**Regional Differentials in access to improved water and sanitation in Urban Zambia**

More than half (55%) of the world's population live in urban areas. This is expected to increase to about 70% by 2050 (UN 2018). UN projections indicate that this proportion is expected to increase to 58% by 2050. Zambia is one of the most urbanised countries in sub-Saharan Africa. In 2010 more than one third (39.5%) of Zambia's population of 13 million lived in urban areas (CSO 2013). Such a concentration of the population in cities poses challenges to meet the needs for services of the urban population. Public Administration and Municipalities are constantly faced with the challenging task of delivering better services such as water and sanitation to the citizens to ensure a high quality of life in urban spaces (Benevolo et al 2016). Talukder et al. (2015) allude to the fact that in some cities the risks drinking water poses to human health is still unquantified.

Though improved water and sanitation have been recognised as a human right and essential for the full enjoyment of life, there is still a large number of the world's population who do not have access to improved water and sanitation. According to WHO/UNICEF (2015), globally, about 663 million people and 2.4 billion people do not have improved sources of drinking water and sanitation, respectively. Moreover, approximately 1 billion people still resort to open defecation.

Improved water sources are facilities that are protected from environmental contamination, especially faecal contamination. Examples of such are piped water into a dwelling, to plot or yard and protected well or spring. Improved sanitation refers to the provision of facilities and services that separate and remove human excreta from potential human contact. These include among others flush or pour-flush to piped sewer system, septic tank and pit latrine, and ventilated improved pit (VIP) latrine WHO/UNICEF (2014).

Recognising the crucial role of water and sanitation in development, world leaders included access to improved water and sanitation as one of the Millennium Development Goals (MDGs). MDG 7c target was to halve the proportion of people without access to improved sources of drinking water and basic sanitation by the year 2015 (UN, 2000). Two important indicators were set to measure this target. These were the number of the world's population using an improved drinking water source and the number of the world's population using an improved sanitation facility. With the global efforts that were made to increase improved water and sanitation coverage after the Millennium Declaration, MDG 7c target of halving the proportion of the population without sustainable access to clean and safe drinking water was met in 2010. However, the target on access to improved sanitation was not achieved (JMP 2015). Slightly above half (53.6%) of the 69 countries not on track to meet the MDG sanitation target were in sub-Saharan Africa.

Globally, remarkable achievements have been made in the provision of sanitation, with about 90% of the world's population reportedly having access to improved sanitation and 77% having access to improved sanitation by 2015 WHO/UNICEF (2015). Studies have established that the progress made is not uniform. There are differences in the coverage among and within countries. It is no wonder that the global leaders came up with Sustainable Development Goal 6: Ensure access to water and sanitation for all by 2030 as of building up on MDG 7c. Targets 1 and 2 of SDG 6 are to achieve universal and equitable access to safe and affordable drinking water for all; and achieve 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.

Lack of access to improved drinking water and sanitation has enormous consequences. Diarrhoea is often associated with inadequate access to water, sanitation and hygiene. World Health Organization (2014) estimated Diarrhoeal deaths due inadequate access to water, sanitation and hygiene at 58%. Under five children bear the greatest health burden related to poor water and sanitation facilities (Finkle 2010). With improved access to water and sanitation, about 361 000 deaths of under five could be avoided each year (WHO 2018).

Moreover, having access to improved water and sanitation has significant economic, environmental and social effects. Having access to improved and more accessible water sources, among other things reduces the time and physical effort spent on fetching water. The saved time and energies can be spent on other activities that could contribute to economic growth (Hutton 2013). Though improved access to water and sanitation is imperative for all, it is more crucial for the urban poor.

An earlier study has established the existence of rural-urban inequalities in access to improved water and sanitation in Zambia. However, it is not clear what variations exist in access to improved water and sanitation among urban households. This study adds on to the debate by focusing on urban Zambia. The aim of the study is to identify the variations in access to improved water and sanitation among urban Zambian households as well as examining the factors associated with access to improved water and sanitation.

**Data and Methods**

The study used a nationally representative household survey data (the Zambia Demographic and Health Survey). The primary sampling unit was regarded as a cluster which was defined on the basis of enumeration areas (EAs). The sample for the survey was selected using stratified two-stage cluster design. EAs were the sampling units for the first stage whereas households were the second stage of sampling. A representative sample of 15,920 households were selected (ZDHS). The survey provides information on various topics which include water and sanitation. This study's analysis was based on 6,640 households residing in the urban areas. The household recode was used and households were the unit of study.

**Variables**

Four measures of access were estimated based on the Demographic and Health Survey (DHS) data: Percent of households with access to an improved water supply, percent of households with access to improved sanitation, percent of households that spend 30 minutes or more collecting water and percent of households reporting to engage in open defecation.

The explanatory variable were head of household age, head of household sex, household size, head of household education and household wealth.

**Statistical Analysis**

Descriptive statistics were used to establish the proportion of households with access to improved water and sanitation. The Pearson chi square test was used to determine the associations between the independent variables and the four measures of access to water and

sanitation. Multivariate regression analysis was also conducted to control for the other variables in measuring association.

**Results**

Results indicate that the highest proportion of households with access to improved water resided in Lusaka (42%), followed by Copperbelt with 29%. North Western had the lowest (2.0%). The majority (40.6%) of the urban dwellers who spent more than 30 minutes to collect water resided in Lusaka region. These were followed by those who lived on the Copperbelt (13.5%) and the least (2.6%) of these resided in the Western Region. More than one third (45.6%) of households with improved sanitation lived in Lusaka Region. The second highest proportion (29.5%) of those with improved sanitation resided on the Copperbelt whereas the least resided in North western (1.0%). rural areas and 57.9% lived in urban areas. The highest percentage (18.4%) of those who defecated in the open resided in Lusaka, followed by 17.4% in Central with the least residing in Luapula.

Table 1 indicates that urban households with heads aged 70 and above were 0.5 times less likely to have access to improved water. Male headed households were 31% less likely to have access to improved water. Households with 6-10 members had reduced odds (0.7) of accessing improved water and those whose heads had secondary or higher education had increased odds (OR=1.9) of having access to improved water. Wealth was positively associated with access to improved water. Access to improved water was significantly associated with all regions except Muchinga and Northern.

Urban households whose heads had secondary or higher education had lower odds (OR=0.4) of spending more than 30 minutes to collect water. Rich households in urban Zambia were 0.5 times less likely to spend more than 30 minutes to collect water. Urban households in Lusaka, Muchinga, Northern, North Western and Western regions were more likely to spend more than 30 minutes to collect water.

Urban households headed by individuals with secondary or higher education were 2.6 times more likely to have access to improved sanitation. Wealth was positively associated with access to improved sanitation. Urban households in Eastern, Luapula, Lusaka and Southern were more likely to have access to improved sanitation whereas those in Northern, North Western and Western were likely to.

Urban households whose heads were 70 years and above and those with heads who had secondary or higher were 86% and 72%, respectively, less likely to defecate in the open. Defecating in the open was negatively associated with household wealth. Household in all regions except Eastern, Southern and Western regions had reduced odds of defecating in the open.

**Conclusion**

Lusaka region had the highest proportion of urban households with access to improved water and sanitation whereas North Western had the lowest. The majority of urban households who spent more than 30 minutes collecting water resided in Lusaka region and the least lived in the Western Region. Moreover, the highest percentage of those who defecated in the open resided in Lusaka, whereas the least resided in Luapula. Household wealth was the most important factor associated with access to improved water and sanitation. There is need for the

government to put in concerted efforts to reduce the inequalities in access to improved water and sanitation in urban Zambia. Poor households need to be prioritised.

**Table 1: Odds ratios from binary logistic regression predicting improved access to water, Zambia DHS 2013-14**

| | Water source | | Time | | Toilet Type | | No Toilet | |
|---|---|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 | Model 1 | Model 2 |
| Selected characteristics | OR (CI 95%) | OR (CI 95%) | OR (CI 95% | OR (CI 95% | OR (CI 95% | OR (CI 95% | OR (CI 95% | OR (CI 95% |
| *Age* | | | | | | | | |
| 15-24 | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| 25-34 | | 0.91 | | 0.90 | | 1.40 | | 0.49 |
| 35-49 | | 0.89 | | 1.38 | | 1.33 | | 0.80 |
| 50-59 | | 0.71 | | 0.98 | | 1.14 | | 0.74 |
| 60-69 | | 0.72 | | 1.05 | | 1.52 | | 0.52 |
| 70+ | | 0.46** | | 1.31 | | 1.00 | | 0.14** |
| *Sex of head of household* | | | | | | | | |
| Female | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Male | | 0.69** | | 1.14 | | 0.84 | | 0.98 |
| *Household size* | | | | | | | | |
| 1-5 | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| 6-10 | | 0.71** | | 1.17 | | 1.02 | | 1.02 |
| 10+ | | 1.00 | | 1.26 | | 1.17 | | 0.29 |
| *Highest education* | | | | | | | | |
| No education | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Primary | | 1.27 | | 0.69 | | 1.27 | | 0.76 |
| Secondary/Higher | | 1.88** | | 0.40*** | | 2.61*** | | 0.28** |
| *Wealth* | | | | | | | | |
| Poor | | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Middle | | 1.53** | | 0.76 | | 1.87*** | | 0.42*** |
| Rich | | 5.07*** | | 0.49*** | | 12.29*** | | 0.09*** |
| *Region* | | | | | | | | |
| Central | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Copperbelt | 1.63** | 1.34* | 0.57* | 0.64 | 1.55*** | 1.14 | 0.13*** | 0.21** |
| Eastern | 6.18*** | 6.71*** | 1.34 | 1.26 | 1.42** | 1.61** | 1.03 | 1.01 |
| Luapula | 0.44*** | 0.69* | 2.00** | 1.53 | 0.90 | 2.20*** | 0.24** | 0.11*** |
| Lusaka | 18.2*** | 12.5*** | 1.41 | 1.69* | 4.14*** | 2.81*** | 0.16*** | 0.36* |
| Muchinga | 0.81 | 1.03 | 5.02*** | 4.59*** | 0.66** | 0.82 | 0.64 | 0.46* |
| Northern | 0.62** | 0.93 | 4.69*** | 3.93*** | 0.37*** | 0.52*** | 0.65 | 0.32** |
| North western | 0.51*** | 0.58* | 2.18** | 1.96** | 0.21*** | 0.18*** | 0.40** | 0.27*** |
| Southern | 4.96*** | 4.45*** | 1.01 | 1.14 | 1.92*** | 1.77** | 0.57 | 0.83 |
| Western | 1.52** | 2.12*** | 2.14** | 1.88* | 0.31*** | 0.33*** | 1.79* | 1.28 |
| | | | | | | | | |