

# Water and Sanitation Projects and People's Welfare: A case of Ngoma District, Rwanda

Mudahemuka William<sup>1\*</sup> and Irakarama Guillaume

University of Tourism, Technology and Business Studies, Rwanda

\*Corresponding author: [williamuda@gmail.com](mailto:williamuda@gmail.com)

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**Abstract:** The purpose of this research was to assess the effect of water and sanitation services by the projects on welfare of the people. The study was carried out in Ngoma District which is located within the eastern province of Rwanda. This study employed cross-sectional survey design. The target population was 336,928 and the sample size computed using Solven's formula as  $n = N \div (1 + Ne^2)$  so the sample size was 400. The data collection tools were questionnaires and interviews. Data was analyzed by descriptive statistics, Pearson Correlation and Regression. The study discovered that 28.2% of the answerers agreed that the interventions of water and sanitation projects' services were fairly satisfactory. Furthermore, the study revealed that 43.2% of the hedgers agreed that people's welfare was satisfactory. The study found a significant but weak effect of water and sanitation projects' services on people's welfare by 0.8%. The study concluded that water and sanitation projects' services have a weak effect on people's welfare by 0.8% ( $R^2=0.008$ ,  $p<0.01$ ). The study made the recommendations like need for the government with the support of the local leaders to identify the most affected villages and construct protected springs and boreholes for them; need for non-governmental organizations and well-wishers to educate the people about having latrines and rubbish bins in their respective homes

**Keywords:** Water, sanitation, project, people, welfare, Rwanda

## 1. Introduction

Water supply and sanitation whiteout the growth agenda more than 20 years ago. The 1977 UN Water summit in Mar del Plata, Argentina, recommended that the 1980s should be announced "the International Drinking Water Supply and Sanitation Decade (IDWSSD)". In planning for the opening up of the Decade, the World Bank and the World Health Organization (WHO) found out rapid evaluations of the Water Supply and Sanitation (WS&S) sectors in more than 100 developing countries (Bendahmane, 2013). These, together with WHO's five-yearly supervising of WS&S coverage, provided the baseline statistics against which progress in the sector is generally measured. The picture was a depressing one: 1.2 billion people out of a total Third World population of 2.2 billion (China not included in the statistics at that time) were without access to safe drinking water; 1.7 billion had no means of excreta disposal. As a result, an estimated 10 million people a year were dying from diseases directly related to poor sanitation and among the world's hospital

beds were occupied by patients suffering from water-related illnesses (Dangerfield, 2012).

In Africa, a report by RWSSI (2013) showed a steady increase in the provision of access to Water Supply and Sanitation in the Region. In 2013, a reported additional 23.6 million and 13.3 million people gained access to water supply and sanitation, respectively in 24 of the countries with African Development Bank (AfDB) rural water supply and sanitation interventions (RWSSI, 2013). This represents respective increases of about 40% for water supply and 30% for sanitation over 2012. This brought the number of additional people served with access to water supply and sanitation by the end of December 2013 to about 827 million and 57.6 million, respectively. Furthermore, a report by RWSSI (2013) revealed that in 2013 twelve countries (Chad, Ethiopia, Kenya, Madagascar, Malawi, Mali, Mozambique, Rwanda, Senegal, Tanzania, Uganda and Zambia) reported an increase in the number of citizens served with water supply and sanitation. Ethiopia accounted for 75% of the reported increases. The number of people provided with access to sanitation during the reporting period was

lower than that of water supply by 3 million, indicating the need for concerted sanitation interventions in order to achieve satisfactory improvements (RWSSI, 2013).

Rwanda has made good progress in extending water supply and sanitation coverage during the past few years. According to the same source, access to adequate sanitation was 54% in urban areas and 37% in rural areas. However, according to a World Bank report, access to rural water supply in Rwanda increased from 41% in 2001 to 55% in 2005., under government commitment to three complementary sets of targets: the Economic Development and Poverty Reduction Strategy (2012), Millennium Development Goals (2015), and Vision 2020 (African Ministers' Council on Water (AMCOW), 2015). The institutional framework has been strengthened by the recently updated National Policy and Strategy for Water and Sanitation Services (2010), addressing all four subsectors.

The coverage trend over the past 10 years for water supply in rural areas demonstrates the country's ability for developing new projects; while for sanitation the enabling environment and ability for service development will need to be reinforced further in the medium term. After many years spent on fundamental sector reforms, execution in the urban areas requires attention.

According to *Guttman and Shlomit (2012)*, *welfare* is a general term for the condition of a personal or group, for example their spiritual, socio economic, psychological, or medical state. In other words, welfare is defined by *Gallagher, et al., (2014)* as a positive effect that is meaningful for citizens and for many sectors of the community where people perceive that their lives are going great. *Tamir and Brett (2012)* defined *welfare as term used to refer to how well a person's life goes for the person who lives it.* For the main objective of this work, people's welfare was operationalized as their health status, quality of life, and dignity as the state of being worthy of honor or respect.

According to *Enquête Intégrale sur les Conditions de Vie des Ménages (English translation: Integral Investigation on the Conditions of Life of Households) (EICV, 2015)*, around 67.6% of Ngoma households have access to safe water including (74.2%) of households using an improved water source with 40.7% of households using protected springs, 11.6% using stand pipe, 1.3% having water piped into their dwelling/yard. Only 34.4% of Ngoma households are within 5-14 minutes of main drinking water source while 18.9% are within 15-29 minutes (Ngoma District Development Plan, 2013-2018). The situation is quite similar to that at the national level which is respectively 39% and 23.6%. Against 74.5% of the population at the national level, 78.7% of the business centers in the district population have access to basic sanitation (Ngoma District Development Plan 2013-2018).

The majority use protected latrines (77.6%) and 7.1% don't have latrines, which is a high score compared to national situation (6.1%). Waste management remains a problem where 17.5% of Households throw their domestic wastes in bushes or field and only 78.0% have composts. This is relatively lower than national level where respectively 31.1% throw their wastes in bushes and 59.4% of Households use compost. In the town, the rate of Households who use public rubbish is 0.0% compared to national level of 5.0% (Ngoma District Development Plan, 2013-2018).

The government of Rwanda has over the years partnered with several international organizations to sponsor water projects with the aim of increasing water supply in its provinces. Among the core water projects that have increased the capacity of water supply in the Eastern side of Rwanda include Cyampirita Water Supply system that was completed in 2015. The project has significantly impacted 7615 households in Rugarama and Rwimbogo sectors in Gatsibo District. Another water project that was initiated by World Vision in Gatsibo District, aimed at providing water tanks to 80 Community Health Workers from Gakoni and Kiramuruzi cells of Kiramuruzi sector to fight water borne diseases and unnecessary deaths of children and women (Ministry of Infrastructure (MINIFRA, 2016).

For example, the Japanese International Corporation Agency (JICA) constructed water facilities and strengthened capacity of water associations in operations and maintenance of set up stations. Water facilities have increased safe water access to more than 80,000 people in Rwamagana, Kayonza, Ngoma and Kirehe Districts. These projects include the Rwakibogo water project that provides clean water for over 41,800 people in Mwulire, Kigabiro and Munyaga Sectors in Rwamagana District. To ensure community's direct involvement and proper maintenance in water supply, local governments have been given autonomy to manage water systems in conjunction with private operators (MINIFRA, 2016).

This study assessed the effect of water and sanitation projects' services on the welfare of the people in Ngoma District. The purpose of this was to analyze the outcomes of water and sanitation projects' services on welfare of people in Ngoma, Rwanda. It is hoped that the findings of this study will help policy makers to improve on monitoring and evaluation in rural water supply.

This study will provide information that will enable project managers to be focused on services to the community of Ngoma District in which policy, institutional arrangements, financing, planning and governance of the sector support water services at scale for rural populations indefinitely.

Furthermore, the findings of this research will help the Rwandan government to promote capacity building targeted at improving the supply of sanitation products

and services to the rural poor to reduce their vulnerabilities to preventable diseases.

Last but not least, this study will add to the body of public knowledge new contributions which will be relevant to future researchers who may want to research on the same subject area. Several studies, that is to say, (Mara & Cairncross 2011; Hardoy et al. 2011; Esrey 2012; Simpson-Hébert et al. 2012; Telmo2012; Almedom et al. 2013) have been done both within and outside Africa, but none was done in Rwanda and specifically Ngoma District. The present study was an attempt to close such a contextual gap. Similarly, the above studies did not capture water and sanitation, vis-à-vis people's welfare, hence presenting a content gap which this study covered in terms of health, dignity and quality of life.

## **2. Review of Related Literature and Studies**

This section presents the review of related literature and studies that guided the study.

### **2.1 The interventions of Water and Sanitation Projects' services**

The key proponent The advantages of improved water supply and sanitation are many, including prevention of disease, better nutrition, improved basic health care, increased access to different institutions such as health centers, district hospital and schools, increased quantity of and access to water, improved water quality, reduction in time and effort required for water collection, promotion of infrastructures, reinforcing of societal organization, developments in housing, and ultimately, improved quality of life (Okun, 2014).

Access to water supply and sanitation is a basic need and a human right. It is indispensable for the dignity and health of all people. The health and economic interests of water supply and sanitation projects' services to households and individuals (and especially to children) are well registered. Of special importance to the poor people are the time-saving, convenience and dignity that improved water supply and sanitation represent. According to World Health Organization and UNICEF (2010) report, the root causes of failed water and sanitation systems are weak institutions, inadequate support of institutions, lack of institutional monitoring, poor capacity of community and government structures, over reliance on nongovernmental organizations and external financing from NGOs.

### **2.2 The Welfare of the People**

Welfare is the health, happiness and fortunes of an individual or a group. It could also mean a statutory procedure or social effort designed to promote the

fundamental physical and material welfare of people in need (MaCurdy & Jeffrey 2008). In most developed countries, well being is largely provided by the government from tax revenues and to a lesser extent by charities, informal social groups, religious groups, and inter-governmental organizations (Leze, 2014).

According to Haveman (2001), welfare can take a variety of forms, such as monetary payments, subsidies and vouchers, or housing assistance. Welfare systems differ from different countries, but welfare is commonly provided to citizens who are not employed, those with illness or disability, the elderly, those with dependent children, veterans.

### **2.3 Related Studies**

Water is a precious resource and vital for life. Without it we would die within days. Access to affordable supply of water is universally recognized as a fundamental human need for the present generation and a pre-condition for the improvement and care of the next. Water is also a basic economic resource on which people's livelihoods depend. In addition to domestic water use households use water for productive activities such as livestock rearing in rural areas and farming, or horticulture and home-based micro companies in urban settlements (Mara & Cairncross, 2011).

If people do not have adequate and appropriate sanitation stations or the chance to develop good hygiene practices, diseases can be spread through the contamination of water or through other pathways in the households. At any one, time some of people in developing countries are suffering from one or more of the six main diseases associated with inadequate water supply and sanitation: schistosomiasis, diarrhea, ascariis, dracunculiasis, hookworm, and trachoma (Hardoy et al. 2011).

Improving the health of the poor people is a frequently cited target of water and sanitation projects' services. The relationship is not allowing easily the establishment in practice at the project level, but over the longer term it can be demonstrated that there are significant health-associated benefits from improvements in water supply and sanitation provision, particularly when these are associated with changes in hygiene behavior. The Water and Sanitation for Health programme (Esrey, 2012) revealed that in the 144 epidemiological researches that it had reviewed, the health impact of improved water supply and sanitation public facilities was on high level, measured by significant reductions in morbidity rates and higher child survival rates.

According to Simpson-Hébert et al. 2012, The White Paper on International Development treats water as an economic and a social good at the same time in the context of the goals of sustainable development. The advantages of providing safe water supply and sanitation goes beyond improvements to health, well-being, and quality of life. Access to affordable water conveniently

can save people's time and energy and enhance their livelihood opportunities. Growth in sanitation will contribute to improve privacy and retain human dignity — legitimate and significant social development concerns. These less quantitative benefits are among the interests in water supply and sanitation most often reported by citizens in low-income communities.

The dismal situation initiated by inadequate access to WS&S services aggravated still further by large numbers of broken down or malfunctioning water and sanitation services providing. The health benefits of an improved water supply can be destroyed during night time if people are forced to revert to contaminated sources when the public supply fails. Capital investment in new services is wasted unless there is adequate provision for the reliable operation and maintenance of installed stations (Almedom et al. 2013).

Telmo (2012) found research on water supply and sanitation in Mali and concluded that the two forms of water supply technologies present were hand dug wells and borehole pumps. There were also three classifications of hand dug wells: improved traditional wells, not improved traditional wells, and modern wells. Well depths ranged from 5.2 to 9.0 meters.

Twenty-seven of the 38 sources of water had water available year round, and all households had access to a water source with year round availability. The distance done in traveling to collect water ranged from 3 to 260 meters and the average distance traveled was 44 meters. Although the all households from the area had reasonable access to a water supply, not all households collected water from an improved water source. The only improved water supply technologies in the village were two borehole pumps. Simple pit latrines were the only kind of sanitation facilities present in the village and they are considered to be used in improvement of sanitation technologies.

A review by Ashish and Amadi(2013)was done to explore the contribution of water treatment, hygiene, and sanitary interventions on improving child health outcomes such as absenteeism, infections, general knowledge, behavior, and practices and adoption of point-of-use water treatment. A literature search was conducted using the databases Pub Med and Google scholar for studies published between 2009 and2012 and focusing on the effects of access to safe water, hand washing facilities, and hygiene education among the schools at children level.

Studies included were those that registered the provision of water and sanitation facilities in schools for children under 18 years of age, interventions which assessed WASH practices, and English-language, full-text peer reviewed papers. Fifteen studies were included in the final analysis. 73% ( $n = 11$ ) of the studies were conducted in developing countries and were rural based (53%, = 8). The child's age, gender, grade level, social and economic

index, access to hygiene and sanitary facilities, and prior knowledge of hygiene practices were significantly attached with the outcomes.

### 3. Research Methodology

Research methodology is what makes social science scientific and a research plan of action to measure variables of interest. It also looks on the cognitive process of the research problem arising from the nature of its subject matter.

This study adopted a cross-sectional survey design and in addition to that, this study used quantitative approach as the main approach, with support from qualitative approach. The target population of this study included 336,928 participants (Rwanda Census, 2012). The researcher distributed 400 questionnaires but was able to retrieve only 302 questionnaires that were correctly filled and answered by the donor community, project managers, local leaders, and the local community. The researcher used probability sampling specifically, simple random sampling (SRS) to select the members of the local community. Furthermore, the researcher used non-probability sampling, that is, purposive sampling technique to select the local leaders regarding to their respective locations and positions, project managers and the donors. The study collected primary and secondary data. This study used both interview guides and questionnaires. Validity and reliability were both considered by the study where the content validity index (CVI) was applied to determine the validity of the instrument by the formula below:

$$CVI = \frac{\text{items declared relevant by experts}}{\text{total number of items}}$$

According to this formula, if the CVI  $\geq 0.70$ , the instrument is considered valid, otherwise it is not (Amin, 2005). In this case, the  $CVI = \frac{23}{27}$  **CVI=0.85**

According to Amin (2005), if the Cronbach's alpha values are  $\alpha \geq 0.70$ , the instrument is reliable, otherwise it is not. In the findings of this study, all the Cronbach's alpha values were  $\alpha \geq 0.70$ . Quantitative data from the questionnaires from the field were edited, coded, compiled and sorted to have the required quality, accuracy and perfectness.

During the analysis of the data, frequencies and percentage distribution were used to analyze data on the profile of the respondents, while standard deviations and means were used to assess the study objective one and objective two. Furthermore, Pearson correlation and regression analysis was done to establish the extent to which water and sanitation projects' services have influenced the welfare of the people of Ngoma District.

## 4. Results and Discussion

The first objective of this study was to assess the interventions of water and sanitation projects' services on people's welfare in Ngoma District

The research carried out that water and sanitation projects' services in Ngoma District were fairly satisfactory (overall average mean=3.04, Std=1.285). This is because water and sanitation projects' services have not yet completely captured all parts of the district hence the reason for its fair interventions.

Furthermore, it is attributed to the fact that majority of the respondents indicated that they do not treat water with any chemical such as chlorine or anything because they cannot afford it, instead they boil it to make it safe. In addition, most of the respondents still do not have piped water into their residents; instead they use boreholes and protected spring that is a bit far from the household.

As regard sanitation facilities, the findings revealed that sanitation facilities used by the households of Ngoma District was assessed by respondents as fairly satisfactory (average mean=3.04, Std=1.285). This was attributed for the fact that most of the people in Ngoma District still throw their rubbish in bushes instead of composts. A good number of the households have pit latrines, though there are some households that do not have toilet facilities; only a few of them have flush toilet system.

The second objective of this work was to assess the welfare of the people of Ngoma District. The findings revealed that people's welfare was satisfactory (overall average mean=3.70, Std=1.149). This was attributed to the satisfactory health, quality of life and dignity of the people of Ngoma District.

In regard to health, the study found that it was satisfactory (average mean=3.37, STD=1.242). This was attributed to peoples' positive emotions, being inspirational to others; others were in control of their lives and practiced right diets. This could have been because they had good sanitation because of having pit latrines, and having access to safe and clean water from protected springs and boreholes.

In regard to quality of life, it was found to be satisfactory (average mean=3.92, STD=1.019). This was attributed to positive attitude towards life because most of them attributed happiness, peace and calmness. In other words, these people are satisfied with life's offers, including everything from physical, health, family, and the environment. They are not stressed and suppressed with diseases.

In regard to dignity, the study found it to be satisfactory (average mean=3.52, Std=1.185). This was attributed to the fact that most people felt they were respected by their community members, and this made them feel positive about themselves and encourage them to support others also to live positive quality life.

The third objective of this study was to establish the effect of water and sanitation projects' services on people's welfare in Ngoma District. The findings revealed a positive, weak and significant correlation between water and sanitation projects' services and people's welfare in Ngoma District ( $r=.308^{**}$ ,  $p<0.01$ ). This implies that there is a significant positive yet weak effect of water and sanitation projects' services on people's welfare in Ngoma District, hence upholding the alternative hypothesis and rejecting the null hypothesis. In other words, an improvement of water and sanitation services provision causes an improvement in people's welfare.

**The Effect of Water and Sanitation Projects' services on People's Welfare in Ngoma District**

Correlations					water and sanitation	Welfare			
water and sanitation					Pearson Correlation	1			
					Sig. (2-tailed)	.308**			
					N	302			
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
1	.009a	.008	.0074	.00128	R Square Change	F Change	df1	df2	Sig. F Change
1					.008	1414.488	1	300	.000
Model	Unstandardized Coefficients			Standardized Coefficients		T	Sig.		
	B	Std. Error	Beta						
1	(Constant)	3.492	.283			12.342	.000		
	water facility	.131	.063	.119		2.072	.039		
	sanitation facility	.066	.065	.058		1.009	.314		

a. Dependent Variable: people's welfare

\*\* . There is a significant correlation at the 0.01 level (2-tailed).

## 5. Conclusions and Recommendations

This part presents conclusions and recommendations of the study based on results of the study.

### 5.1 Conclusions of the Study

From the findings in the preceding sections, the following conclusions are made:

The study found that the measures used fairly promoted water and sanitation projects' services in Ngoma District. This is because the people of Ngoma district have embraced proper ways of making water clean and safe for domestic use. Furthermore, due to the project, they have adopted proper means of disposing wastes.

The study indicates that the factors that affect people's welfare are health, life quality and dignity. This is because, with good water and sanitation facilities, the welfare of the people in terms of quality of life, health and dignity will improve. Otherwise, poor sources of water affect the health of people by making them fall sick, as well as affecting their quality of life.

The study revealed that water and sanitation projects' services have a positive but weak effect on the welfare of the people of Ngoma District.

This implies that having proper water and sanitation infrastructures through different projects can help promote access to clean and safe water and proper sanitary establishment, which will help improve people's welfare. This is because, a household with better water and sanitary facilities will allow them to be dignified, have quality life and good health.

### 5.2 Recommendations of the Study

The government, with the support of the local leaders should identify the most affected villages and construct protected springs and boreholes for them so that they can access safe, clean and cheap water within a few minutes from their homes.

Similarly, the Rwandan government, through the ministry of natural resources, with the support of local government leadership and technocrats, should train the local masses on the importance of having latrines and rubbish bins in their homes so as to make sure every family promotes good hygiene and sanitation.

Furthermore, projects managers, and donors should involve the participation of the local masses in the different phases of the water and sanitation projects.

There is need for the government, NGOs and well-wishers to educate the masses about the importance of treating or boiling water before it can be used. Furthermore, in order for the local masses to have better welfare, the local leaders, the business community and the government should encourage them to involve themselves in viable economic activities by borrowing loans from microfinances and Savings and Credit Cooperatives (SACCO) groups.

The local leaders should make hygiene and sanitation practices a compulsory at the village, sector and district level where women are trained in community, economic and health issues affecting the household. The training can be done by participants from the ministry of health on various topics such as boiling drinking water, proper waste disposal methods, general cleanness of the house, compound, plates, cups, clothes, saucepans etc.

There is need for NGOs and the district leaders to carry out research into appropriate and cheap technologies, aiming at a large-scale transition from traditional to hygienic latrines at affordable cost to households.

In addition, policy makers should come up with policies that make more effective use of existing knowledge about the impacts and effectiveness of rural water supply, sanitation and hygiene interventions.

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