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Determinants and inequalities in access to improved water sources and sanitation among the Zambian households

James N. Mulenga [1*], Bupe B. Bwalya [2], Kunda Kaliba-Chishimba [3]

[1] *Department of Economics, School of Social Science, Mulungushi University, Zambia*
[2] *Department of Mathematics and Statistics, School of Sciences, Engineering and Technology, Mulungushi University, Zambia*
[3] *Department of Social Development Studies, School of Social Science, Mulungushi University, Zambia*

Abstract

Improved water sources and sanitation are crucial for human survival. The study focused on examining the inequalities and determinants of access to water and sanitation between rural and urban households. This study analysed the household data sets from the 2013-14 Zambia Demographic and Health Surveys (ZDHS) with a total sample size of 15,920 households. To determine the percentage distribution, inequalities and determinants of access to improved water and sanitation, the study used univariate analysis, the Erreygers concentration index (E) and the logistic regression, respectively. Sixty five percent (64.5%) of the households had access to improved water source compared to 35.5% who did not while only a quarter (25.4%) of the households had access to improved sanitation compared about three quarters (74.6%) without access. The results also show that access to improved water and sanitation is concentrated among the wealthier households and increases with increasing wealth quintile in both rural and urban areas. Further, study showed that wealth index, gender of household head, region and type of place of residence were all positively associated with access to improved sanitation. Wealth index and sex of household head were found to be positively related with access to improved water. To enhance access to improved water and sanitation among the poor households it is imperative that government and other stakeholders intervene by providing the amenities or by subsidising the provision.

Keywords: Access; Inequalities; Improved Water; Improved Sanitation; Erreygers Concentration Index; Household; ZDHS; Zambia

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* Corresponding author. *E-mail address:* nileshmulenga@gmail.com

1. Introduction and Background

Water permeates all aspects of life on earth (WWAP, 2016) as it is essential for the survival and sustenance of human, animal and plant life. Adequate and safe drinking water, sanitation, and hygiene are all essential ingredients to human health. A number of studies have established a link between access to water and sanitation, and morbidity and mortality. Fink et al. (2011) and Yongsi (2010) observed that access to improved water and sanitation was associated with lower mortality and a lower risk of child diarrhoea particularly among the children aged below 5 years. WHO (2017) further highlights that diarrhoeal disease is the second leading cause of death in children under five years old. Around 340,000 children under-five die every year from diarrhoeal diseases caused by dirty water and poor sanitation translating to about 1,000 children per day, or about one child every two minutes (WHO, 2015). This signifies how important clean water and basic sanitation are to human health and survival.

Recognising the importance of water and sanitation to human survival, the United Nations (UN) in 2010 through Resolution 64/292 affirmed the human right to water and sanitation (UNICEF, 2014). As such all human beings must have access to clean water and basic sanitation. Globally, significant progress has been made in the terms of access to improved water and sanitation during the Millennium Development Goal (MDG) era. The global MDG target for drinking water was met in 2010. Currently, 91 per cent of the global population now uses an improved drinking water source compared to 76 % in 1990 while the target for sanitation was missed with 68 % of the global population currently using an improved sanitation facility compared to 54 % in 1990 (WHO, 2015).

Despite the progress in access to water and sanitation, the benefits are not evenly spread in the world. There are inequalities in access to improved water supply and sanitation between rich and poor, between rural and urban areas and between men and women. As such people in developing countries continue to depend on unsustainable and unimproved water sources and unimproved sanitation. Globally people living in rural areas poorer households are less likely to have access to improved water and sanitation facilities (UN, 2015). Additionally, women and girls are affected disproportionally by poor access (UNICEF, 2016). The 2015 Joint Monitoring Programme (JMP) report highlighted that 663 million people still lack improved drinking water sources while 2.4 billion people still lack improved sanitation facilities (WHO, 2015). This highlights the fact that more needs to be done to improve the situation globally.

In order to resolve the disparities in access to water and sanitation, the UN member countries adopted the Sustainable Development Goal (SDG) number 6 which sets to “ensure availability and sustainable management of water and sanitation for all”. Target 6.1 of the SDG 6 focuses on “achieving universal and equitable access to safe and affordable drinking water for all by 2030” while target 6.2 focuses on “achieving access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations, by 2030”. This paper endeavoured to provide an input to the discussion of how the two targets could be achieved.

Zambia like many countries recognises the importance of access to water and sanitation as key component of all aspects of sustainable development (GRZ, 2017; GRZ, 2014; GRZ, 2006). The importance of

access to improved water and sanitation has been highlighted in various government plans and policies which include the Vision 2030, Fifth National Development Plan 2006 – 2010, Sixth National Development Programme 2011 – 2016, Seventh National Development Plan 2017 – 2021 and the National Water Policy of 2010. In all these plans government had put in place various strategies to improve the access to improved water and sanitation. Subsequently, various programmes have been implemented by government together with cooperating partners to improve access to water and sanitation such as the National Rural Water Supply and Sanitation Program (NRWSSP) in 2006 and National Urban Water Supply and Sanitation Program (NUWSSP) in 2011 (UNDP, 2013).

Notwithstanding the various interventions, Zambia like other Sub-Saharan African countries, missed the MDG targets for drinking water and sanitation. However, some success has been scored from 1991 to 2015. Figure 1.0 highlights the trends in access to improved water and sanitation in Zambia compared to Sub Saharan African countries for the period 1991 to 2015. Access to improved water has improved from 51% to 65% over the period (UNDP, 2013) while households with access to improved sanitation has only improved marginally from 20% in 2005 to 25% in 2013-14 (GRZ, 2017; CSO et al., 2014). These statistics indicate that there has been slow progress towards increasing the access to improved water and sanitation in Zambia. This is particularly the case among the women and children, the poor, marginalised and rural communities (Varen et al., 2015).

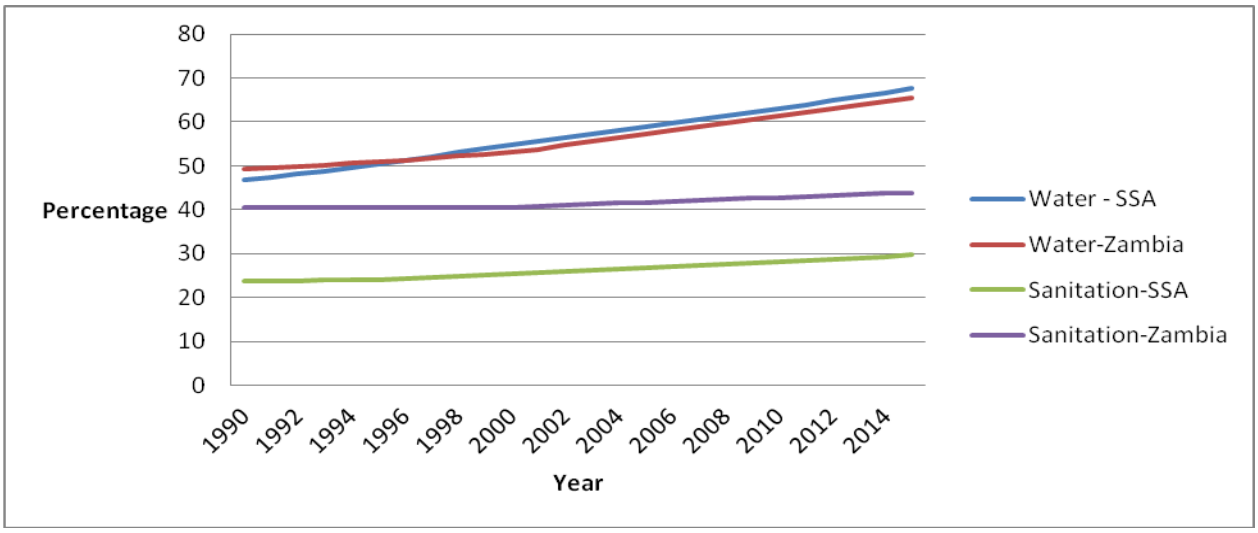

Figure 1.0. Trends in access to improved water and sanitation in Zambia compared to the Sub Saharan African countries average from 1991 to 2015 (Source: Constructed from the World Development Indicators)

In view of the water and sanitation situation in Zambia, this study was undertaken to examine households' determinants of access to improved water and sanitation in Zambia. This study endeavoured to achieve the following objectives;

1- To determine the proportions of households with access to improved water and sanitation in the wealth quintile categories in Zambia.
2- To establish the relationship between household characteristics and access to improved water and sanitation in Zambia.
3- To examine the inequalities in access to water and sanitation between the rich and the poor households in Zambia.

2. Literature

Despite the fact the water and sanitation sector is well researched, there is a scarcity of literature linking the characteristics of the household members to access to water and sanitation. A few studies have explored the link between the household member characteristics and access to water and sanitation. A study by Irianti (2016) in Indonesia found that access to better water sources including improved or piped water source could be explained by disparities in geography, gender, marital status and financial status. The study found that household size was positively associated with odds of having access to better drinking water sources. Households headed by ever married persons and household headed by females, education of household head and household wealth were more likely to have access to better sources for drinking water.

Another study by Ribeiro (2015) in Timor-Leste established that urban/rural status, region and wealth index explained the disparities in access to improved drinking water sources and only wealth index significantly determined the access to improved sanitation. Similarly, Nketiah-Amponsah (2009) in Ghana and Tuyet-Hanh et al. (2016) demonstrated that income and type of place of residence were significant determinants of the use of piped water. The study further observed that education was a determinant of both access to clean toilet facility and use of protected water sources for drinking purposes. Further, Koskei et al. (2013) found that households' characteristics such as occupation and education level of the household had a strong impact on the type of water source used by household. The study also confirmed that the type of toilet facility used by household was significantly influenced by the marital status of household head. Mahama et al. (2014) also observed that education, income and location of the household were important determinants of households' access to improved water.

3. Study methodology

3.1. Data and sample

3.1.1. Data

This study used the household data sets from the 2013-14 Zambia Demographic and Health Surveys (ZDHS). The ZHDS provides information on households' access to improved water sources and sanitation. It also

provides information on type of place of residence, size of household, sex of household head, age of household head, region of residence and the household wealth index.

3.1.2. Population and sample size

The sampling frame for this study was provided by the 2010 Zambia Population and Housing Census. The sampling design used in the survey was two-stage stratified cluster sample design. The sample thus obtained is nationally representative. In the first stage, probability proportion-to-size was used to select Enumeration Areas (EAs) or clusters and 722 EAs (305 in urban areas and 417 in rural areas) were selected. Prior to selection EAs are stratified by province and then into urban and rural. In the second stage a representative sample of 18,052 households was drawn for the 2013-14 ZDHS of which 16,258 were occupied at the time of the fieldwork. Of the occupied households, 15,920 were successfully interviewed, yielding a household response rate of 98%. The information was collected using questionnaires translated into seven major languages. For the purpose of this study, household level data was used and a total of 15,916 households were used for the analyses.

3.1.3. Ethical considerations

The data for this study was collected using tools that are approved by ICF Institutional Review Board (IRB) and complies with the U.S. Department of Health and Human Services regulations for the protection of human subjects (45 CFR 46). The survey was also complied with the Zambian Laws.

3.2. Variables

3.2.1. Dependent variable

The dependent variables in this study are 'improved water source' and 'improved sanitation'. According to CSO et al. (2015) an improved drinking water source is defined as drinking water sourced from a household connection (piped), public tap or standpipe, tube-well or borehole, protected dug well, protected spring, rainwater collection, or bottled water, while improved sanitation refers to sanitation for household that has a flush toilet, ventilated improved pit latrine, pit latrine with a slab, or composting toilet and does not share its facility with other households.

3.2.2. Independent variables

The independent variables considered for this study were chosen based on their availability in the 2013-14 ZDHS, the objectives of the study and literature reviewed. The variables consisted of households' *type of place of residence* (urban/rural*)*; *size of household* (1-5 members, 6-10 members, 11+ members); *sex of household head* (male or female); *age of household head* (15-34, 35-54 and 55+); *region of residence* (Central, Copperbelt, Eastern, Luapula, Lusaka, Muchinga, Northern, North Western, Southern and Western provinces) and *wealth*

index (poorer, poor, middle, rich and richer). The wealth quintile was constructed using various variables relating to the household characteristics, amenities and characteristics. The quintile was constructed using the Principal Components Analysis.

3.3. Data analysis

Data analysis was undertaken using STATA 13.0 software and involved three types of analyses; descriptive, inferential and concentration analyses. Descriptive analysis was undertaken to examine the percentage distribution of the variables of interest. To establish the inequalities in the access to improved water sources and sanitation the study used the Erreygers Concentration Index. Before undertaking the logistic regression, the variables were tested for the presence of multicollinearity using the method of pairwise correlation. Due to the fact that the outcome variable was dichotomous, the binary logistic regression was performed to assess associations between the independent variables and each outcome variable (improved drinking water source and improved sanitation) and considered the 0.001, 0.01 and 0.05 levels of significance. Considering that the ZDHS survey used complex sampling, sampling weights were applied to each analysis in order to adjust for differences in probability of sample selection.

The following Logistic regression model was estimated;

$$L_i = \ln\left[\frac{p}{1-p}\right] = X\beta + u_t$$

where p is the probability of the household having access to either improved water source or sanitation, X represents a vector of independent variables, $\beta's$ are odds ratios and *u* is the error term.

3.3.1. Measuring inequality in access to improved water and sanitation

To establish if inequalities exist in access to improved water source and sanitation, the study examined the data using the concentration indices. The concentration index can be used to examine inequality not just in health outcomes but in any health sector variable of interest (O'Donnell et al., 2008). In this study, the concentration index was used to measure wealth related inequalities in the access to improved water sources and sanitation facilities, respectively. Comparisons were made between inequalities in access to improved water sources and sanitation between rural and urban areas as well as between male and female headed households. The values of the concentration index ranges from -1 to +1. A value of zero means there are no inequalities, while positive value implies inequality in access to improved water sources or sanitation that is to the advantage of the higher wealth quintiles and a negative value implies inequality in access to either improved water or sanitation that is to the advantage of the lower wealth quintiles. Meaning poorer households have access to improved water and sanitation.

Various concentration indices exist in literature, this study analyzed inequalities in access to improved water and sanitation using the Erreygers Concentration Index (E). This index is suitable for calculating inequalities when the variables are binary.

The Erreygers Concentration Index (E) can be expressed algebraically as follows;

$$E(w) = \frac{4-w}{w^{max}-w^{min}} * CI(w)$$

where w is the mean of the access to improved water or access to improved sanitation variables, w^{max} and w^{min} are the extremes of the improved water or access to improved sanitation variables and CI (w), the standard concentration index.

4. Results

4.1. Description of the sample

Table 1 presents the key characteristics of the sample. The table shows that slightly above a quarter of the households were female headed (26.6%). About 22.1% of the households were classified as poorer while 19.7% were richer. In terms of region of residence, the highest percentage of the households were from Lusaka (18.2%) while the smallest was from North Western (4.5%) and more than a half (58.3%) resided in rural areas.

4.2. Access to improved water and sanitation among Zambian households

Figure 2.1 shows the percentages of households with access to improved water sources in Zambia. Overall, 64.5 % (10,274) of households have access to improved water sources while, 35.5% (5,646) do not have access. The problem seems to be more pronounced in rural areas where 53.4% do not have access to improved water sources compared to only 10.5% of the households in the urban areas. Figure 2.2 presents the proportions of households with access to improved sanitation facilities. Overall, 25.4 % (4,046) of women have access to improved sanitation facilities while, 74.6% (11,873) do not have access. Figure 2.2 further shows that the problem of lack of access to improved sanitation facilities is mostly a rural phenomenon, with 81.5% of the households not having access to improved sanitation facilities compared to 65.0% in urban areas.

4.3. Distribution of access to improved water and sanitation by wealth quintile categories.

Figure 3.1 presents the distribution of access to improved water sources by wealth quintile. The table shows that as the household gets wealthier, access to improved water sources increases rapidly from 38.7% among the poorer to 96.0% among the richer households while the proportions of households without access to improved water supply decreases rapidly from 61.3% among the poorer to 4% among the richer households.

Similarly, Figure 3.2 presents the distribution of access to improved sanitation by wealth quintile. Poorer households have very low proportions of access to improved sanitation (12.4%) compared to the richer (58.7%). As the household gets wealthier, access to improved sanitation increases slowly up to the rich quintile and then increases rapidly from the rich quintile to the richer one. On the other hand, the proportions of households without access to improved sanitation decreases slowly from 87.6% among the poorer to 77.9% among the rich and then decreases rapidly to 41.3% among the richer households.

Table 1. Sample description and prevalence of access to improved water and sanitation in Zambia - 2013/14 ZDHS

Explanatory Variables	Percentage	Number
Age of household head		
15-34 years	32.6	5,189
35-54 years	44.6	7,100
55 + years	22.8	3,628
Size of household		
1-5 members	57.4	9,143
6 - 10 members	39.1	6,230
Above 11 members	3.4	543
Sex of Head		
Male	73.4	11,685
Female	26.6	4,232
Wealth Index		
Poorer	22.1	3,512
Poor	19.2	3,054
Middle	18.6	2,957
Rich	20.4	3,252
Richer	19.7	3,141
Region		
Central	9.2	1,471
Copperbelt	15.4	2,455
Eastern	12.2	1,937
Luapula	7.9	1,265
Lusaka	18.4	2,925
Muchinga	5.5	881
Northern	8.0	1,267
North Western	4.5	724
Southern	12.1	1,934
Western	6.6	1,057
Type of place of residence		
Urban	41.7	6,640
Rural	58.3	9,276
Total	**100**	**15,916**

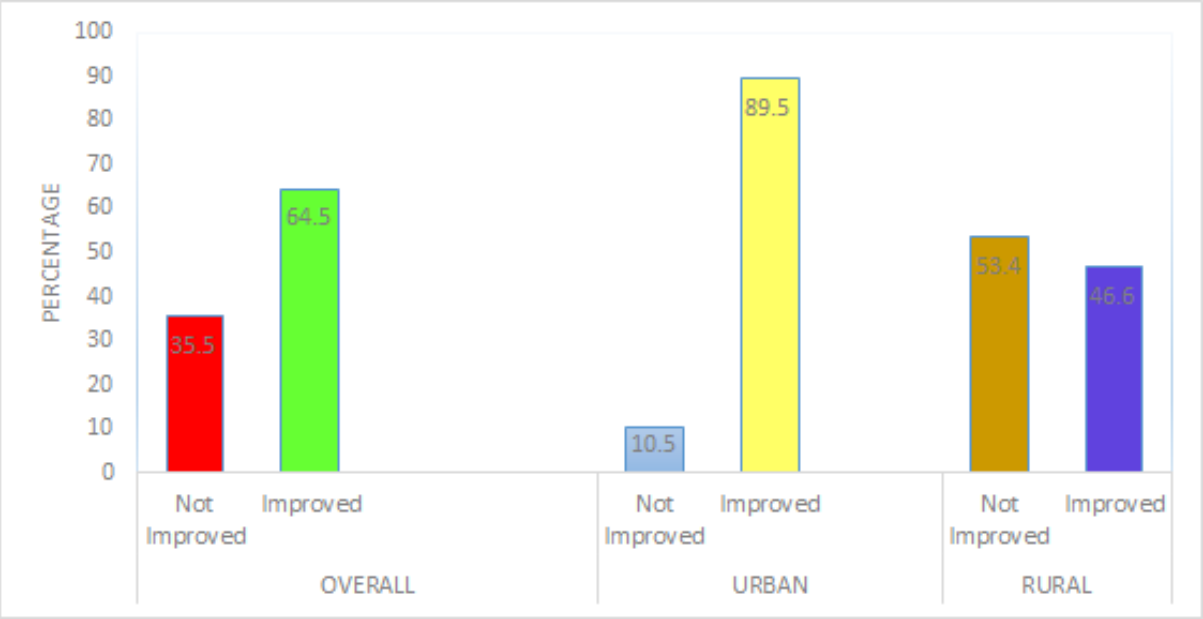

Figure 2.1. Percentage of households with access to improved water sources in Zambia; overall and rural vs urban

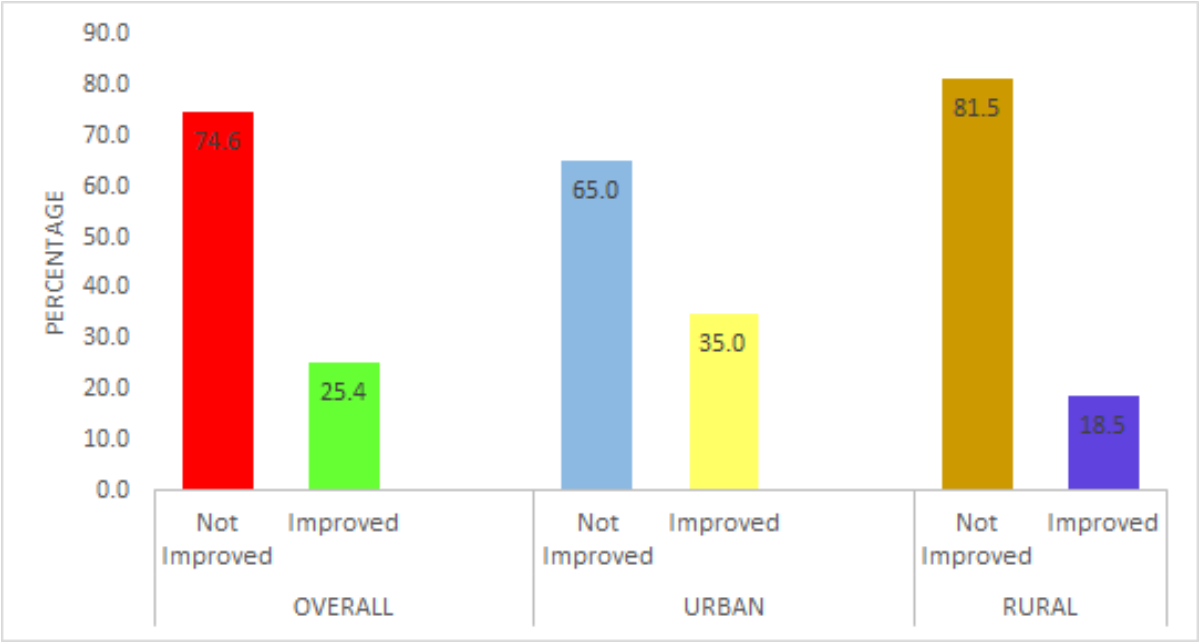

Figure 2.2. Percentage of households with access to improved sanitation in Zambia; overall and rural vs urban

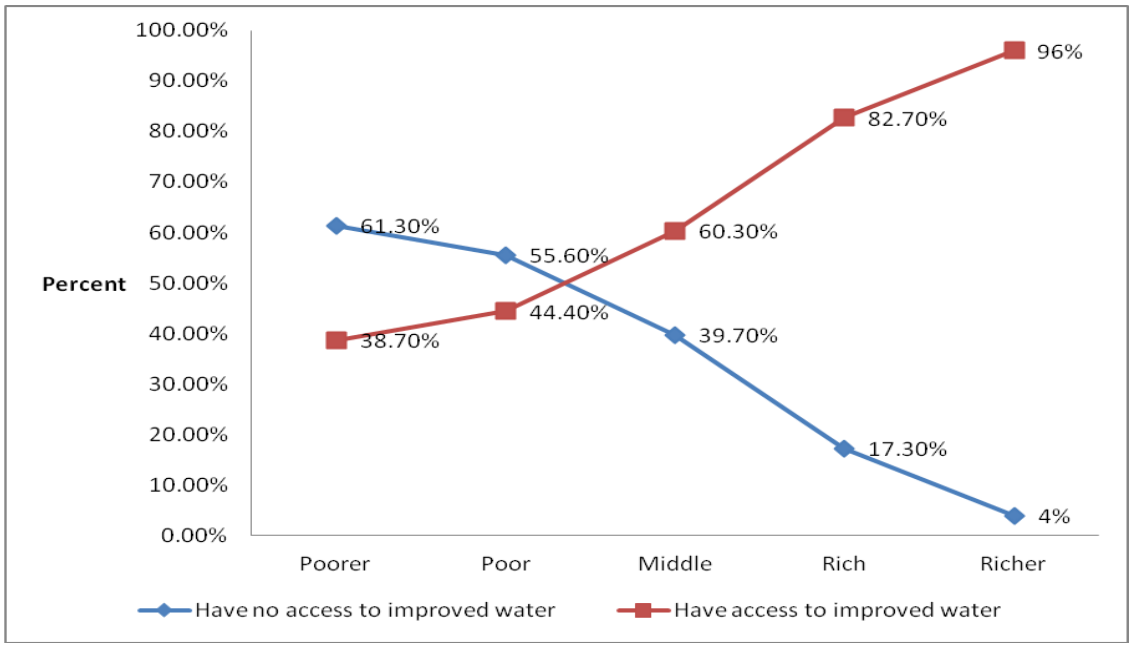

Figure 3.1. Distribution of access to improved water by wealth quintile

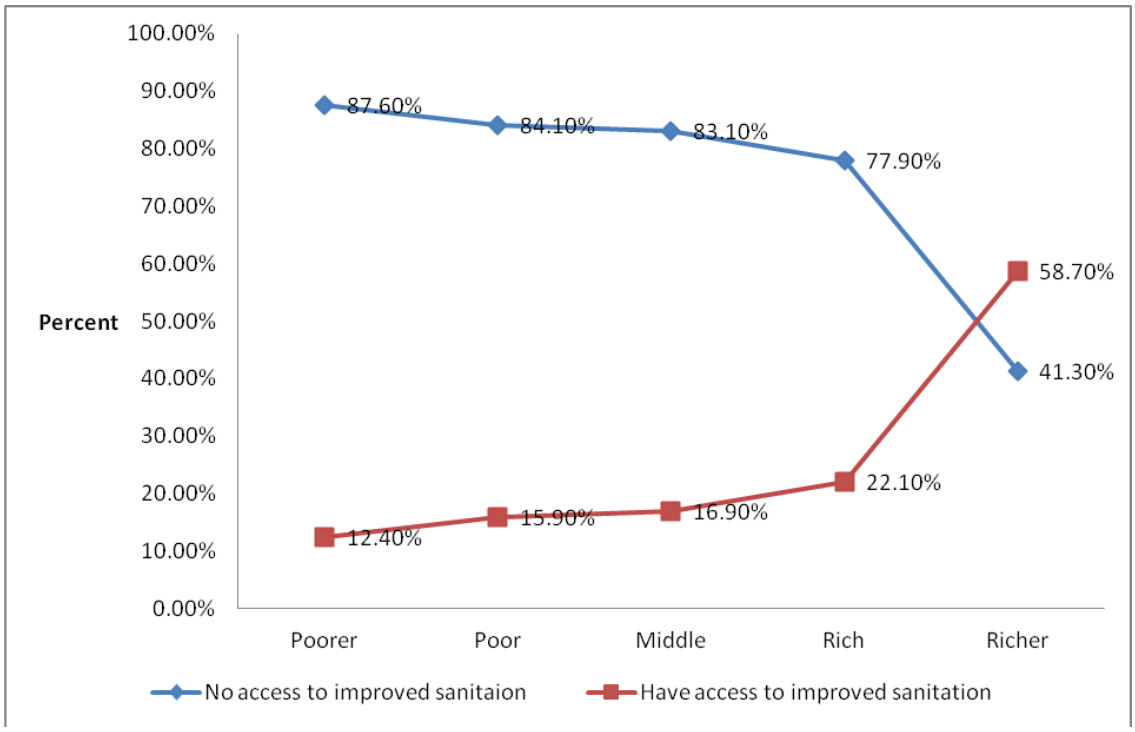

Figure 3.2. Distribution of access to improved sanitation by wealth quintile

4.4. Inequality in access to improved water sources and sanitation

Table 2.1 presents the concentration indices for access to improved water and their corresponding p-values. The positive (0.48934733) combined index shows that access to improved water sources for all the sampled households is concentrated among the wealthier households. There is also a significant concentration of access to improved water sources among the wealthier households in both rural and urban areas. The indices show that the degree of inequality is slightly greater in rural areas (0.20107506) compared to urban areas (0.17860007). The test confirms that the indices are statistically different in rural and urban areas.

Similarly, Table 2.2 presents the concentration indices for access to improved sanitation and their corresponding p-values. The positive (0.31664933) combined index shows that access to improved water sources for all the sampled households is concentrated among the wealthier households. There is also a significant concentration of access to improved water sources among the wealthier households in both rural and urban areas. The indices show that the degree of inequality is greater in urban areas (0.43626661) than in rural areas (0.14776594). The test confirms that the indices are statistically different in rural and urban areas.

Table 3.1 shows the concentration indices for access to improved water and their corresponding p-values. The positive (0.48934733) combined index shows that access to improved water sources for all the sampled households is concentrated among the wealthier households. There is also a significant concentration of access to improved water sources among the wealthier households in both male and female headed households. The indices show that the degree of inequality is slightly greater in among the male headed households (0.4966137) compared to female headed households (0.48155628). The test confirms that the indices are not statistically different in both the male and female headed households. Similarly, Table 3.2 shows results of the concentration indices for access to improved sanitation and their corresponding p-values. The combined concentration index (0.31666658) shows that access to improved sanitation for all the sampled households is also concentrated among the wealthier households. There is also a significant concentration of access to improved sanitation among the wealthier households in both male and female headed households. The indices show that the degree of inequality is slightly greater in among the female headed households (0.32829992) compared to male headed households (0.31157936). The test confirms that the indices are not statistically different in both the male and female headed households.

Table 2.1. Estimates of the concentration indices: Rural vs urban inequalities in access to water (Access to improved water by rural/urban)

Index	Number of Obs	Index Value	Robus SE	p-Value
Erreygers Normalised CI	15502	0.48934733	0.01862293	0.0000
Erreygers Normalised: Urban	6751	0.17860007	0.0187685	0.0000
Erreygers Normalised: Rural	8751	0.20107506	0.02060936	0.0000
F-Statistic = 434.07271				0.0000

Table 2.2. Estimates of the concentration indices: Rural vs urban inequalities in access to sanitation (Access to improved sanitation by rural/urban)

Index	Number of Obs	Index Value	Robus SE	p-Value
Erreygers Normalised CI	15489	0.31664933	0.02505261	0.0000
Erreygers Normalised: Urban	6748	0.43626661	0.03110876	0.0000
Erreygers Normalised: Rural	8741	0.14776594	0.01381736	0.0000
F-Statistic = 353.117				0.0000

Table 3.1. Estimates of the concentration indices: Inequalities in access to water by household headship (Access to improved water by male/female headed households)

Index	Number of Obs	Index Value	Robus SE	p-Value
Erreygers Normalised CI	15502	0.48934733	0.01862293	0.0000
Erreygers Normalised: Male	11316	0.4966137	0.01888714	0.0000
Erreygers Normalised: Female	4186	0.48155628	0.0241006	0.0000
F-Statistic = 1.0674751				0.3015

Table 3.2. Estimates of the concentration indices: Inequalities in access to sanitation by household headship (Access to improved sanitation by male/female headed households)

Index	Number of Obs	Index Value	Robus SE	p-Value
Erreygers Normalised CI	15502	0.31666658	0.02504158	0.0000
Erreygers Normalised: Male	11316	0.31157936	0.02590918	0.0000
Erreygers Normalised: Female	4186	0.32829992	0.03084475	0.0000
F-Statistic = 1.6584397				0.1978

4.5. Logistic regression analyses

Table 4 presents the adjusted odds ratios of household characteristics that are association with access to improved water sources and sanitation. The results show that on average, the odds of having access to improved water sources increases as we move from households in the poor quintile to those in the richer quintile compared to the poorer households. The results also show that the female headed households had about 20% higher odds of having access to improved water sources compared to the male headed households. Further, results indicate that all provinces had lower odds of having access to improved water sources relative to Lusaka Province. Central Province has 80% lower odds of having access to water sources compared to households in Lusaka. In addition, households based in the Copperbelt, Luapula, Muchinga, Northern, North Western and Western all had 90% lower odds than those based in Lusaka. Moreover, Households in Southern Province had 70% lower odds of having access to improved water sources relative to those located in Lusaka. Households in rural areas had 70% lower odds of having access to improved water sources than the households in urban areas.

Similarly, results in Table 4 show that that on average, the odds of having access to improved sanitation were higher among the households from poor, middle, rich and richer quintiles compared to households in

poorer quintile. The results also show that the female headed households had about 10% higher odds of having access to improved sanitation compared to the male headed households.

Table 4. Adjusted odds ratios (AORs) of the factors that affect household's access to improved water and sanitation in Zambia

	Access to improved water sources		Access to improved sanitation	
LABELS	AOR	CI	AOR	CI
Wealth Quintile				
Poorer	1		1	
Poor	1.3***	1.1 - 1.5	1.4***	1.1 - 1.7
Middle	1.7***	1.4 - 2.0	1.8***	1.5 - 2.2
Rich	2.9***	2.3 - 3.6	3.8***	3.0 - 4.7
Richer	10.4***	7.4 - 14.6	26.5***	19.9 - 35.3
Sex of Household Head				
Male	1		1	
Female	1.2***	1.1 - 1.4	1.1*	1.0 - 1.3
Region				
Lusaka	1		1	
Central	0.2***	0.1 - 0.3	4.7***	3.0 - 7.4
Copperbelt	0.1***	0.1 - 0.2	2.3***	1.5 - 3.5
Eastern	0.5	0.3 - 1.1	3.2***	2.2 - 4.6
Luapula	0.1***	0.1 - 0.2	6.8***	4.1 - 11.1
Muchinga	0.1***	0.0 - 0.2	2.9***	1.9 - 4.3
Northern	0.1***	0.0 - 0.1	2.2***	1.5 - 3.2
North Western	0.1***	0.1 - 0.3	0.6*	0.4 - 0.9
Southern	0.3**	0.1 - 0.6	1.5	1.0 - 2.1
Western	0.1***	0.1 - 0.3	1.3	0.8 - 2.1
Type of place of residence				
Urban	1		1	
Rural	0.3***	0.2 - 0.3	1.4**	1.2 - 1.8

**** p<0.001, ** p<0.01, * p<0.05*

5. discussion of findings

This paper intended to examine the inequalities in access to water sources and sanitation among the rural and urban households as well as to establish the factors that are related with access to improved water and sanitation as well as in Zambia. The findings indicate that 35.5% of the households in Zambia do not have access to improved water sources while 74.6% do not have access to improved sanitation. These results are consistent with the 2013-14 ZDHS and the 2013 MDG Progress Report for Zambia. The results also indicate that inequalities in access to improved water supply and sanitation exist between the rich and the poor households both in the rural and urban areas.

Access to improved water sources and sanitation is more concentrated in the rich households than the poor ones. This is similar to the findings of Yang et al. (2016). Moreover, in the rural areas inequalities in access to improved water supply are higher than in the urban areas. However, inequalities in access to improved sanitation are higher among the urban households compared to the rural households. These findings match the observations of the report done by WHO and UNICEF (2014). The reports observe that despite some progress in access to improved water sources and sanitation, stark disparities between the rich and the poor still exist. However, the concentration indices indicate that there is no statistical difference between female and male headed households.

In terms of the factors that are related with access to improved water and sanitation. The study found that wealth is an important determinant of access to improved water and sanitation. The odds of having access to water increase as household's progress from poorer to wealthier households. The reason for this is that having wealth may imply increased ability to pay for the basic needs such as water and sanitation. These results are in consonance with the results of other researchers (Irianti et al., 2016; Tuyet-Hanh et al., 2016; WHO and UNICEF, 2014; Ribeiro, 2015; Koskei et al., 2013; En and Gan, 2011). WHO and UNICEF (2014) notes that there is a strong relationship between wealth, as measured by household assets, and use of improved water sources and sanitation.

Further, the results showed that, female headed households had higher odds of having access to improved water sources and sanitation. In Zambia, the culture ascribes the role of managing household affairs which include sanitation, hygiene and fetching water to women. Most household chores relate to water usage and most of the household chores are undertaken by women, therefore women have a direct connection to water and sanitation. It is believed that this is their responsibility. These observations are in line with other researchers like Irianti et al. (2016).

The study also revealed that region/province was related to access to water and sanitation. All provinces showed lower odds of having access to improved water in comparison to Lusaka province. This is because of various projects/programmes aimed at improving access to water such as the Lusaka Water Supply, Sanitation and Drainage Project implemented by the Millennium Challenge Corporation (MCC), among others. On the contrary, almost all provinces had higher odds of households having access to improved sanitation. The possible explanation for this result is that Lusaka has a lot of unplanned settlements without access to improved sanitation. Ribeiro (2015) and Adams et al. (2015) had similar findings.

Lastly, the rural based households showed lower odds of having access to improved water sources. The results are consistent with (Tuyet-Hanh et al., 2016; Ribeiro 2015; Nketiah-Amponsah, 2009). This is consistent with Nketiah-Amponsah (2009) who concluded that access to piped water is an urban phenomenon. Moreover, globally, it has been observed that the rural based households are less likely to have access to improved water sources compared to the urban households (UNICEF & WHO 2014). This is because most rural households do not have the ability to pay for piped or improved water sources and water supply companies are mostly urban based. In terms of sanitation, the odds of having access to improved sanitation are higher among the rural based households. It implies that the RWSS program is paying dividends with regard to sanitation.

6. Conclusion

This study brings forth important observations. Access to improved water sources is relatively high although access to improved sanitation is low. Despite the progress is access to improved water sources and sanitation there exist inequalities between the richer and the poor households. The wealth index and sex of household head were positively related with access to improved water while region and type of place of residence showed a negatively associated. The rich households are more likely to have access to improved water and sanitation than the poor households, both in rural and urban areas. The study showed that wealth index, gender of household head, region and type of place of residence were all positively associated with access to improved sanitation.

7. Policy Implication

The findings of this study provide an input into policy. In order to achieve targets 1 and 2 of SDG 6, this study suggests the following policy options:

1- Take water to everyone by investing in water and sanitation infrastructure both in the rural and urban areas.
2- To reduce the inequalities between the rich and the poor, government should intervene through provision of improved water and sanitation rather than leaving the provision to commercial companies.
3- In order to n arrow the inequality gap, it would require addressing the poverty levels. This would be an effective and long term solution to the problem of access to improved water and sanitation
4- The sanitation problem in Lusaka is also worrying considering that it's the capital city. Efforts and investment into sanitation infrastructure need to be made to address the situation.

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