AVAILABILITY OF DOMESTIC WATER AND SANITATION IN HOUSEHOLDS: A GENDER PERSPECTIVE USING SURVEY DATA IN SOUTH AFRICA

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Abstract

The availability of domestic water and adequate sanitation is high on the agenda of both international and local communities. Despite concerted efforts to achieve the targets set by the Millennium Development Goal (MDG) for water and sanitation, current levels of water supply and adequate sanitation coverage remain largely inadequate. Various contributing factors, including economic and demographic pressures, account for the lack of adequate domestic water and sanitation. This paper analyzes the availability of water and sanitation in South Africa by gender of head of household. Lack of water and poor sanitation is one of the many challenges faced by poor urban populations. The paper examines gender differentials and the availability of domestic water and sanitation using the 2002 South Africa General Household Survey. The analysis is primarily descriptive. However, principal component analysis is also used for the purposes of estimating the wealth of households. The study finds a relationship between the socioeconomic status of households and the availability of water and sanitation. However, it does not find any major difference in the wealth of households and the availability of adequate water and sanitation by gender of household head. Based on these findings, the study recommends that generalizations concerning the feminization of poverty need to be avoided and that interventions in the realm of water and sanitation need to take account of the socioeconomic status of households and of their areas of residence.

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1. This paper was written when the author was working for the University of KwaZulu-Natal, Durban, South Africa.

1. Introduction

Water is one of the most important natural resources and is the essence of life on earth. The availability of safe water and adequate sanitation is critical not merely for health reasons, but also for economic development (WHO and UNICEF, 2006). The importance of water and adequate sanitation is recognized at both local and global levels. Global targets and action plans are enshrined in the United Nations Millennium Development Goals (MDGs); the International Decade for Action 'Water for Life' (2005-2015); and the 2008 International Year of Sanitation, to mention just a few such plans. In spite of these concerted efforts, water and adequate sanitation remain a challenge for many people, especially poor populations in developing countries. Approximately 1.2 billion people do not have access to safe water and 2.6 billion lack basic sanitation (Cairncross *et al.,* 2003). Reports indicate that Sub-Saharan Africa faces the greatest challenge since the number of people without access to drinking water over the 1990-2004 period increased by 23 percent, while those without sanitation increased by 30 percent over the same period (WHO and UNICEF, 2006). Failure to ensure sustainable access to water and adequate sanitation in Africa can be attributed to a variety of factors, including the rapid pace of urbanization.

Urban population growth has implications for the provision of services and the state of the environment., For example, poor services, including inadequate provision of water and sanitation and inadequate drainage and garbage collection, are significant features of the world's fastest growing cities (Cairncross *et al.,* 1990). Urban poverty also contributes to the lack of adequate water and sanitation in poor households. Lawrence *et al.* (2002) noted that socioeconomic status is a significant determinant of household access to water and basic sanitation in households. Other variables closely connected with the availability of water and adequate sanitation include, among others, household size and gender of the household head.

With this background in view, this paper analyzes gender differentials concerning access to improved sources of domestic water and sani-

tation in South Africa. The paper analyzes, by gender of head of household, a set of variables including (i) access to improved domestic water and sanitation; (ii) the demographic characteristics of households; (iii) the availability of household amenities; and (iv) a wealth index.

Understanding the Gender Differential and Availability of Domestic Water and Sanitation

An extensive literature focuses on the close link between poverty and household headship by gender. Of particular concern is the argument that female-headed households are generally poor, disadvantaged and faced with economic deprivation. More importantly, the literature suggests that female-headed households have limited access to resources (Mbugua, 1997; Oppong, 1997; World Bank, 1991). While the condition of women is reported to have changed since the UN Decade for Women (1975-1985), many differences between men and women still persist. Gender differentials remain highly pronounced in the face of competition over resources for development and social assistance and advancement (Chant, 2003). The prevailing perception of poverty in female-headed households has been identified as one of the major policy issues facing developing countries (Peters, 1983).

Of particular relevance to this paper is the claim that poor households are unable to access important services such as water and sanitation. Their lives and health are thereby put at risk. Understanding the living conditions and poverty levels of female-headed households is particularly important not only for policy development, but also for programs aimed at reducing poverty. This is especially important since reports indicate that the number of female-headed households is on the increase. In his analysis of DHS data concerning 43 developing countries that participated in the DHS between 1990 and 1998, Bongaarts (2001) found that the proportion of female-headed households was substantial, ranging from 13 percent in the Near East/North Africa to 16 percent in Asia, 22 percent in Sub-Saharan Africa and 24 percent in Latin America.

In the light of a number of social, structural and economic changes, gender differentials and the availability of water and sanitation merit further attention for the purposes of defining programs of practical intervention. In most cases, studies of gender and water tend to focus on the involvement of women in water provision projects and in

the management of water resources. Analyzing the availability of water and adequate sanitation by gender of head of household helps to understand how female-headed households compare with their male counterparts, which in turn informs policy and intervention programs.

Gender issues are also reflected in the MDGs, particularly Goals 2 and 3, which aim respectively to ensure universal primary education and to promote gender equality and the empowerment of women. MDG Target 10 aims to reduce by half the proportion of people without sustainable access to safe drinking water by 2015. Meeting the MDG target for water and sanitation will not only contribute to ensuring healthy populations and economic development, but will also help to promote gender equality and the empowerment of women – provided services are equally accessible to male- and female-headed households.

Since water is a critical component of the role of women in the household, easy access to water supplies also helps to reduce women's workloads. In most African societies, women are responsible for keeping the nutritional and hygienic conditions of families at satisfactory levels. The hard work required of women for the purposes of ensuring that there is water in the household also involves girl children. Girls are reported to have poor school attendance as a result of walking long distances in search of water when compared to boys. FAO (2001) reported that women receive less education than men in many developing countries. Water collection – a daily chore for some girl children – is reported to contribute to a high level of female dropout rates in schools (UNICEF website). The inadequate provision of water is therefore one of the major causes of low female enrolment rates and low levels of female education. In the case of young girls, ensuring access to water and sanitation therefore increases the chances of long-term wellbeing.

2. Methodology

This study uses the 2002 South Africa General Household Survey (GHS), a survey conducted annually primarily to assess government development programs and projects (Statistics South Africa, 2003). The sample includes 30,000 dwelling units, and the data comprises three files: household, individual and worker. Data drawn from the dif-

ferent files were connected on the basis of a record identifier. The household file includes information concerning household characteristics; among other variables; the individual file contains information concerning every individual's age, gender, literacy, and relationship to the household head; and the workers file contains information such as type of work, salary, insurance, and the number of supported members living both within and outside the household. A total of 26,243 dwelling units were used, since some were dropped because of incomplete information. Of these, just 15,219 households are analyzed since the paper focuses on urban areas. The strength of the data is based on the fact that the sample is nationally representative.

This study is based largely on descriptive statistics. Principal Component Analysis is used to estimate household wealth by gender of head. The study uses information such as ownership of durable assets as a proxy of wealth, and housing conditions, including roofing material, toilet facilities, and water and energy sources. Other studies have also recommended these poverty correlates (Merrick, 2001). One reason why the present study uses assets to estimate wealth is that the levels of poverty in urban areas have been underestimated since, generally speaking, such estimates are based on income and consumption levels and do not consider variables such as housing conditions and lack of basic services such as water and sanitation (Satterthwaite, 2003). Dungumaro (2007) also found a statistically significant relationship between the availability of domestic water and socioeconomic variables such as housing conditions.

Principal Component Analysis begins by "specifying each variable by its mean and standard deviation" (Filmer and Pritchett, 2001: 117). For the purposes of the present study, dummy variables were created for 18 assets. The asset indicators are grouped into three types. The first category is household ownership of consumer durables, which includes ownership of a clock, bicycle, radio, television, motorcycle, or car. The second category includes the characteristics of a household's dwelling, with three indicators relating to toilet facilities, three concerning the source of drinking water, one concerning rooms in the dwelling, two concerning building materials, one each concerning the source of energy for cooking and lighting, and a final indicator relating to land ownership.

As noted above, the analysis is performed by gender of head of household since many studies in the field draw a connection between poverty and household headship by gender. The general argument is that
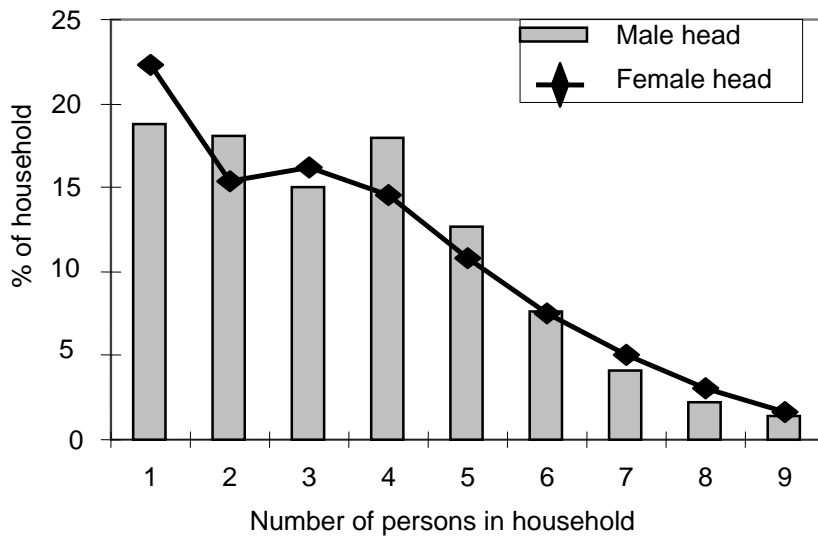
female-headed households are poorer than their male counterparts (Gonzalez de la Rocha, 1994), and are more likely to be affected by intergenerational poverty (Chant, 1997, 1999; Mehra *et al.*, 2000; ILO, 1996).

3. Results

3.1. Household size

The number of household members is one of the basic demographic characteristics of a household. The average household size for female-headed households was found to be 3.7, while the figure for male-headed households was 3.6. The distribution of the number of people in households is presented in Figure 1, which indicates that a greater number of female-headed households had six to nine members while male-headed households had a higher percentage of households that included one to four members. This observation suggests that

Figure 1 – Number of household members
by gender of head of household

Source: Calculated from 2002 GHS data files.

female-headed households are likely to be larger than male-headed households – a point of concern insofar as the literature maintains that households with more members are more likely to be faced with poverty than households with fewer members (Kimenyi and Mbaku, 1995).

3.2. Availability of water and sanitation

Analysis of socioeconomic variables and the availability of water and sanitation will not merely help to rank communities according to their needs and poverty levels, but will also help to define more practical, affordable and sustainable interventions, especially among the urban poor. Lawrence *et al.* (2002) argued that people may be "water poor" not because there is no safe water in their area, but because they are "income poor". An inadequate provision of piped water and proper sanitation are identified as serious problems affecting poor urban dwellers (Satterthwaite, 2003). Furthermore, many of the diseases affecting populations in Africa, Asia and Latin America are environmentally related insofar as air, water and soil act as the medium for their dispersal (*ibid.*). WHO (1999) also observed that because of an inadequate provision of water, sanitation, drainage and garbage collection, urban areas pose serious health hazards for human populations, since many disease vectors tend to thrive where there is an inadequate provision of these services. Table 1 presents sources that fall under improved and unimproved water and sanitation as categorized by WHO and UNICEF.

Table 2 presents the results of the analysis of the availability of water and toilet facilities, and indicates that the percentage of male-headed households that obtain water from a pipe tap in the dwelling is higher than the percentage of female-headed households that obtain water from the same source. Female-headed households obtaining water from a pipe on site scored higher than male-headed households. The analysis indicates that the three main sources of water for both female and male households were "Piped tap in the dwelling", "Piped tap on site", and "Public tap". Other sources were excluded from Table 2 since the scores were very low. Based on the results presented above, it can be argued that both male- and female-headed households obtain water from a safe source. These results do not suggest any differences in obtaining water from an improved source by gender of head of household.

Table 1 – Water sources and sanitation facilities

Improved drinking water source	Unimproved drinking water source
• Piped water into dwelling, plot or yard • Public tap/standpipe • Tubewell/borehole • Protected dug well • Protected spring • Rainwater collection	• Unprotected dug well • Unprotected spring • Cart with small tank/drum • Tanker-trunk • Surface water (river, dam, lake, pond, stream, canal, irrigation channels)
Improved sanitation facilities[2]	Unimproved sanitation facilities

• Flush or pour-flush to
  - piped sewer system
  - septic tank
  - pit latrine
• Ventilated improved pit latrine
• Pit latrine with slab
• Composting toilet
	• Flush or pour-flush to elsewhere[3]
	• Pit latrine without slab or open pit
	• Bucket
	• Hanging toilet or hanging latrine
	• No facilities or bush or field

Source: WHO and UNICEF, 2006.

Table 2 – Percent distribution of source of water and sanitation
by gender of head of household for urban areas of South Africa

Variable	Male	Female	Total
Household's main source of water:			
Piped tap in the dwelling	61.8	55.3	59.5
Piped tap on site	30.0	35.0	31.8
Public tap	5.9	6.8	6.2
Toilet facility:			
In-dwelling flush toilet connected to a public sewage system	58.4	50.5	55.6
On-site flush toilet connected to a septic tank	25.6	29.3	26.9
On-site pit latrine without ventilation pipe	6.0	8.1	6.8

Source: Calculated from 2002 GHS data files.

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2. Only those facilities that are not shared or are not public are considered to be improved.

3. Excreta are flushed into the street, yard or plot, open sewer, a ditch, a drainage way or other location.

Table 3 presents the results concerning gender of head and water sources (both improved and unimproved). The results indicate that the difference between gender of head of household and water sources is not significant.

Table 4, which presents the results concerning toilet facilities by gender of head of household, indicates that there is a statistically significant difference between gender of head of household and sanitation facilities ($\chi^2 = 6.515$; $P = 0.011$).

Table 3 – Difference between gender of head and water sources
(improved and unimproved)

Gender	Improved water source	Unimproved water source
Male	99.9	0.1
Female	99.9	0.1

$\chi^2 = 0.015$ $P = 0.904$ $N = 15,202$.

Table 4 – Sanitation facilities by gender of head of household

Gender	Sanitation facility	
	Improved	Unimproved
Male	89.3	10.7
Female	88.0	12.0

$\chi^2 = 6.515$ $P = 0.011$

One issue that needs to be addressed is the analysis of water source according to the number of household members. This is because the analysis of household size by gender of head indicates that female-headed households are slightly larger than male-headed households. Furthermore, the literature maintains that households with more members are more likely to experience poverty (Kimenyi and Mbaku, 1995) than smaller households. The economic status of households is also closely linked with the affordability of services such as water and sanitation – hence the need to analyze the source of water by household size.

Table 5 shows that household size does not influence the type of water source. Results of the statistical analysis are in line with the results outlined in Table 5. Analysis shows that the difference between water source and household size is not statistically significant (means are 1.98 and 1.71 for improved and unimproved source respectively with $P = 0.651$). All of the listed water sources are categorized as improved water sources. Results for unimproved water sources were left out since the percentages were very small.

Table 5 – Source of water by household size

Selected source of water	Household size				
	1-2	3-4	5-6	7-9	10+
Piped tap in dwelling	55.8	64.4	62.2	55.0	46.9
Piped tap on site	34.1	27.6	30.2	37.3	43.7
Neighbours tap	2.0	1.2	1.1	1.3	0.8
Public tap	6.8	6.0	5.7	5.7	7.3

However, when the same analysis is applied to rural areas only, the results indicate that the increase in household size is related to the use of water from an unimproved water source (Table 6). This implies that interventions need to be site-specific since the situation in urban areas is markedly different from the situation in rural settings. The shaded area in Table 6 indicates the increase in the percentage of households that obtain water from an unimproved water source with an increasing household size, notably for those that include more than 10 members.

The results are not consistent when the analysis is applied to toilet facilities. It appears that the percentage of households using pit latrines without ventilation increased in line with increasing household size but subsequently began to decrease. The results are given in Table 7. When toilet facilities were categorized under improved and unimproved sources, it was found that the difference between household size and toilet facilities is statistically significant (means are 1.97 and 1.71 for improved and unimproved toilet facilities with $P = 0.014$).

Table 6 – Source of water by household size in rural areas

Source of water	Household size					
	1-2	3-4	5-6	7-9	10+	Total
Piped tap in dwelling	12.1	13.7	10.4	7.5	4.4	11.1
Piped tap on site	35.7	23.7	23.7	21.0	19.4	27.1
Neighbours tap	4.4	4.3	4.2	3.0	2.6	4.0
Borehole on site	3.3	3.9	2.8	2.0	2.5	3.1
Public tap	19.0	24.4	22.5	24.1	24.5	22.2
Borehole off site	5.7	6.5	6.3	8.3	8.6	6.6
Flowing water/stream	8.3	11.8	15.3	18.4	20.2	12.7
Dam/pool/stag. water	1.4	1.5	1.8	2.5	3.9	1.8
Well	2.1	3.3	4.4	5.2	6.2	3.5
Spring	3.4	3.5	5.5	5.2	6.2	4.3

Table 7 – Type of toilet facilities by household size in urban areas

Toilet facility	Household size					
	1-2	3-4	5-6	7-9	10+	Total
Flush (inside) with public sewer	52.5	61.3	57.9	46.6	39.3	55.5
Pit latrine with ventilation	1.6	1.8	2.5	3.0	1.8	2.0
Pit latrine without ventilation	6.6	6.2	7.3	7.8	9.9	6.8
Bucket toilet	3.2	4.3	4.3	6.1	5.2	4.1

3.3. *Results of Principal Component Analysis*

Table 8 presents the mean and standard deviation of the principal components, component matrix and scoring factor. The index is obtained by dividing the scoring factor by the standard deviation. Interpretation is easy since the variables take either value 0 or value 1. For instance, if a household owns a clock, its points increase by 1.17, whereas they decrease by 1.52 for a household with a chemical toilet, bucket toilet, or neither. Households are then sorted by asset index into percentiles: the top 20 percent (wealthy households), middle 40 percent (middle-income households), and bottom 40 percent (poor households), based on the method applied by Filmer and Pritchett (2001). The categories used did not follow any conventional definition of poverty (*ibid.*).

Table 8 – Scoring factors from Principal Component Analysis of 18 variables

Variable	Scoring factor	Mean	Std dev.	Scoring factor/sd
Own clock	0.434	0.83	0.372	1.17
Own bike	0.290	0.19	0.389	0.75
Own radio	0.372	0.79	0.407	0.91
Own television	0.641	0.57	0.495	1.29
Own motorbike	0.152	0.01	0.116	1.31
Own car	0.548	0.24	0.425	1.29
Water sources 1	-0.341	0.07	0.259	-1.32
Water sources 2	-0.541	0.08	0.271	-2.00
Water sources 3	0.658	0.84	0.362	1.82
Toilet facility 1	0.785	0.56	0.496	1.58
Toilet facility 2	-0.465	0.31	0.461	-1.01
Toilet facility 3	-0.516	0.13	0.340	-1.52
Source of energy for lighting	0.683	0.77	0.421	1.62
Source of energy for cooking	-0.648	0.25	0.433	-1.50
Number of rooms	0.297	4.00	2.299	0.13
Own high quality dwelling	0.514	0.19	0.390	1.32
Own low quality dwelling	-0.533	0.22	0.412	-1.29
Own land	-0.220	0.05	0.215	-1.02

1 = improved, inside the house; 2 = improved, on site; 3 = unimproved.

Table 9 – Classification differences of the wealth estimates
by gender of head of household

Economic status	Gender of head of household	
	Male	Female
40% 'Poor'	16.2	19.3
40% 'Middle'	45.3	58.8
20% 'Rich'	38.5	21.9

Table 9 presents the results concerning wealth estimates by gender of head of household, and indicates that nearly 60% of female-headed households are in the middle group and 20% are in the richest group. This means that there are three times more female-headed households

in the middle or high income groups than female-headed households in the poorest group.

These results suggest that female poverty is not homogenous and that generalizations concerning female poverty need to be avoided. Any such generalization may result in granting resources to households that do not necessarily require any assistance while depriving those in need. The statistical test indicates that the relationship between gender of head of household and economic status is highly significant ($\chi^2 = 577.1$; $P = 0.000$).

4. Discussion

The study finds a slightly higher percentage of female-headed households that obtain water from an unimproved source. However, it is important to note that, based on the 2002 GHS data, poverty differentials by gender of head of household and the availability of domestic water and sanitation in South Africa are not highly pronounced. This can be attributed to the specific characteristics of the sample or simply to the fact that female-headed households in urban areas of the country tend not to be poor. The paper also demonstrated differences in household size where female-headed households were found, on average, to be larger than their male-headed counterparts.

The study does not find any relationship between household size and source of water. Increase in household size is not associated with obtaining water from an unsafe source. When the analysis was applied solely to rural areas, the results indicated that an increase in household size is related to using water from unimproved sources. However, the results concerning toilet facilities by household size were found to be statistically significant. These results suggest that the analysis of water and sanitation facilities by place of residence and gender of head is important before any intervention programs are effectively implemented.

The results concerning wealth estimates by gender of head of household suggest that female-headed households are not homogenous. This observation is in line with studies conducted elsewhere that tend to corroborate the heterogeneity of female poverty (see Moser, 1996 on Manila and Lusaka; Appleton, 1996 on Uganda). However, the study did find that female-headed households are marginally more

likely to be poor than male-headed households, which suggests that there is a link between female headship and poverty. Chant (2003) warns that denying the connection between female headship and poverty may deprive such households of resources that could enable them to overcome their difficulties. Generally speaking, the present study does not disprove the claim that female-headed households are more likely to be poor than their male counterparts.

5. Conclusion and policy recommendations

The purpose of this study was to analyze the availability of domestic water and sanitation by gender of head of household. Based on the results presented above, I conclude that there is a significant difference in the wealth of households according to the gender of the household head (means 2.3 and 2.1 for male and female respectively, at 1 percent level). The availability of water drawn from an improved source by gender is not statistically different. However, the difference between using improved sanitation facilities by gender of head is statistically significant, which suggests that female-headed households require more assistance than their male counterparts to meet the MDG target for improved sanitation.

The study finds a significant difference in household size by gender of head of household. A higher number of female- than male-headed households included six to nine members. Results concerning the difference between household size and wealth index are statistically significant ($P = 0.000$), which suggests that female-headed households are more likely to be poor than their male counterparts. Once again, the study finds a relationship between female headship and poverty. Based on these results, the study recommends site-specific studies (by country and areas of residence within countries) to ensure effective, practical and sustainable water and sanitation interventions.

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