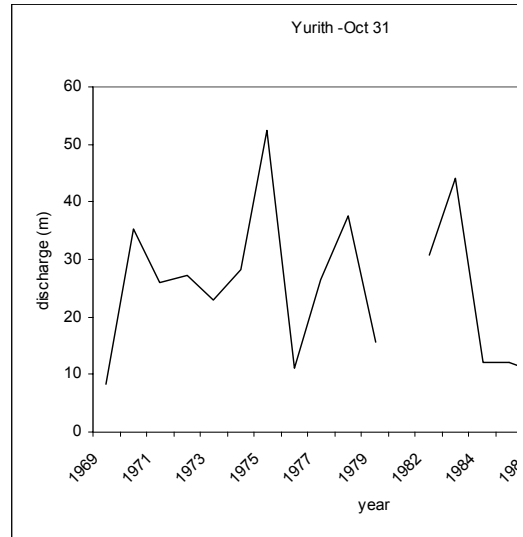
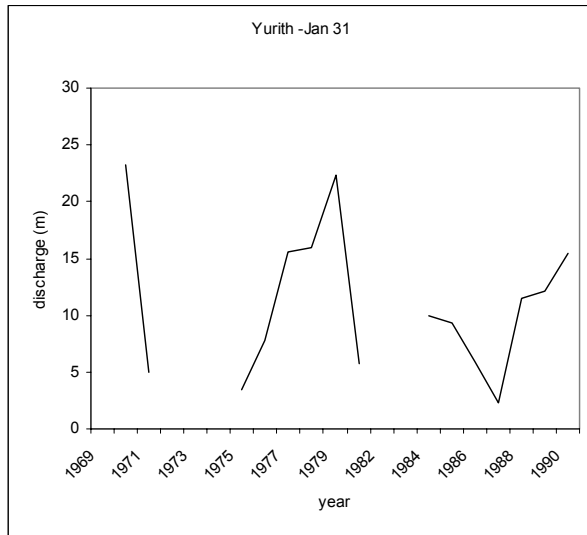
## OUTPUT 9: HYDROLOGICAL DATA

Hydrological data from the various sites is undergoing checks for quality assurance and quality control. Data gaps such as in river discharges are being addressed and will be filled in, where appropriate, with graphical or statistical methods of estimation. Some water quality data is also available and their usefulness in relation to elucidating aspects of water related health risks is being assessed. We have also been able to acquire water level data for Lake Victoria, which will be critical when evaluating the cholera risk around the lakeshore area. Some examples of the datasets are given below.

The figures below show the changes in the Nakivubo flow in Kampala, Uganda. The data covers the period 1998 to present, and shows that there was a marked increase in discharge in the year 2000.

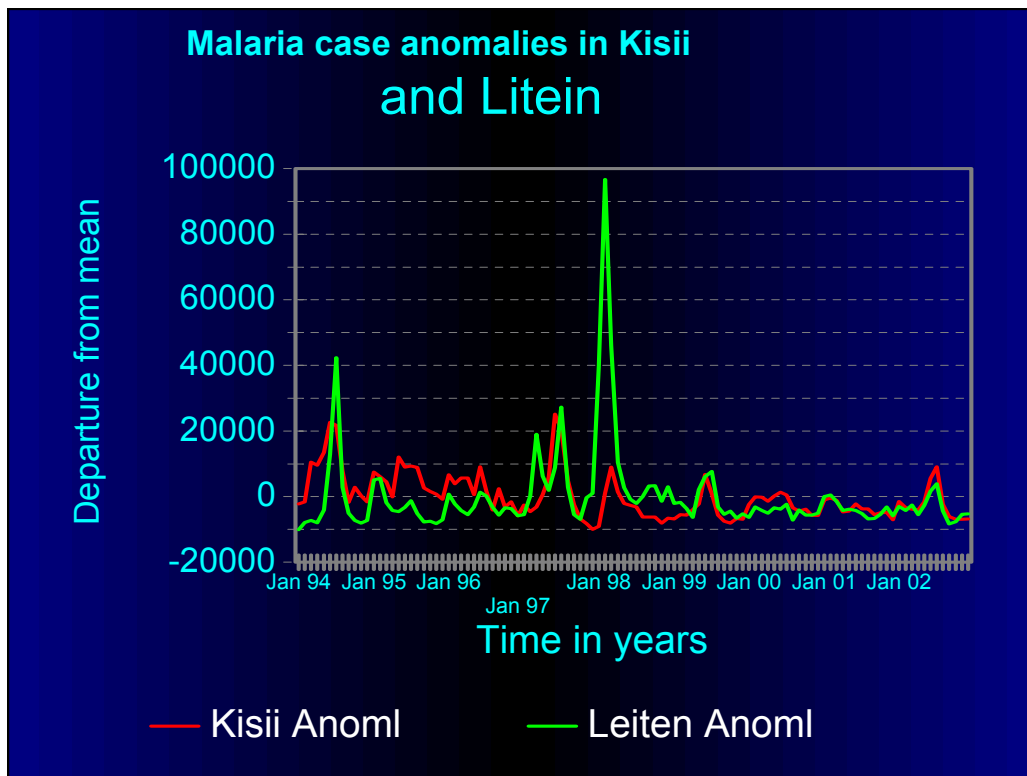


The Yurith river is one of the principal rivers in the Kericho, Kenya site. There is a long data record for the site, but it also demonstrates the problem of data gaps.



**OUTPUT 10: PRELIMINARY ANALYSIS OF HEALTH DATA FOR KENYA**

Preliminary analysis of the health data for Kenya sites are given in Figures 1-3. Figure 1 gives the malaria case anomalies in two sites, Kisii and Litein. Figure 2 gives the analysis of cholera cases in Nyanza. Note that there are no records of cholera in the Kisii Highlands as well as no cases reported from 2002 to date. The cumulative trends in cholera cases in Nyanza is given in Figure 3.



Figuer 1. Malaria case anomalies in Kisii and Litein.

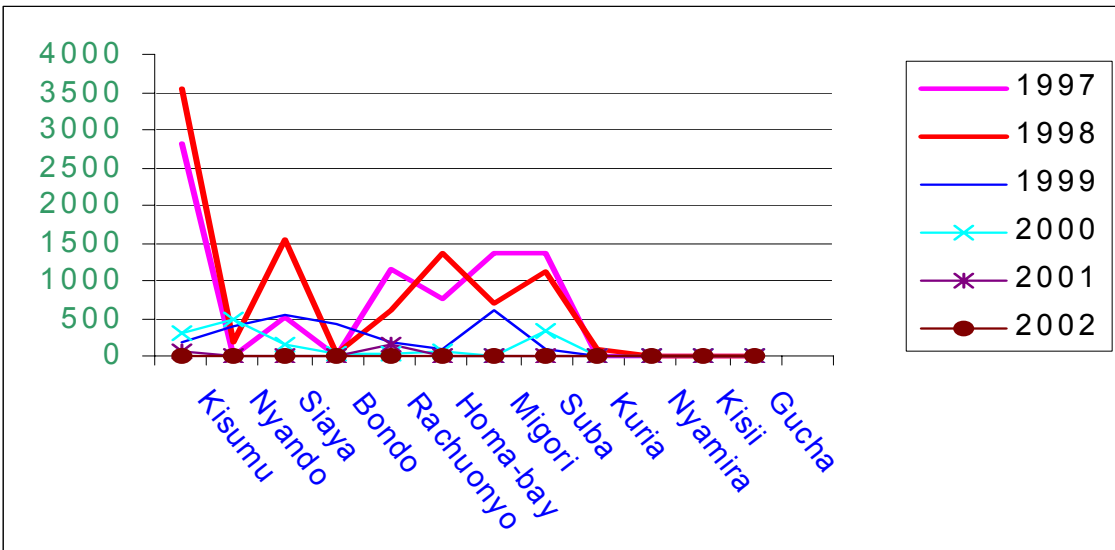
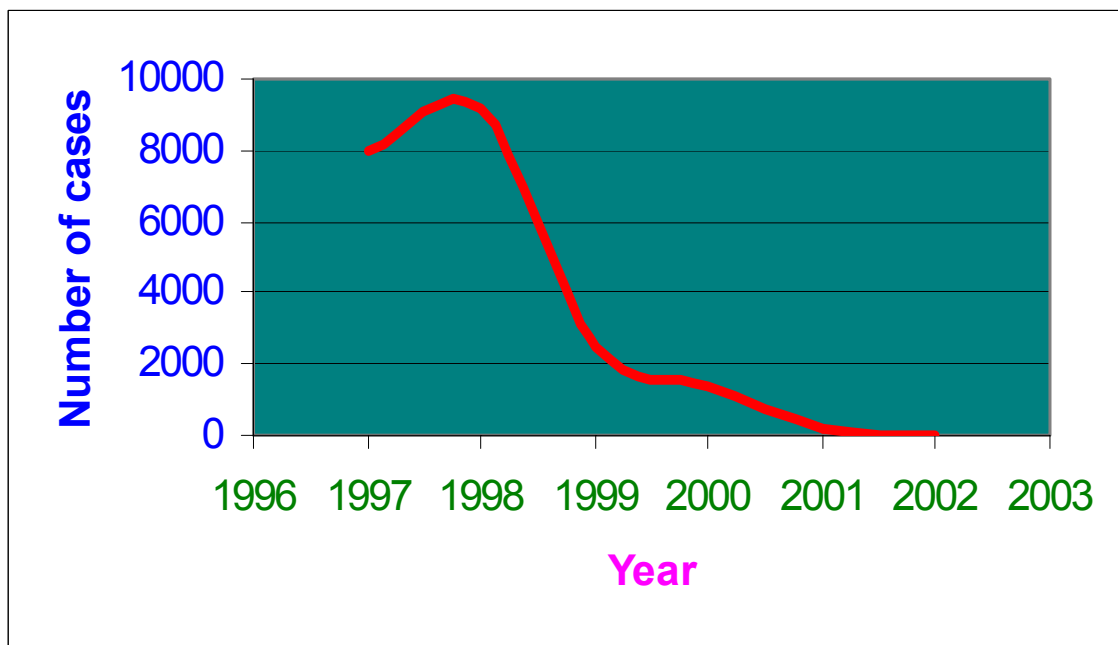


Figure 2 Trends in cholera cases in Nyanza.

Figure 3. Cumulative trends in cholera cases in Nyanza.

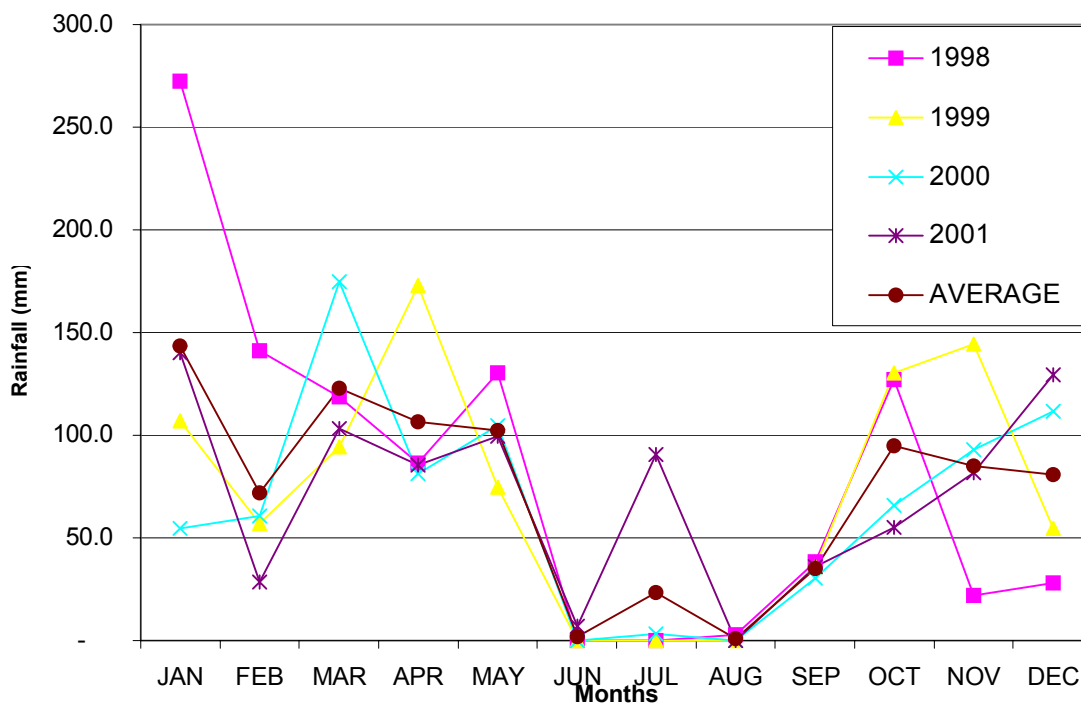


## Seasonal Rainfall Pattern and Malaria Incidences in Nshamba Village, Tanzania

**1.0 Seasonal Rainfall Pattern**

The period between September and April is when there are more severe incidences/outbreaks of malaria in this village. It is this period when the area receives more rains (Figure 1). Local people associate these outbreaks to the season when beans are growing in the field, under the bananas. They point out that during this season mosquitoes find suitable breeding ground in the beans fields where the microclimate is damp and humid. Also during the rainy season there are several places where stagnant water can be found, e.g. in portholes (*madimbwi*) and cut banana stems. According to the people the mosquitoes breed on bean-leaves.

**Figure 1: Mean Monthly Rainfall in Muleba District (1998-2001)**

**2.0 Vulnerability to Malaria by Sex and Age Groups**

Concerning the different groups affected most by malaria; participants identified three key groups – the infants, women – especially pregnant, and the elderly. Children at the age of 0-5 years of age were reported to be most seriously affected by malaria. Figures 2 and 3 further support this argument. This was attributed to several reasons, including: (1) poor nutrition for this age group, particularly between September and November, when even the breast fed infants do not get enough milk from their mothers, (2) because they are not able look for food for themselves, unlike the grown ups. (3) In several incidences if children are fed with potatoes they suffer from diarrhoea, hence they become very weak and easily

attacked by malaria, (4) many women from poor households spend most of their time doing casual labour elsewhere (kuhemea), and there is little time to attend these young children.

Figures 2 and 3 demonstrate that children death toll due to malaria reaches climax during the period between January and March. This is the period when children suffers from malnutrition and is the wettest part of the year, thus creating more mosquito breeding sites (see Figure 1). However, death toll for over 5 seems to be uniform over the year indicating that there is no critical period as compared to children (under 5).

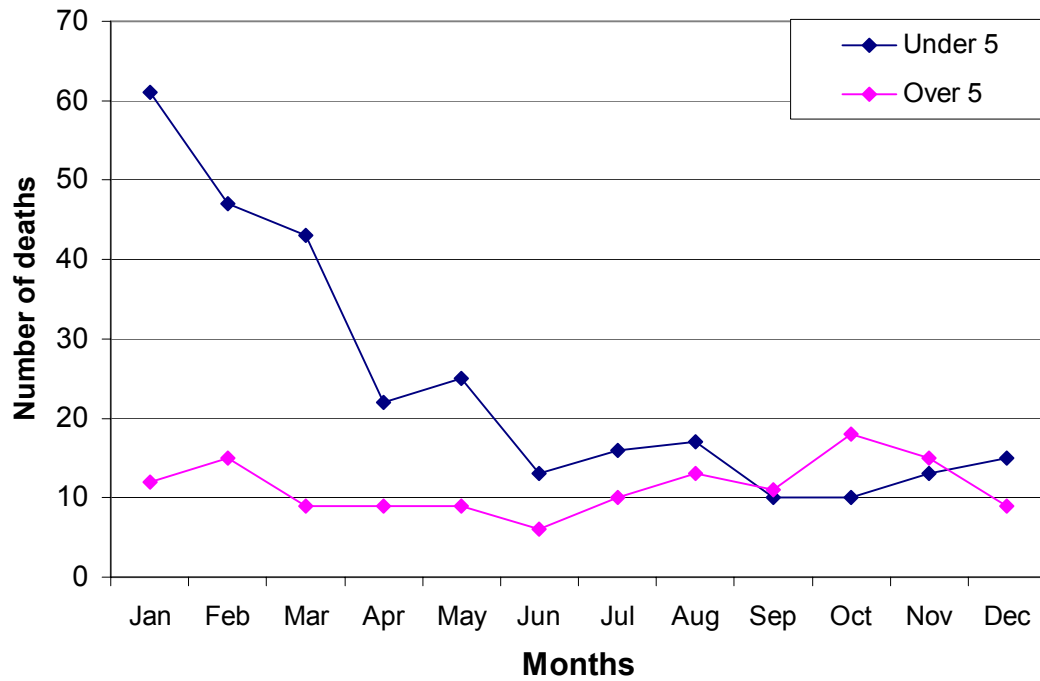
It was reported during the discussion that women, especially pregnant, are the second most affected group by malaria. The main reason for the pregnant women was reported to be due to poor nutrition. This makes them weak and more susceptible to malaria. Other non-pregnant women were also reported to be more affected than men. This was attributed to fact that they (women) work so much in the farms than men, which makes them weaker and more susceptible than men. Also there was an assertion that adult men are nutritionally better off compared to women as they spend long times in alcohol (pombe) shops and eat good food in kiosks (local restaurants) before going home to join the household for another meal. This allegation poised by women was not refuted by participant males, perhaps reflecting that it was somewhat a true observation.

Another explanation to why women suffer more from malaria than men is that during the growing season women are more involved in weeding beans field. It was argued that the women together with their children become exposed to frequent mosquito bites, and hence more prone to contract malaria. It was noted that traditionally Haya men do not take part in weeding beans, because they cannot manage, hence they are less exposed to mosquito bites.

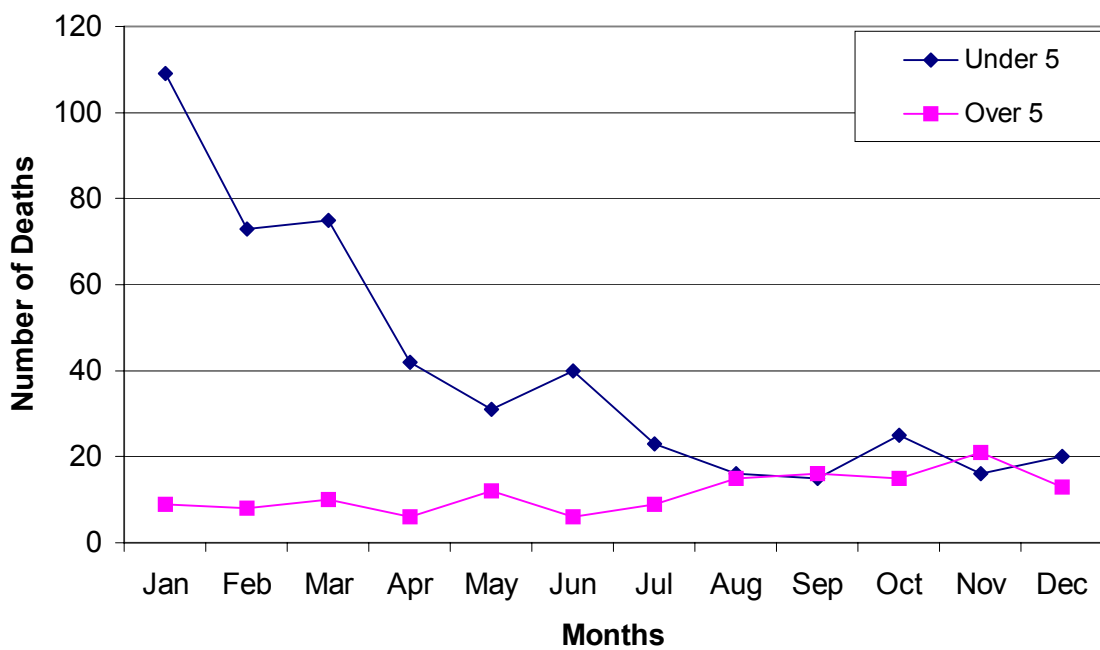
It was argued further that even at home women are more exposed to mosquito bites in the evenings compared to men because most evenings the men are out in the bar enjoying local brew and, perhaps, not as much bitten by mosquitoes. It was also reported that malaria affects elderly people, though to a lesser extent compared to the other two groups.



**Figure 2: Total Death due to Malaria for Ndolage Hospital in 2001**



**Figure 3: Total Deaths due to Malaria in Rubya Hospital in 2001**



### 3.0 Local Adaptation

Several viewpoints were raised concerning ways in which malaria incidences are controlled through either treatment or prevention. The use of bed-nets, and recently the use of tablets (*Ngao*) to impregnate the bed-nets against mosquitoes have been widely adopted. However, there was a concern that not many people can afford buying bed nets for the entire household. Other people also mentioned that catching malaria cannot be prevented; it is only when one contracts malaria that one goes for medication.

Many people use traditional curative measures (local herbs) to treat malaria than going to hospitals. Participants estimated that about two-third of the malaria patients get cured after using these traditional medicines. Several plants were mentioned to cure malaria, although to different levels of success. They include (using their Haya names): *Mbilizi*, *Kajule*, *Nkaka*, *Ikintuntumwa*, and *Mwarobaini*. This practice is not only unique to Bugarama Village. It is established that over 80% of Tanzanians living in rural areas rely on herbal remedies for their primary health care (Mwisongo and Borg, 2002). Similarly, a study conducted in Bukoba Rural show that communities rely on herbal anti-malaria therapy for primary health care. It was evident in Bukoba Rural that some members of the communities rely entirely on herbal remedies in the treatment of malaria. Similar observations were made in Bugarama Village. It was also true that traditional healers are familiar with symptoms of malaria in that they give treatment to those who are actually suffering from malaria.

Survey carried out by National Medical research Institute (NIMRI) noticed that traditional healers like other cadres in medicines have knowledge and skills for malaria disease management (diagnosis, treatment and prevention). They are capable of treating the disease by applying herbal medicine orally. NIMRI further undertook laboratory analyses of these traditional herbs to establish their efficacy and safety. The majority were established to be anti-malarial and they could treat other diseases. However, the toxicity varied with herbs in that they were established to have low to very high toxicity.

Several explanations were given to the use of the local herbs for treating malaria, that: (1) they are quite common, well known and familiar to most people, (2) easily available, and less expensive, and effective as first aid before taking the patient to hospital/health centre, (3) Pregnant women using these herbs against malaria do not encounter any problems during delivery.

Participants pointed out that every village had got its own “*First Aid Kit*”. Every household in the village contributes shillings 1,500/= annually to the “*Village Health Facility*”, after which one gets free services. A Village Health Attendant is available in Bugarama village and provides first-aid services to all villagers. It was noted however that the household that have not contributed the shillings 1,500/= to the village health facility has to look for other means of treatment when a household member falls sick. However, under “*emergency*” situations even one who has not paid his dues receives the medication on

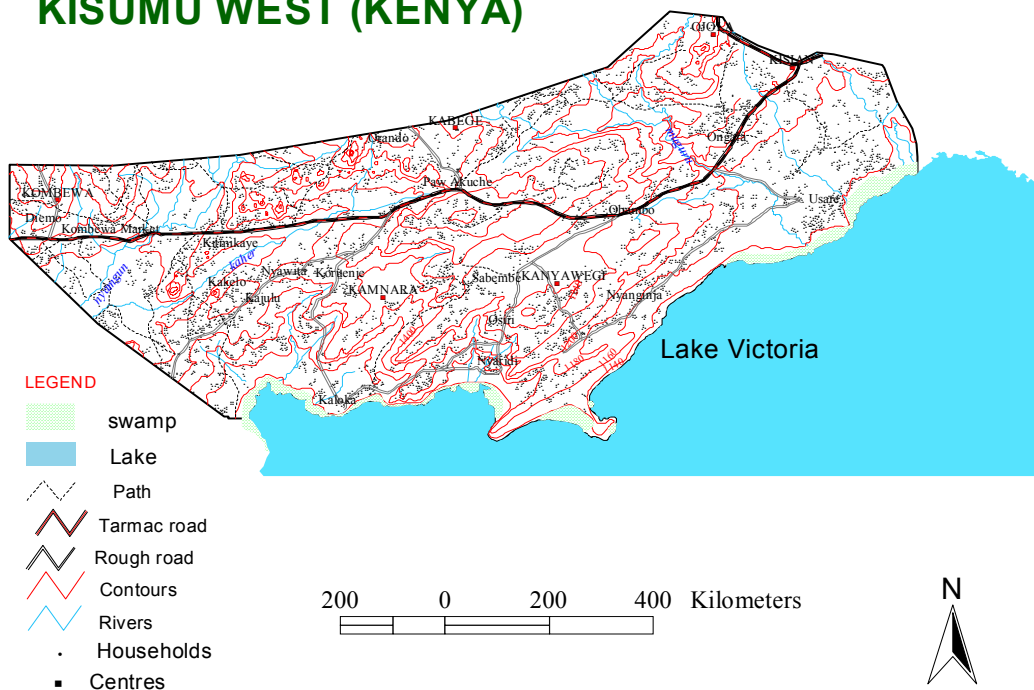
AF91

condition that he/she pays his/her contribution upon recovery. Those considered as being extremely poor people receive treatment free of charge, without a need to contribute. It was pointed out that a receipt of one having paid the contributions to the village health facility may be used as security/guarantee when one goes to (government) hospitals, such as Rubya. The facility attends to not only malaria but to other illnesses as well. A health centre is also located in the neighbouring village (centre known as Biirabo).

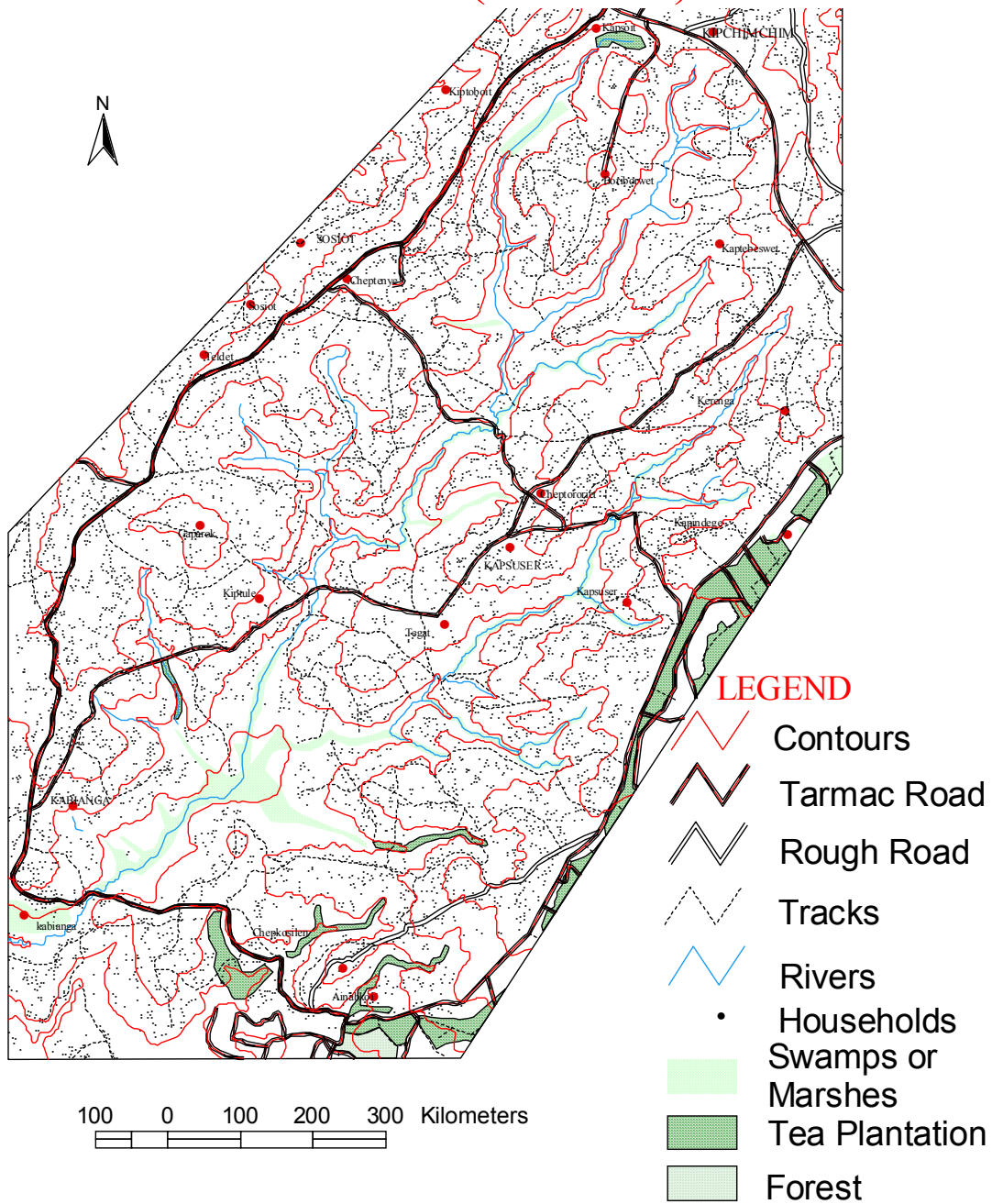
## OUTPUT 11: SITE-SPECIFIC GIS MAPS

Site specific GIS maps have been produced for five of the six study areas in the Lake Victoria region. The map for Kabale area is currently under production. Household data, well data and other types of data that were georeferenced are being geometrically corrected to remove distortions between the GPS system of georeferencing (UTM GWS84) with the map systems which had different projections.

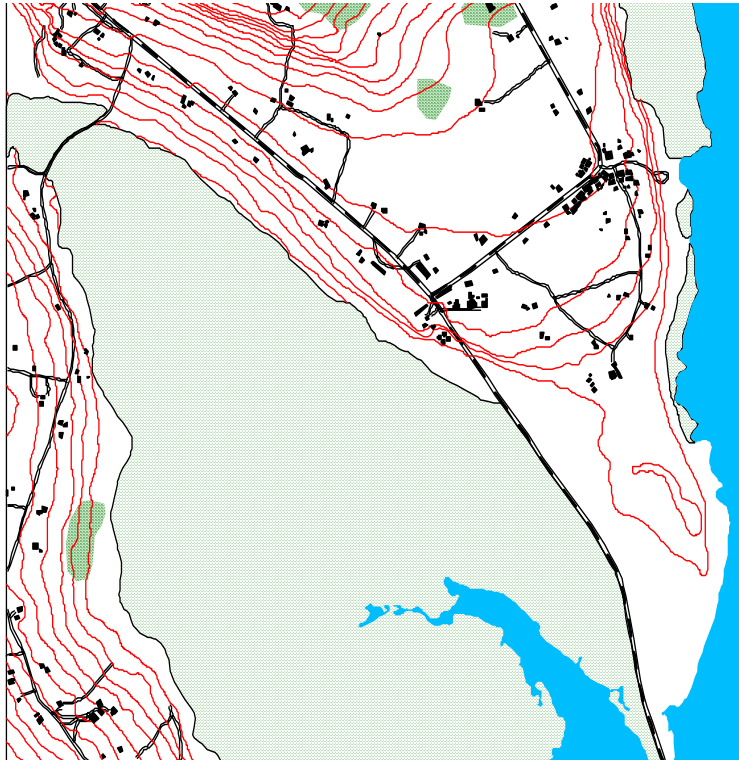
### KISUMU WEST (KENYA)



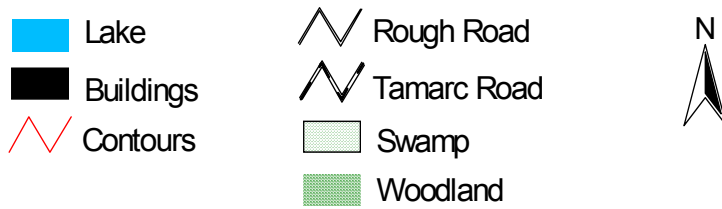
## BELGUT (KENYA)



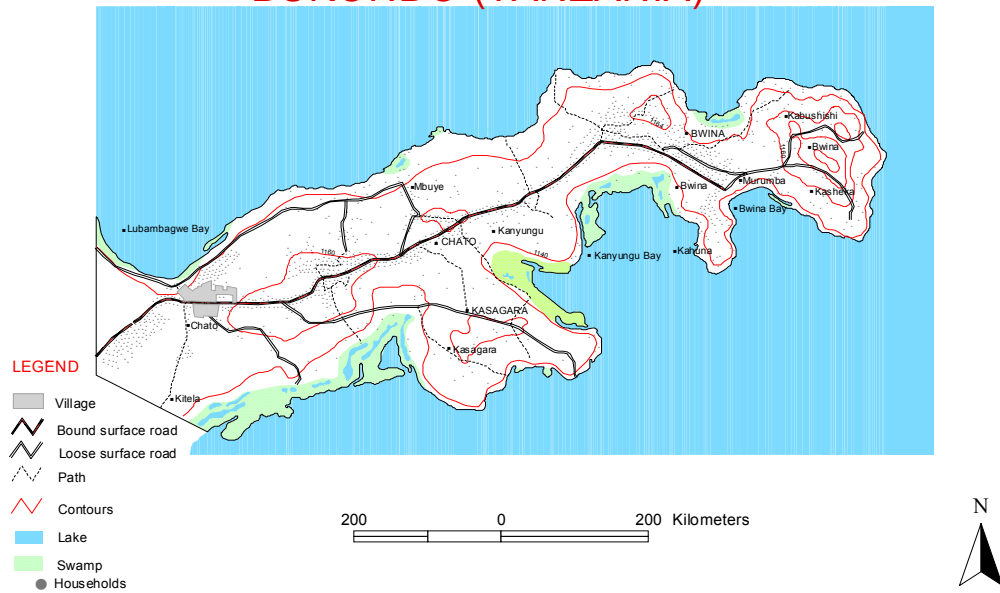
## KAMPALA (UGANDA)



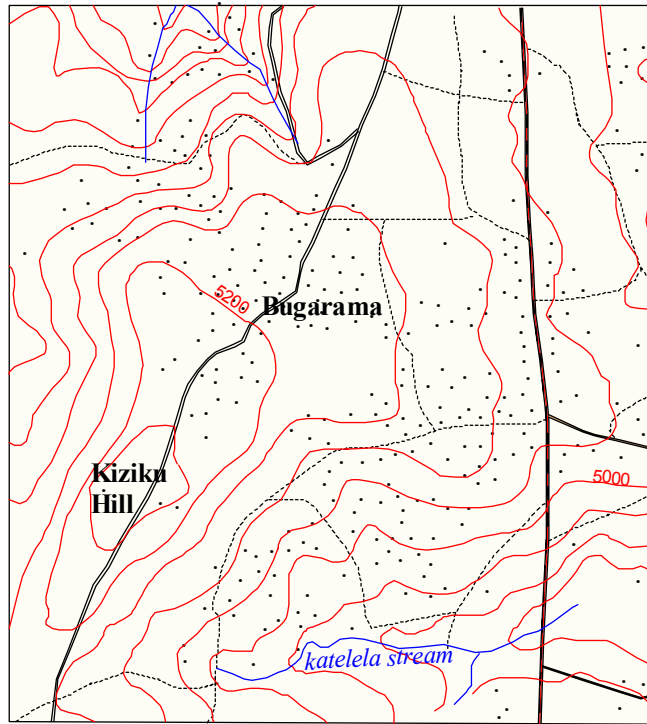
### LEGEND






## BUKONDO (TANZANIA)



# MULEBA (TANZANIA)



## LEGEND

-  River
-  Contour
-  Murram road
-  Dry weather road
-  Motorable track
-  Foot path
-  Households

30 0 30 60 Kilometers



## OUTPUT 12: GIS TRAINING

Nine persons underwent a 5 day GIS training course which covered the introduction to GIS, and working with data to developing a GIS application in Arc View (see course training program below). Five graduate students, three researchers and one principal investigator participated in the course. The course was very useful in data entry and analysis for the Project AF-91. The participants are currently involved in the data entry and analysis.

### 5-DAY ARC VIEW TRAINING PROGRAM

- |        |  |
|--------|--|
| Day 1. | <i>1. Arc View basics</i><br>Exercise 1: An Arc View sampler<br><i>2. Getting data into Arc View</i><br>Exercise 2a: Add themes to a view<br>Exercise 2b: set view properties<br><i>3. Displaying themes</i><br>Exercise 3a: Using the legend editor to create Thematic Maps |
| Day 2. | Exercise 3b: Set theme display properties; i.e.; displaying layers at different Scales<br><i>4. Working with tables</i><br>Exercise 4a: Add and edit tables<br>Exercise 4b: Select and summarize records   |
| Day 3. | Exercise 4c: Join and link tables from other data sources<br>Exercise 4d: Create a chart<br><i>5. Creating and editing shapefiles from raster (Image) and vector data sets and Digitising through the screen</i><br>Exercise 5: Create and edit shapefiles                   |
| Day 4. | <i>6. Querying and analyzing themes for planning and decision making.</i><br>Exercise 6a: Use theme-on theme selection<br>Exercise 6b: Join and merge spatial data<br><i>7. Creating layouts-Map productions</i><br>Exercise 8: Create a map layout                          |
| Day 5. | Project- Developing a GIS application in Arc View (Participants expected to use their own data)  |

### Daily Schedule For 5-Day Arc View Training Program:

- |             |                           |
|-------------|---------------------------|
| 9.00-11.00  | First morning sessions    |
| 11.00-11.30 | Coffee/tea breaks         |
| 11.30-01.00 | Second morning session    |
| 01.00-02.00 | Lunch break               |
| 02.00-03.30 | First afternoon sessions  |
| 03.30-03.45 | Coffee/tea breaks         |
| 03.45-05.00 | Second afternoon sessions |



AF91

**LIST OF PARTICIPANTS FOR GIS TRAINING**

Name	Designation	Address
James Ndwiga Kathuri	Postgraduate student	University of Nairobi Department of Geography P.O. Box 30197 Nairobi, Kenya
Lydia Atieno Olaka	Postgraduate student	University of Nairobi Department of Geology P.O. Box 30197 Nairobi, Kenya
Roselyn Amonyelet Ojala	Postgraduate student	Drought Monitoring Centre N Kenya Meteorological Departme P.O. Box 30259, Nairobi, Kenya
Dr. Dan Olago	Senior Lecturer/Principal Resea	University of Nairobi Department of Geology P.O. Box 30197, Nairobi, Kenya
Dr. Maggie Opondo	Senior Lecturer/Principal Resea	University of Nairobi Department of Geography P.O. Box 30197, Nairobi, Kenya
Dr. Richard Kangalawe	Researcher	Institute of Resource Asses University of Dar es Salaam, P. 35097, Dar es Salaam, Tanzania
Eugene Apindi Ochieng	Postgraduate student	University of Nairobi Department of Geology P.O. Box 30197, Nairobi, Kenya
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Number of Words: 68,663 (approx.)  
Number of Characters: 391,382 (approx.)