DOMESTIC WATER SUPPLY AND ITS IMPLICATION TO HOUSEHOLD INCOME IN KILOLO DISTRICT, IRINGA REGION, TANZANIA

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Abstract

This study was conducted in four villages of Kilolo District with the aim of establishing the relationship between domestic water supply and household income. Specifically, the study aimed at: identifying water sources that exist in the study area; to determine the proportion of time spent by respondents on collecting water for domestic purposes and lastly comparing income between households living within and beyond 400 metres to water sources. The study adopted a cross-sectional research design where structured questionnaire with open-ended and close ended questions were used in data collection from a sample size of 120 respondents. Data analysis was done using Statistical Package for Social Sciences (SPSS. 16.0) computer software. The study identified that the main water sources for domestic purposes in study area include; tap water, protected shallow wells, unprotected shallow wells and rivers. The findings of T-test also showed that there is a significant different in time spent of collecting water for domestic purposes between water rich and water scarce villages ($P < 0.05$) in both dry and rain season as respondents from villages of Uhambingeto ward spent more time on fetching water per day as compared to women and men from Mtitu ward. Furthermore, the study revealed that respondents who located within 400 metres to water sources have a mean annual income greater than those beyond. The study recommends for development of water supply system that will include rain water harvesting plan as one of the strategies for improving water resources availability at village levels.

Key words: ***Domestic,*** ***Water Supply,*** ***Household Income***

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1.0 Introduction

Water is a fundamental resource to socio-economic development (UN-WATER, 2005). It has a vital role to play in poverty reduction through various production activities. Indirect or direct, water provides employment and it counts much in ensuring good economic development worldwide. For instance, poor men and women in urban, rural and peri-urban settings base their livelihoods on small-scale cropping, livestock keeping, agro-processing and other micro-enterprises. In many of these activities, an adequate water supply is a crucial enabling resource (Butterworth and Moriarty, 2004). Despite of that crucial role played by water for socioeconomic development, access to water has become a key challenge facing many societies worldwide. It was estimated that more than 2 billion people were affected by water shortages in the world of which, 1.1 billion do not have sufficient drinking water and 2.4 billion have no provision for sanitation (WHO/UNICEF, 2000). As per HDR (2006), water insufficient is often linked to poverty as its deprivation in quantity and quality affects people's socioeconomic activities. For example in rural areas of many developing countries, people uses water for various domestic and productive activities to earn an income for their household through gardening, farming, livestock, and brick making (Butterworth and Moriarty, 2004).

In Tanzania, estimates by the Ministry of Water and Livestock Development in 2002 showed that, about 68% of the urban population has access to piped water, while in rural areas only 48.5% of the population has access to safe water sources (tap water and protected shallow wells). This coverage in the provision of safe water particularly to rural areas is undesirably low (URT, 2002a). Kilolo District like other District Councils of Tanzania is not excluded from the impacts of water scarcity that has been affecting women and girl-children adversely as are culturally and traditionally responsible for fetching water (FAO, 1996). Women spend many hours per day for gathering water from distant sources. That time could be spent on performing farm and off-farm income generating activities, which in turn build up rural household's capacity towards poverty reduction (IFAD, 2001). Despite of the increase in water burden encountered by the population of Kilolo District, yet there is a limited empirically information on the effects of domestic water supply on household income. Therefore, this study was undertaken to determine the relationship between domestic water supply and household income by taking a case of Kilolo District Council, Iringa Region, Tanzania. Specifically the study aimed at identifying water sources that

exist in study area; to determine the proportion of time spent by respondents on collecting water for domestic purposes per day and to compare income between households within 400 metres and those beyond 400 metres to water sources.

2. Study Area and Methodology

The research was conducted at Kilolo District in Iringa Region in 2012. Kilolo District is one of the seven districts of the region. Other districts are Mufindi, Njombe, Makete, Ludewa, Iringa Urban and Iringa Rural. The geographical coordinates of Kilolo District are 8° 0' 0" South, 35º 51' 0" East. Kilolo District is bordered to the North and East by the Morogoro Region, to the West by the Iringa Rural District and to the South by the Mufindi District. The district is divided into three divisions namely; Mazombe, Mahenge and Kilolo. According to the 2002 Tanzania National Census, the population of Kilolo District was 204,372 people of whom 104,372 and 99,756 were females and males respectively (NBS, 2002). The district has been chosen because it is among the most deprived district in Iringa region in terms of water scarcity (URT, 2005b). Only 48% of rural households are using improved water sources (piped and protected). In terms of poverty, about 29% of the population in the district is below the poverty line and the number of poor people per Kilometer Square is 7 (URT, 2005b).

A cross-sectional research design was used in which data from respondents was collected at a single point of time. Purposive and simple randomly sampling techniques were employed in this study. The purposive sampling was used to obtain Mtitu and Uhambingeto wards with respondents living within 400 metres and beyond 400 metres to water sources respectively. The simple randomly sampling technique was used to select Kilolo and Lulanzi villages of Mtitu ward and Vitono and Kipaduka villages of Uhambingeto ward. 34 and 36 respondents were randomly selected from Kilolo and Lulanzi villages respectively. On the other hand 29 and 31 respondents were selected randomly from Vitono and Kipaduka villages of Uhambingeto ward to make a total of 60 respondents from each ward. The interview schedule and Checklists were used to capture information from the selected respondents in this study. An interview schedule was used for household respondents where open and closed ended questions were used. On the other hand checklist was employed for discussion with three officers from District Water Engineer

office. Data collected from the respondents were cleaned, coded and analyzed by using Statistical Package for Social Science (SPSS version 16.0) computer software to obtain means, frequencies and percentages. Cross tabulations and T-test were performed to determine associations between variables. T-test was employed to compare and find whether there were differences in means of some variables such as household income

3. Results and Discussion

3.1 Sources of Domestic Water Supply in Study Area.

In this study respondents were requested to mention the major sources of water for drinking purposes. The main identified water sources include; tap water, protected shallow wells, unprotected shallow wells and rivers. In Mtitu ward, about 56.7%, 28.3%, and 15% of respondents interviewed had reported to use tap water, protected shallow wells and unprotected wells respectively as their sources of water for drinking purposes (Table 1). Whereas in Uhambingeto ward there were no tap water, but 31.7% and 68.3 % of respondents used protected and unprotected water sources respectively for drinking purposes.

Table 1: Domestic water supply for drinking and other household uses

	Water rich Villages (N = 60)				Water scarce Villages (N = 60)			
Drinking water	**Kilolo**	**Lulanzi**	**Total**	**%**	**Vitono**	**Kipaduka**	**Total**	**%**
Tap water	34	0	34	56.7	0	0	0	0
Protected shallow wells	0	17	17	28.3	5	14	19	31.7
Unprotected shallow wells	0	9	9	15.0	24	17	41	68.3
Total	34	26	60	100	29	31	60	100
Water for other household uses								
Tap water	29	0	29	43.3	0	0	0	0
Protected shallow wells	0	15	15	25.0	4	4	8	13.3
Unprotected shallow wells	0	11	11	18.3	25	27	52	86.7
Rivers	5	0	5	8.3	0	0	0	0
Total	**34**	**26**	**60**	**100**	**29**	**31**	**60**	**100**

Furthermore, respondents were asked to state other types of water sources used for other domestic purposes. Most domestic water uses reported by respondents were cooking, washing

clothes, bathing, washing utensils, gardening, watering livestock, brewing local beer and for building purposes. According to this study, 8.3% uses rivers, 25% uses protected shallow wells, 43.3% tap water and 18.3% used unprotected shallow wells water for domestic normal household chores in Mtitu ward. For Uhambingeto ward, the findings show that, 13.3% of the respondents interviewed used protected shallow wells and 86.7% of respondents used unprotected shallow wells as their major source of water for other household domestic purposes. The study findings implies that, respondents at Kipaduka and Vitono villages in Uhambingeto ward relied much on protected water sources (31.7%) and unprotected water sources (68.3%) for drinking and other domestic purposes. In Kilolo and Lulanzi villages (Mtitu ward), respondents relied much on tap water (56.7%) and protected shallow wells (28.3%) for drinking and other domestic purposes. From these findings, Vitono and Kipaduka villages are classified as water scarce villages while Kilolo and Lulanzi villages are classified as water rich villages.

3.2 Responsibility of fetching water in dry and rain season in study area

Respondents were asked to mention who is responsible for fetching water among the household members. This was asked to the respondents from within 400 metres (water rich area) and beyond 400 metres to water sources (water scarce areas). In water rich areas none of the interviewed respondents reported male to be main responsible of fetching water during dry season, while 47% of interviewed respondents indicated women alone to be responsible for fetching water for the household domestic purposes. Furthermore, 32% and 21% of respondents who interviewed in the same area had indicated that both (women and men) as well as boys and girls respectively were responsible for fetching water for household domestic uses (Table 2). In water scarce areas the study findings indicated that 57% of interviewed respondents indicated both (females and males) were responsible of collecting water for their household requirements in dry season.

Table 2: Responsibility for fetching water at household in dry and rain season

	Water rich (N = 60)			Water scarce(N = 60)		
Responsible In dry season	**Kilolo**	**Lulanzi**	**%**	**Vitono**	**Kipaduka**	**%**
Male only	0	0	0	0	3	5
Female only	15	13	47	5	5	17

Male &female	10	9	32	19	15	57
Boys & girls	9	4	21	5	8	21
Total	34	26	100	29	31	100
In rain season						
Male only	0	0	0	0	3	5
Female only	23	17	67	11	15	43
Male & female	1	0	2	12	4	27
Female & girls	0	0	0	4	1	8
Boys & girls	10	9	31	2	8	17
Total	34	26	100	29	31	100

Furthermore, it was revealed that 67% of respondents who interviewed indicated females only to be responsible for collecting water for their respective household uses whereas no males only indicated to be responsible for fetching water during rain season. Only 2% indicated that both (females and males) were responsible of collecting water for their families' domestic purposes in water rich areas (Table 2). In water scarce areas during rain season, the study findings indicated that 27% of both (females and males) were responsible for collecting water for domestic purposes. The study finding implies that, in both seasons, dry and rain; women were reported to be the major responsible group for fetching water for various domestic activities. The rate of males' participation on fetching water was higher in dry season as compared during rain season. About 32% and 57% of respondents who interviewed had indicated both males and females to be responsible for collecting water in dry season in water rich and water scarce respectively. During the rain season, only 2% and 27% of respondents have indicated both female and males to be responsible in collecting water. This is probably due to the fact that in dry season domestic water services obtained at long distance from their dwellings. The long distance from water sources to dwellings needed some means of water transportation such as bicycles which is commonly used by males in the study area. However in Kilolo and Lulanzi villages where domestic water services obtained within short distance, still women subjected with the responsibility of hauling water (Table 2). This was reported as culturally and traditionally inherited behaviours on which women were tasked with most of domestic activities including collecting water and firewood, cooking and child caring.

3.3 Major Income Generating Activities (IGAs) related to Water

The major IGAs related to water in the study area includes livestock production, crop production, food vendors, local beer brewing and gardening (Table 3). Forty two percent of respondents identified livestock production as the major IGA related to water and 39% of the respondents have reported crop production to be IGA related to water. The possible reason for the higher percentage for livestock production may be due the fact that livestock production is undertaken in both dry and rain seasons, thus water demand for those livestock became high while crop production was mostly practiced in rain season in which water demand became minimal due to dependent on rain fed cropping system. Other IGAs related to water were local beer brewing (6.1%), food vendors (3.8%) and gardening (8.8%). Gardening was mainly practiced in water rich villages such as in Kilolo because the activity is water oriented. However, gardening is a short period cropping system which can be undertaken even more than four times per year on the same plot depending on the types of crops.

Table 1: Major IGAs related to water (N = 120)

	Responses					
Type of IGA	**Kilolo**	**Lulanzi**	**Vitono**	**Kipaduka**	**Total**	**Percent**
Livestock production	12	18	27	23	90	42
Crop production	19	23	21	20	83	39
Local brew	2	2	7	2	13	6
Food vendors	2	4	0	2	8	4
Gardening	12	3	3	1	19	9
Total	47	50	58	48	213	100

NB: Total frequency do not add to 120 due multiple response

3.4 Time spent by respondents in fetching water by sex

During dry season, women and men in water rich villages spent an average of 150 and 25 minutes per day for fetching water respectively. In rain season women and men spent average of 68 and 5 minutes per day in collecting water for domestic purposes. While, in dry season women and men in water scarce villages spent an average of 508 and 375 minutes per day in collecting water respectively. In rain season women and men in water scarce villages spent an average time of 167 and 64 minutes per day in collecting water for their respective households uses.

Table 4: Average time (minutes) spent by sex for fetching water

Ward	In dry season			In rain season		
Water rich	**Women**	**Men**	**Total**	**Women**	**Men**	**Total**
Kilolo	49	14	63	25	3	28
Lulanzi	101	11	112	43	2	45
Sub-total	150	25	175	68	5	73
Water scarce						
Vitono	245	194	439	90	40	130
Kipaduka	263	181	444	77	24	101
Sub -total	508	375	883	167	64	231
Total	658	400	1058	235	69	304

The above findings implies that in both villages of Mtitu and Uhambingeto wards, women spent relatively much time for fetching water for household purposes as compared to time men spent. Furthermore, results in Table 4 indicates that women and men in villages of Uhambingeto ward spent more time on fetching water per day as compared to women and men from Mtitu ward. This was probably contributed by long distance from home to water sources experienced by the households in Uhambingeto which was ranged between 4 to 12 kilometres. Means of water transportation was also reported as among of the causes for women to spend much time on fetching water as compared to men in which in most cases have been using bicycles .

T- test statistical analysis was used to compare the difference in mean time spent by respondents from water rich and those from water scarce areas. The finding of T-test analysis showed that there is a significant difference in mean time that spent for collecting water between water rich and water scarce villages ($P < 0.05$) in both dry and rain season (Table 5). During dry season a mean time of 101 and 435 minutes used by respondents on fetching water per day for domestic purposes in water rich and water scarce villages respectively. In water rich and water scarce villages a mean time of 41 and 111 minutes respectively were used for fetching water per day during rain season (Table 5). This implies that respondents spent more time of fetching water in dry season compared to time spent during rain season.

Table 5: Mean time spent of fetching water in water rich and water scarce villages

In dry season	Respondents	Mean time	T - Test	P- Value
Water rich	60	101.25	- 14.76	0.000
Water scarce	60	434.50		
In rain season				
Water rich	60	41.42	- 8.16	0.000
Water scarce	60	110.68		

3.5 Annual income of the households within and beyond 400 metres to water sources

In order to determine relationship between the distance to water sources and household income of the respondents, amount of money generated from water related activities were determined. Furthermore, monthly mean annual income of the two groups was eventually computed. The findings from the study area revealed that, 38% of respondents who located within a distance of 400 metres to water sources earned an annual income above 1 200 000 TAS and only 4.4% of interviewed respondents from the same area reported to earned an annual income of less or equal to 400 000 TAS (≤ 400 000). The rest, 22% and 35.6% of the respondents who were interviewed had reported to earned an annual income of 400 100 – 800 000 and 800 100 – 1 200 000 TAS respectively (Table 6). On the other hand nearly a half (49%) of the respondents who interviewed from the households located beyond 400 metres to water sources reported earned an annual income ranged from 400 100 to 800 000 TAS while only 21 % of the respondents interviewed from the same area reported to earned an annual income above 1 200 000 TAS (Table 6).

Table 6: Relationship between distance to water sources and household income

	Distance(M) from home to water sources					
	Within 400		Beyond 400			
Income (TAS)	Households	%	Households	%	Total	%
≤ 400 000	2	4.4	10	13.3	12	10.0
400 100- 800 000	10	22.2	37	49.3	47	39.2
800 100- 1 200 000	16	35.6	12	16.0	28	23.3
Above 1 200 000	17	37.8	16	21.3	33	27.5
Total	45	100.0	75	100.0	120	100.0

TAS = Tanzania Shillings

T- test statistical analysis was also applied to compare the mean annual income between households located within 400 metres to water sources and those households located beyond 400 metres to water sources. The findings of T-test analysis showed that there is a significant different in mean annual income between households located within and those beyond 400 metres to domestic water sources at ($P < 0.05$). Households situated within 400 metres to water sources identified to earned mean annual income of 1 416 367 TAS and those households beyond 400 metres to water sources earned mean annual income of 910 307 TAS (Table 7). This study finding implies that households situated within 400 metres to domestic water supply earned a relatively high income compared to households situated beyond 400 metres to domestic water supply. This finding may be due to the fact that individuals from households located beyond 400 metres to water sources spent relatively more time on water collection per day than individuals from households located within 400 to water sources and hence limited time devoted for IGAs.

Table 7: Mean annual household income within and beyond 400 metres to water source

Category	Respondents	Mean (Tshs)	T-test	P-value
Within 400M to water	45	1 416 367	3.44	0.035
Beyond 400M to water	75	9 010 307		

4.0 Conclusion and Policy Recommendations

The study have recorded tap water, protected shallow wells, unprotected shallow wells and rivers as the main sources of water in the study areas. These water sources have been playing very greater role in livestock production, crop production, food vendors, local beer brewing and gardening. The study also had revealed that in both villages of Mtitu and Uhambingeto wards, women spent relatively much time for fetching water for household activities as compared to time men spent. However, it was also noticed that women and men in villages of Uhambingeto ward spent more time on fetching water per day as compared to women and men from Mtitu ward ($P < 0.05$). Furthermore, statistical analysis has demonstrated the existence of close relationship between respondent's household income and distance to water sources. Respondents living within 400 metres to water sources have reported to have higher annual mean income as compare to those living beyond 400 metres ($P< 0.05$). The study draws the following

recommendations ; development planner at local and national level have to include water harvesting in its development plans as one of the strategies for improving water availability at village level. There is a need also for developing water supply systems at village levels as a solution for increasing the proportion of population accessing water within acceptable distance by putting more emphasis on both technical and community building capacity from grassroots levels for ensuring its sustainability.

5.0 References

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