

FANGSHU CHEN. M.S. Determination of the Relationship Between Water Access and Women's Overall Happiness, Education and Income Levels in Rural Households in The Gambia Using the UNICEF-MICS Data. (2022)
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This paper aimed to assess water, sanitation, and hygiene services in rural Gambia and to evaluate the association between water access and women's overall happiness, education, and income levels in rural households. A secondary data analyses of 2018 UNICEF-MICS data was carried out. A total number of 2,202 women aged between 15-49 years old from rural households in The Gambia were included in the study.

Bivariate and multivariate analyses were performed. The results showed that more than 80% of households had basic access to improved water sources with water-collection time less than 30 minutes for a round trip. However, the majority (73.5%) of the households did not have basic sanitation facilities. Less than half of households had basic handwashing facilities. Results from bivariate analyses indicated that a higher percentage of wealthy households had significantly greater sanitation facilities and water services (58.4% and 8.6% respectively, $p < .05$). Results from logistic regression showed that women from households who had basic handwashing facilities had a higher probability of being happy compared to women from households who had limited or no handwashing facilities at all (OR: 1.369; CI: 1.086-1.725; $P < .05$). In conclusion, water security plays an integral role in closing the gap between gender inequality and promoting more education and job opportunities for women in rural Gambia.

DETERMINATION OF THE RELATIONSHIP BETWEEN WATER ACCESS AND
WOMEN'S OVERALL HAPPINESS, EDUCATION AND INCOME LEVELS IN RURAL
HOUSEHOLDS IN THE GAMBIA USING THE UNICEF-MICS DATA

by

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CHAPTER I: INTRODUCTION

Water insecurity is a concerning issue for many people around the world, especially for people in Africa. Approximately 30% of the world's population lacks safe drinking water.¹ Globally, 40% of the people do not have proper hand washing facilities, and 25% of the people do not have access to basic sanitation services.² According to the United Nations Children's Fund (UNICEF), among the people without access to improved water sources, half of them resides in Sub-Saharan Africa.³ Specifically, in Sub-Saharan Africa (SSA), more than 70% of the people lack access to safe drinking water and basic sanitation facilities.² The UN defined water insecurity as a lack of consistent access to sufficient amount of clean and safe water to meet basic human needs, socio-economic development, and overall livelihoods.³ Poor water quality and access are the two main indicators of water insecurity.³

In The Gambia, more than 38% of the people lack access to improved sanitation.⁴ Furthermore, 69.1% of the people do not use soap or other types of detergents for hand washing.⁴ Over the past few years, tremendous efforts have been made to provide safe drinking water for the people in The Gambia, which to date, has only slightly improved the water access and sanitation situation in the country.⁴ Access to improved water services has risen from 86% in 2010 to 90% in 2018.⁴ The percentage of people practicing open defecation has reduced to 1% in 2018 compared to 2.8% in 2010.⁴ Nevertheless, less than one third of the nation's population uses safe drinking water sources.⁴

When water accessibility is limited, women's physical and mental health is negatively impacted. A research study done in women from Western Kenya found that water insecurity was related to worse physical health summary scores.⁵ The results also indicated that more severe water insecurity was related to a higher probability of women experiencing fatigue.⁵ A cross-

sectional study in Ethiopian found that water insecurity played a significant role in predicting psychological distress in women.⁶ A similar study was conducted in urban Nepal, Aihara et al. found that women experienced difficulties in completing basic household activities including drinking, cooking, and cleaning due to water insecurity, which was correlated with psychological distress in women.⁷

Besides experiencing physical and mental distress, women also face educational and financial difficulties as a result of water insecurity. In 2017, the World Food Program reported that due to lack of clean water nearby, women often travel far to collect water.⁸ The longer women travel for water, the less time they have for education and income-generating related activities.⁸ In alignment with this statement, a research study conducted in Bolivia found that water insecurity was negatively related to household income levels.⁹

To achieve the Sustainable Development Goal # 6—to provide clean water and sanitation facilities for all—intensified efforts still need to be made. There is very limited research on the effect of water access on women’s happiness, education and income levels. National level data from the United Nations Children’s Fund (UNICEF)’s Multiple Indicator Cluster Survey-Six (MICS6) from 2018 on the health of women from rural areas in the Gambia was analyzed in this study. The aim of this study was to examine the association between water access (water, sanitation, and hygiene services) and women’s overall happiness, education and household income levels among rural households in the Gambia.

CHAPTER II: LITERATURE RIVEW

Water access issues at a global level

According to the United Nations World Water Development Report (UNWWDR) 2019, 30% of the people do not have access to clean water globally.¹ In other words, at least 884 million people lack access to safe drinking water.² Moreover, it is estimated that millions of people do not have proper facilities for hand washing or access to basic sanitation services (40% and 25%, respectively).² In Sub-Saharan Africa (SSA), at least three fourth of population lacks safe drinking water and sanitation services.¹ With the growing population worldwide, the demand for clean water and sanitation is rising. The UNWWDR 2019 predicated a 30% surge in the current level of water use globally by 2050.¹

Water accessibility is defined as how water is physically obtained.¹ Clean and safe water is a basic human need as water is used for farming, drinking, cooking, cleaning, and many other important aspects of humans' lives. Water insecurity causes tremendous stress on people.¹ Globally, more than 2 billion people face high water stress as a result of water inaccessibility, and approximately 4 billion people experience extreme water scarcity for one month or longer every year.¹ Nevertheless, significant water inequalities are observed between and within countries, regions, and communities.¹

Water access issues in Sub-Saharan Africa

In SSA, access to cleaner water increased from 49% in 1990 to 68% in 2015. In Sub-Saharan Africa, less than one fourth of the people have safe drinking water, and 28% of the people have basic sanitation facilities.² Moreover, major disparities are present between urban and rural areas in SSA.¹⁰ In a cross-sectional study in Ghana, one of the western countries in SSA, Armah et al compared water access opportunities among four types of households: urban

rich, urban poor, rural rich, and rural poor households.¹¹ Armah et al found that overall urban households had a better access to clean water and sanitation facilities or services compared to those living in rural areas where some did not have access to these facilities or services at all.¹¹ The results indicated that rural poor households were 4 times less likely to have access to safe and clean water sources than urban poor households.¹¹ Compared to urban rich, urban poor, and rural rich households, rural poor households had less opportunities to access improved water sources ($p < 0.0001$).¹¹ Furthermore, urban households had better opportunities for obtaining improved water sources and sanitation facilities than rural households as a result of more established infrastructure, higher education and income.¹¹

Water access issues in The Gambia

The Joint Monitoring Program for Water Supply, Sanitation, and Hygiene (JMP) created by the WHO and UNICEF reported that in The Gambia, only 45% of drinking water sources were safely managed in 2020.³¹ Approximately 36% of drinking water sources were improved sources, but they were not on the premises.³¹ In terms of sanitation, only 29% of sanitation facilities were safely managed.³¹ And 18% of sanitation facilities were improved facilities not shared with other households.³¹ It is worth noting that there was extremely limited unimproved water sources and practice of open defecation (1%) in The Gambia in 2020.³¹ In the case of hygiene, more than two thirds of households had limited hygiene facilities lacking water and/or soap.³¹ However, only 18% of households had basic hygiene facilities with water and soap available.³¹ A small percentage of households (8%) had no hand washing facilities at all.³¹

Water inequality was highly prevalent between rural and urban households in The Gambia. According to the JMP report from 2017, 64.1% of urban households had access to safely managed drinking water sources, while only 7.1% of rural households had safely managed

water sources.³² When it comes to sanitation services, 24.9% of urban households had basic sanitation facilities compared to only 1.5% of rural households had basic sanitation facilities.³²

In a similar trend, water inequality was also observed between rich and poor households in rural Gambia.³² In 2017, 47% of rich households had unimproved sanitation services compared to 60.5% of poor households had unimproved sanitation services.³² With regard to drinking water services, a smaller percentage(5%) of disparities were reported between rich and poor households.³² However, hygiene facilities were extremely limited across all rural households in the Gambia in 2017.³²

Issues rural areas face due to poor water access

In rural parts of SSA, people face a variety of challenges related to water access and sanitation. Due to poor infrastructure and unpredictable rainy seasons, rural areas in SSA are often affected by floods or droughts depending on the regions and seasons.^{12,13} Hence, rural households do not have a reliable or consistent water source throughout the year. Farming generates the majority of income for about 90% of rural households in SSA, and at least 95% of farming depends on rainfall.¹³ With the increasing occurrence of floods and droughts caused by climate change, rural populations lose a considerable amount of crops and income.¹⁴ Due to limited financial support from the government and low to no monthly income, rural households in Africa are unable to demand or gain access to tap water; therefore, rural households generally rely on natural ground or surface water for daily household activities and drinking.¹⁴ Even when there are some existing and decentralized water infrastructures, including community water collection points, they are hard to manage and sustain because of limited technical and managerial support.¹⁴

In general, rural populations in Africa spend most of their time during the day walking long distances to collect water.¹⁰ Based on the results of an epidemiological, multi-country study concluded that 40 to 90% rural households in Africa spend more than 30 minutes to collect water.^{10,15,16} And the primary people collecting water are women and children.¹⁷ This time and energy consuming activity diverts water collectors from working and earning money for their families.¹⁷ On average, women and girls in Sub-Saharan Africa walk for about 3.5 miles a day, carrying approximately 42 pounds of water. In addition, collecting water may take up 16 total hours of their day.¹⁷ Hence, rural households spend a significant amount of energy and time in accessing water for daily use.^{17,18,19}

Water fetching burden and related issues among women

Women and young girls responsible for accessing and carrying water spend the majority of their days walking long distances for their daily water needs; they share the highest burden of opportunity cost.²¹ Due to the burden of fetching water, women and girls in rural areas lose the opportunity to participate in educational and economic opportunities.²² For instance, around 72 million school-aged children are not attending school worldwide, especially girls.²³ Further, more than 50% of the world's illiterate youth are girls and part of the reason is attributed to household responsibilities such as water fetching and carrying out household activities.²² As a ripple effect, due to low education, women and girls are restricted from getting decent jobs, losing opportunity to improve economic and social conditions for themselves and their families.²²

The unequal distribution of water-fetching responsibilities not only limits women's income and educational opportunities, but also their physical growth.²³ A research study on the health impacts of water fetching in Ghana, South Africa and Vietnam reported that those who had fetched water before or were currently responsible for water fetching experienced more pain

in multiple areas of the body including their hands, shoulders, upper back, head, chest, and feet than people who had never fetched water.²⁴ Physical stress and pain resulted from carrying water over time could also contribute to long-term disabilities, stunting, and other musculoskeletal diseases in the future.²⁴

Water access in relation to gender equality

The Sustainable Development Goals (SDGs) proposed by the United Nations (UN) encompass global shared visions relating to a cleaner and healthier environment.²⁰ A total of 17 goals are included in SDGs, naming a few: no poverty, zero hunger, quality education, gender equality, clean water and sanitation, affordable and clean energy.²⁰ Specifically, goal 6 (clean water and sanitation) aims to ensure access to safe and affordable drinking water, sanitation and hygiene for all by 2030.²⁰ Also, under this goal, increased need of efforts to improve infrastructure to end open defecation and give special support to women and girls has been highlighted.²⁰ In alignment with addressing global climate change, increasing water-use efficiency and practicing sustainable fresh water-use has also been set as a target under the water and sanitation goal (#6).²⁰ Goal 5 on gender equality aiming to achieve equality between women and men in all aspects of their lives such as educational, economical, and political aspects overlaps with the water and sanitation goal.²⁰ Improving access to water and sanitation can also help women with family responsibilities including performing household chores and taking care of children. Hence, to achieve the goal of gender equity, achievement of SDG #5 on water and sanitation is warranted.²⁰

Water insecurity

In alignment with SDG goal 6 on water and sanitation for all, efforts are made to understand the effect of water insecurity. Water insecurity, defined as inconsistent access to sufficient amount of clean and safe water, has been associated with poor health among women and children. For instance, in a study carried out in rural Uganda, water insecurity was associated with high rates of depression among women.³³ Especially, the women with more sensitive water access issues scored higher on water insecurity compare to men living in the same households.³³ It was indicated the reasons behind this gender discrepancy were due to the differences in roles and responsibilities between women and men.³³ Since women commonly take on household chores including water fetching, cooking, taking care of children, doing laundry, they experience more stress, worry, feelings of low self-worth, and other negative feelings related to water insecurity.³³

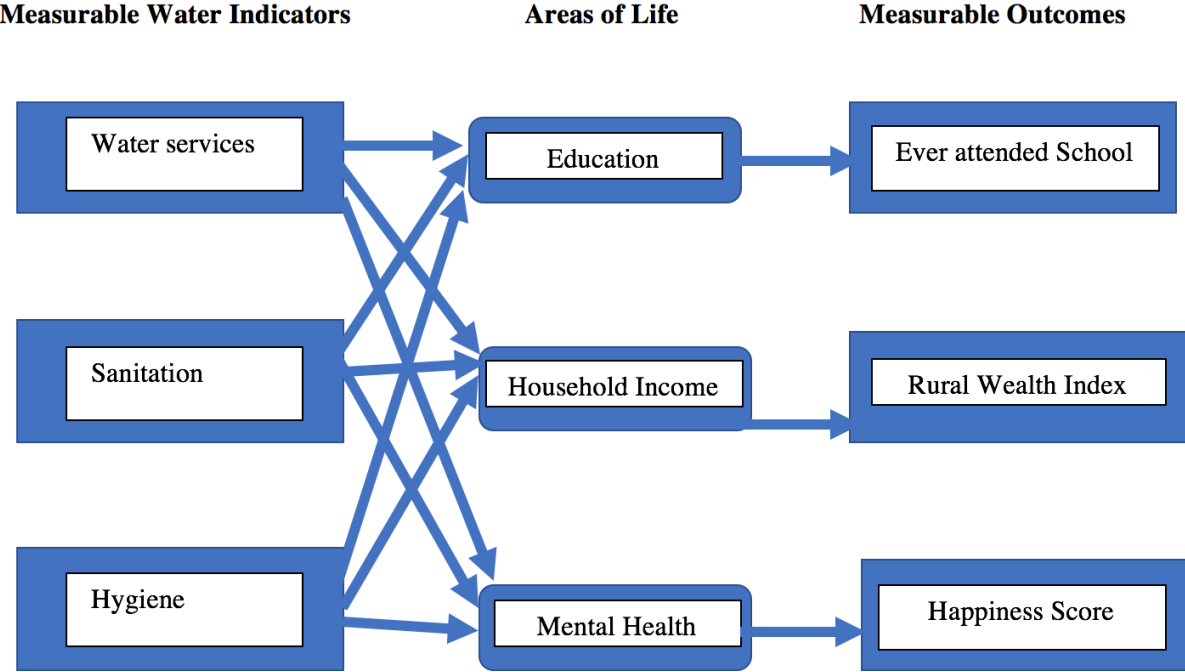
In another cross sectional study conducted by Tsai et al, the association between water insecurity and absence from school was examined in southwestern Uganda.²⁶ Tsai et al also investigated the extent of absence from school related to caregivers' depression.²⁶ In the study, a total of 257 households with women as the household heads completed interviews.²⁶ Interview questions included basic demographic characteristics, number of children under 18 years old, housing situation, self-reported measure of water insecurity level, frequency of experiencing symptoms of depression..²⁶ The results showed household water insecurity was significantly associated with depression symptoms among female caregivers, which in part contributed to their kids missing school.²⁶

Water insecurity is also a major contributor to food insecurity. From farming, food preparation, food consumption to cleaning, water is needed in every step of the process.²⁷ In The

Gambia, food insecurity rate has increased from 5% in 2016 to 8% in 2021.³¹ Based on a preliminary study of the association between water insecurity and food insecurity, water insecurity limits the diversity of food households can cook and consume.²⁷ For example, beans, which are nutritious and affordable, require much more water to cook than rice does.²⁷ When there is no water, one cannot cook at all.²⁷ Furthermore, time and money spent on collecting, buying and treating water undermines food budget.²⁷ In a mixed methods study in Mumbai, India, Subbaraman et al. found that households sometimes use money meant for food to purchase water instead.²⁸

As mentioned earlier, water insecurity is highly prevalent in Sub-Saharan Africa, especially in The Gambia. Sustainable Development Goal number 3, 6, and 5 are interconnected because water security plays an integral role in promoting education and job opportunities for women, and further contributing to their overall well-being. To my knowledge, the proposed study will be the first study to examine the relationship between water access and women's overall estimation of happiness, education and household income levels. The following figure 1 presents a hypothesis of the interrelationship between water indicators and its impact on women's areas of life with their related outcomes.

Figure 1: The impact of measurable water indicators on women's areas of life



CHAPTER III: RESEARCH ARTICLE

Abstract

Objectives: 1) to assess water, sanitation, and hygiene services in rural Gambia; 2) to evaluate the association between water access and women's overall happiness, education and income levels in rural households; 3) to investigate the role of water access, education and income levels in predicting women's overall happiness.

Design: Secondary data analyses of 2018 UNICEF-MICS data

Setting: Rural Gambia

Subjects: Women aged between 15-49 years old from rural households in The Gambia (n=2,202).

Main Outcome Measures: Women's overall estimation of happiness, education, and income levels

Results: More than 80% of households had basic access to improved water sources with water-collection time less than 30 minutes for a round trip. However, the majority (73.5%) of the households did not have basic sanitation facilities. Less than half of households had basic handwashing facilities. Results from bivariate analyses indicated that a higher percentage of wealthy households had significantly greater sanitation facilities and water services ((58.4% and 8.6% respectively, $p < .05$). Results from logistic regression showed that women from households who had basic handwashing facilities had a higher probability of being happy compared to women from households who had limited or no handwashing facilities at all (OR:1.369; CI: 1.086-1.725; $P < .05$).

Conclusions: Water security plays an integral role in closing the gap between gender inequality and promoting more education and job opportunities for women in rural Gambia.

Introduction

Water insecurity is a concerning issue for many people around the world, especially for people in Africa. Approximately 30% of the world's population lacks safe drinking water.¹ Globally, millions of people do not have proper hand washing facilities or basic sanitation services-40% and 25% of the world's population, respectively.² Water insecurity is not only present at the household level, but also in schools and health care settings. In 2019, one out of three schools did not have basic drinking water or sanitation services worldwide.²⁵ Globally, two out of five schools did not have basic hygiene services in 2019.²⁵ In Sub-Saharan Africa (SSA), more than 70% of the people lack access to safe drinking water and basic sanitation facilities.² In 2019, one out of two health care facilities did not have basic water services, three out of five lacked access to basic sanitation services, and one out of four did not have basic hygiene services in SSA.²⁵ According to the United Nations, water insecurity is defined as a lack of consistent access to sufficient amount of clean and safe water to meet basic human needs, socio-economic development, and overall livelihoods.³ Poor water quality and access are the two main indicators of water insecurity.³

In The Gambia, more than 38% of the people lack access to improved sanitation.⁴ Furthermore, 69.1% of the people do not use soap or other types of detergents for hand washing.⁴ Over the past few years, tremendous efforts have been made to provide safe drinking water for the people in The Gambia, which only slightly improved the water access and sanitation situation in the country.⁴ Access to improved water services has risen from 86% in 2010 to 90% in 2018.⁴ The percentage of people practicing open defecation has reduced to 1% in 2018 compared to 2.8% in 2010.⁴ Nevertheless, less than one third of the nation's population uses safe drinking water sources.⁴

When water accessibility is limited, women's physical and mental health is impacted. A research study done in women from Western Kenya found that water insecurity was related to worse physical health summary scores.⁵ The results also indicated that more severe water insecurity was related to a higher probability of women experiencing fatigue.⁵ A cross-sectional study in Ethiopian found that water insecurity played a significant role in predicting psychological distress in women.⁶ A similar study was conducted in urban Nepal, Aihara et al. found that women experienced difficulties in completing basic household activities including drinking, cooking, and cleaning due to water insecurity, which was correlated with psychological distress in women.⁷

Besides experiencing physical and mental distress, women also face educational and economic difficulties as a result of water insecurity. In 2017, the World Food Program reported that due to lack of clean water nearby, women often travel far to collect water.⁸ The longer women travel for water, the less time they have for education and income-generating related activities.⁸ In alignment with this statement, a research study conducted in Bolivia found that water insecurity was negatively related to household income levels.⁹

To achieve the Sustainable Development Goal # 6—to provide clean water and sanitation facilities for all—intensified efforts still need to be made. There is very limited research on the effect of water access on women's happiness, education and income levels. National level data from the United Nations Children's Fund (UNICEF)'s Multiple Indicator Cluster Survey-Six (MICS6) from 2018 on the health of women from rural areas in the Gambia was analyzed in this study. Therefore, the goals of the study were to: 1) assess the water access situation in rural areas in one of the Western African Countries- the Gambia using the national level data of UNICEF-

MICS 2018; 2) evaluate the association between water, sanitation and hygiene facilities and women's overall estimation of happiness, education and income levels among rural households.

Study Area

The Gambia is a country in West Africa.¹⁰ Its official name is the Republic of The Gambia.¹⁰ It is the smallest country on the continent of Africa, which is about 330 km long from east to west, and 50 km wide from north to south.^{10,11} Its total area is 11,295 km².^{10,11} It is situated on the Atlantic coast and surrounded by its neighboring country called the Republic of Senegal.¹¹ The Gambia's distinct feature, the Gambia River, runs through the center of Gambia and empties into the Atlantic Ocean.¹² Naturally, a strip of land forms on either side of the river.¹² Being one of the most populated countries in West Africa, The Gambia's total population is estimated at 2.4 million as of 2020, according to the United Nations.¹³ There are a number of ethnic groups in The Gambia; Malinke, Fulani, Wolof, Diola, Soninke, to name a few.¹³ Malinke is the largest ethnic group, making up approximately one third of the country's total population.¹³ Due to urbanization, about 61% of the population resides in cities.¹³ Banjul, as the capital, is the largest metropolitan area in the country.¹³ When it comes to rural populations, they mainly live in the sandstone uplands of the Gambia River where the best-drained soils are.¹³

The Gambia has a tropical climate with a distinct hot and rainy season from June to October, and a cooler and dryer season from November to May.¹⁰ In the rainy season, temperatures and humidity are high, but in the dry season, dusty and dry trade winds known as harmattan are dominant.¹⁰ Average temperatures range from a low of 48°F (9°C) in the dry season to a high of 110°F (43°C) in the rainy season.¹⁰

Agriculture is one of the main contributors to the country's economy.¹⁴ In 2017, agriculture accounted for 25% of the nation's Gross Domestic Product (GDP).¹⁴ Approximately

75% of the population is engaged in raising livestock or growing crops including peanuts, rice, lentils, sorghum, and cassava.¹⁴

Vegetation ranges from woodlands, savanna, to mangrove swamps along the Gambia River.¹⁴ However, The Gambia is susceptible to periodic drought because it is between the Sahara Desert and the coastal rainforest.¹⁴ Moreover, climate change causes unexpected drought and heat waves in The Gambia, which leads to water shortages and crop failure.¹⁵ Between 1990-2014, 13% of weather related disasters were droughts.¹⁵ Consequently, food insecurity rate has risen by 3% since 2016 due to droughts, floods, and low crop yields.¹⁶ This has resulted in farmers being some of the most food insecure people in The Gambia.¹⁶

According to UNICEF, in 2010, in The Gambia, 86% of the population had access to improved water sources.⁴ Only 2.8% of the population practiced open defecation.⁴ For the past few years, consistent efforts have been made to improve water access and sanitation facilities in the Gambia, which contributed to some positive improvements regarding water usage.⁴ In 2018, 90% of the people had improved water sources, with an 4% increase from 2010.⁴ Additionally, compared to 2.8% in 2010, only 1% of the people still practiced open defecation, with a 1.8% decrease.⁴ About 62% of the population had access to improved sanitation facilities.⁴ However, only 30.9% of the population used soap or other cleaning products for handwashing.⁴ And approximately, 70% of the people lacked safe drinking water sources.⁴ Tremendous efforts are still needed to close the gap.

Figure 2: Study area maps



Study Design and Methodology

To meet the objectives, a secondary data analysis of the United Nations Children's Fund (UNICEF)'s Multiple Indicator Cluster Survey-Six (MICS6) survey was performed. In The Gambia, the MICS6 survey was conducted by the Gambia Bureau of Statistics and UNICEF in 2018. The survey was an internationally comparable multi-purpose household survey measuring key indicators of children and women's physical health, education, financial status, housing situation, and overall well-being. Moreover, the high-quality data from The Gambia MICS 2018 was objective and reliable information on the Gambia's progress toward achieving the Sustainable Development Goals (SDGs). A total of six questionnaires were included in the survey. They covered a number of topics, household demographics, water and sanitation, handwashing, women's and men's health, their education and income levels, and children's health to name a few. The water access related questions were included in the household questionnaire. Women's overall estimation of happiness, health and education levels were included in the women's questionnaire.

To determine the relationship between water access and women's overall happiness, education and income status, the household and women questionnaires were utilized. Following preliminary steps were performed to prepare for the data analysis:

- 1) All of the MICS6 Statistical Package for the Social Sciences (SPSS) files for The Gambia were downloaded from the survey website (<https://mics.unicef.org/surveys>).
- 2) The SPSS files were verified for variable names, labels, and values to understand the data type and to determine a potential analysis approach. Based on the study objectives, specifically the following water access and its related variables were shortlisted from the household survey.

As shown in table 1, water access included questions on types of water source, location of water source, amount of time it takes to reach a water source. All of the questions specifically pertain to drinking water.

Table 1: List of variable names, labels and values of water access related variables

Variable name	Variable label	Values	Type
WS1	Main Source of Drinking Water	11=Piped water: piped into dwelling 12=Piped water: piped to yard/plot and more (See Appendix for the whole list of detailed values)	Numeric
WS3	Location of the water source	1=In own dwelling 2=In own yard/plot 3=Elsewhere and more (See Appendix for the whole list of detailed values)	Numeric
WS4	Time (in minutes) to get water and come back	0=Members do not collect 998=DK 999=No Response	Numeric
WS11	Type of toilet facilities	11=Flush/pour flush:flush to pipe sewer system and more (See Appendix for the whole list of detailed values)	Numeric
WS12	Pit latrine or septic tank ever been emptied	1=Yes, emptied: within the last 5 years 2=Yes, emptied: more than 5 years 3=Yes, emptied:	Numeric

		don't know when 4=No, never emptied	
WS15	Toilet facility shared	1=Yes 2=No 3=No response	Numeric

- 3) To specifically conduct analyses for rural households, cases were selected only if the Area variable is Rural. Additionally, only households with women aged from 15-49 years were selected. With these exclusions, the total number of rural households with women between the ages of 15 and 49 years old in Gambia was: 2,202
- 4) To select specific variables for the analysis, the women's questionnaire was reviewed to select potential variables.
- 5) The result of this process is presented in Table 2 which shows household income, women's education and mental health related variables.

Table 2: List of variable names, labels, and values of women related variables

Variable name	Variable Label	Values	Type
LS1	Estimation of overall happiness	1=Very Happy 2=Somewhat Happy 3=Neither happy nor unhappy 4=Somewhat unhappy 5=Very happy 9=No response	Numeric
WS5	Have your ever attended school	1=Yes 2=No 9=No Response	Numeric
Windex5r	Rural Wealth Index	1=Poorest	Numeric

	Quintile	2=Second 3=Middle 4=Fourth 5=Richest	
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Water related variables including water accessibility, sanitation, and hygiene (WASH) were categorized as independent variables. Specifically, the following variables/questions from the household questionnaire were included. (WS1) What is the main source of drinking water for your household? (Responses: piped water, tube well, rainwater, packaged water, and more)(see appendix for a completed list of responses). (WS3) Where is the location of your water source? (Responses: in your own dwelling/yard/plot or elsewhere). (WS4) If the water source is not located in your own dwelling/yard/plot, how much time does it take for members from your household to collect water (go and come back)? (Response: time spent in minutes for a round-trip). Combining the responses from these three questions and using the Joint Monitoring Program (JMP)'s service ladder, a composite variable including time and water sources was created. A total of five categories were included in the JMP water service ladder: safely managed, basic, limited, unimproved, and surface water.¹⁷ First, safely managed drinking water is from an improved water source that is on the premises, available and free from chemical and fecal contamination.¹⁷ Second, basic drinking water is also from an improved source, but it is not available on the premises.¹⁷ The water collection time is 30 minutes or less for a roundtrip.¹⁷ Third, if the water collection time from an improved source is more than 30 minutes, then it is categorized as limited drinking water.¹⁷ Fourth, unimproved drinking water is from unprotected dug wells or springs. Lastly, surface water is directly from a river, dam, lake, pond, stream, canal or irrigation canal.¹⁷

In terms of sanitation, three questions from the household questionnaire were selected: (WS11) What kind of toilet facilities do members of your household usually use? (Responses: various options including flush/pour-flush toilet, pit latrine, and no facility or open defecation). (WS12) Has your (flush toilet/pit latrine/XX) ever been emptied (Response: yes/no). (WS15) For the households who have toilet facilities, were you sharing these facilities with other households? Based on the responses, five JMP's sanitation service categories were created. Specifically, the five categories are safely managed, basic, limited, unimproved, and open defecation.¹⁸ "Safely managed sanitation facilities are improved facilities that are not shared with other households and where bodily waste matter are safely disposed of in situ or cleaned up and treated offsite."¹⁸ Basic sanitation facilities are improved facilities not shared with other households.¹⁸ Limited sanitation facilities are improved facilities used by two or more households.¹⁸ Unimproved sanitation facilities are pit latrines without a slab or platform, hanging latrines or bucket latrines.¹⁸ Lastly, open defecation is disposal of human bodily waste in fields, forests, bushes, rivers, beaches, and other open spaces.¹⁸

When it comes to hygiene, the following three questions were chosen. (HW2) Was water available at the place for handwashing? (Response: yes or no.) (HW3) Was soap or detergent present at the place of handwashing? (Response: yes or no.) (HW7NR) Was there no handwashing facility at all? (Response: yes or no.) Based on responses to these three questions, three JMP hygiene categories were created. They are: 1) Basic- hand washing facilities with water and soap available, 2) Limited- handwashing facilities lacking water and/or soap), and 3) No facility-no handwashing facilities on the premises.

Education, income, and health outcomes were categorized as outcome variables. Specifically, for education, the following question was selected. (WS5) Have you ever attended

school? (Response: yes or no.) In terms of income levels, (windex5r) was selected. (windex5r) Rural wealth index quintile: poorest, second, middle, fourth, and richest. When it comes to health outcomes, the variable LS1 was included. (LS1) What is your estimation of your overall happiness? (Response: Very happy, somewhat happy, neither happy nor unhappy, somewhat unhappy, or very unhappy.)

Data Analyses

Data were analyzed using SPSS version 13.0 (IBM, New York, USA). Descriptive analysis was performed to determine water, sanitation and hygiene services in rural households and JMP categories were coded. The difference in estimation of overall happiness, education and income levels by water, sanitation, and hygiene services were analyzed by the chi-square test. The role of water, sanitation and hygiene practices in predicting the probability of women being happy was analyzed by logistic regression. Statistical significance was set at a 5% level of significance ($p \leq 0.05$).

Results

The total sample of rural households with women aged between 15-49 years old was 2,202. As indicated in table 3, out of the total sample, 39% of women were in their 20s. Specifically, 18.8% of women were aged between 20-24 years old, and 20.2% of women were aged between 25-29 years old. Approximately, 34% of women were in their 30s (17.3% and 16.7%, aged between 30-34 and 35-39, respectively). A smaller percentage of the women (11.6%) were in their teenage years (15-19 years old). About one third of the women attended school. Amongst women who received education, the majority of them went to primary school, which was the highest level of education they received. Moreover, as indicated in table 1, with regards to the rural wealth index, 25.2% of women were from the poorest rural households.

Regarding marital status, 90.1% women were currently married/in union. In comparison, only 7.5% of women were never married/in union. An extremely small percentage of women (2.4%) were formerly married/in union. Lastly, a greater percentage of women (89.5%) had given birth compared to 10.5% of women had not.

As shown in table 4, in terms of JMP ladder-based water, sanitation, and hand washing facilities, more than 80% of households had basic access to improved water sources for drinking water, with water-collection time less than 30 minutes for a round trip. Approximately 15% of households had unimproved water sources such as unprotected dug wells or springs. In contrast, only a small percentage of households (4.0%) had safely managed drinking water from improved water sources available on premises. When it comes to sanitation services, the majority of the households (64%) had unimproved sanitation facilities, including hanging latrines and bucket latrines. And more than 25% of households had basic sanitation facilities that were improved facilities not shared with other households. However, less than 1% of households had safely managed sanitation facilities which were improved facilities not shared with other households, and excreta were safely disposed. With regard to hand washing facilities, more than half of the households had limited hand washing facilities which lacked water and/or soap. And 40.7% of the households had basic hand washing facilities with water and soap available.

Results from the bivariate analysis showed that a higher percentage of wealthy households (58.4%) had significantly greater sanitation facilities, including safely managed, basic, or limited sanitation facilities compared to un-wealthy households (22.7%, $p < .001$). Similarly, a greater percentage of wealthy households (8.6%) had significantly more access to safely managed and/or basic water services than un-wealthy households (2.2%, $p < .001$). However, no significant difference was found between hand washing facilities and households'

wealth status. WASH was not significantly associated with women's education levels or estimation of overall happiness.

The logistic regression analysis showed that women from households who had basic handwashing facilities with water and soap available were more likely to be happy compared to women from households who had limited or no handwashing facilities at all (OR:1.369; CI: 1.086-1.725; $P < .05$, as shown in table 5). However, water service and sanitation facilities were not significant predictors for the probability of women being happy. Among the other predictors including women's age, education and income levels, the only significant predictor was women's age. Specifically, women aged between 15-29 who were younger had a higher probability of being happy than those aged between 30-49 who were older (shown in table 3).

Discussion

This study evaluated the situation of water access including water service, sanitation and hygiene facilities in rural households from The Gambia in 2018. The results indicated that the majority (80.7%) of rural households spent less than 30 minutes for a round trip to collect improved drinking water. A secondary data analysis of DHS report on fresh water availability and water fetching distance in 26 Sub-Saharan African countries showed that the average water collection time was 23 minutes.¹⁹ A similar study conducted in Kathmandu Valley, Nepal found that water fetching was not only a time-consuming activity, but also a money consuming activity.²⁰ They found that to cope with water insecurity, people had five main types of coping behaviors namely collecting, pumping, treating, storing, and purchasing.²⁰ These coping activities cost households an average of 1% of their current income per month, which was a hidden but real cost of poor water infrastructure.²⁰

This study also found that an extremely small percentage (4.0%) of households had access to improved drinking water available on their property. However, approximately 15% of households had unimproved drinking water from an unprotected dug well or spring. In terms of sanitation, more than half of households were using unimproved sanitation practices including hanging latrines. In comparison, the majority of households had more established hygiene services (40.7% used basic handwashing facilities and 54.6% used limited handwashing facilities). Apparently, intensified efforts still need to be made to improve water access in rural Gambia.

Though the chi-square test results did not show a significant relationship between water access and women's overall estimation of happiness, the highly skewed distribution of water service data in the study could overshadow the actual impact of water service on women's happiness. For example, 1,778 households out of the total 2,202 households had basic water service, while the rest of 424 households had safely managed or unimproved water service. The number of households in the first category was four times greater than the latter one.

Moreover, results from the chi-square test indicated that there was no significant association between water access and women's education level. However, many existing studies have shown the impact of water access on women's mental health and education levels. A cross-sectional study done on the association between women's sanitation experiences and mental health in rural Odisha India found that sanitation insecurity was significantly related to higher anxiety, depression and stress scores.²¹ Another secondary research study conducted in Ghana analyzed DHS report on water hauling and girls' school attendance rate.²² The results showed that a reduction of water fetching time by half increased girl's average school attendance by 2.4%.²²

Further, results from the chi-square test showed that wealthier rural households had better access to sanitation facilities and water services. This finding aligns with the JMP report 2020.²³ The report showed that access to improved sanitation increased as the households got richer.²³

Results from the logistic regression analysis showed women aged between 15-29 were estimated to be happier than women aged between 30-49. This finding was aligned with the result from the chi-square test of women's age and overall happiness. The potential reason could be proposed as younger women were physically healthier than older women. Further studies should be carried out to evaluate women's physical health status and the number of present diseases. Then investigate the relationship between their physical health and overall happiness. A longitudinal study done in Canadian adults aged between 18-43 found that happiness in adults increased into their 30s, but slightly decreased by age 43 due to potential factors including unemployment and physical health deterioration.²⁴

Last but not least, this study found that basic hygiene practices were positive predictors of women's happiness. In other words, women from households with more improved hygiene facilities had a higher probability of being happy.

This study has several limitations. First, the effect of food insecurity on women's overall estimation of happiness was not analyzed in the study. Food being the fuel for life is a major contributor to one's happiness and wellbeing. The Gambia MICS 2018 survey mainly focused on WASH, so there was no data on participants' food consumption. Second, the highly-skewed water related data limits the interpretation of results and findings. Third, the outcome variables including women's overall estimation of happiness, education, and income levels were analyzed based on only three variables (one variable for each outcome), which may limit the validity and generalizability of the findings. Future research studies including numerous outcome variables

should be conducted to further assess the relationship between WASH and women's education and income levels, and their overall well-being.

Conclusion

The majority of rural households had access to basic water and hand washing services. Nevertheless, a large number of households had unimproved sanitation services. Higher household income levels were positively associated with more improved sanitation and water services. Women from rural households with basic hand washing facilities had higher odds of being happy. These findings approved that accelerated progress still need to be made to achieve the SDG goal #6-clean water and sanitation for all. Meeting SDG goal #6 can help achieve SDG goal 5 because ensuring water security in rural households may potentially close the gap between gender inequality and promote more education and job opportunities for women.

Table 3: Description of socio-demographic characteristics of women from rural households

	n (%)
<u>Age</u>	
15 -19	256 (11.6)
20-24	415 (18.8)
25-29	444 (20.2)
30-34	382 (17.3)
35-39	368 (16.7)
40-44	229 (10.4)
45-49	108 (4.9)
<u>Native Language</u>	
Mandinka	689 (31.3)
Wollof	520 (23.6)
Fula	663 (30.1)
Sarahule	212 (9.6)
Bambara	53 (2.4)
Other ^a	19 (0.9)
<u>Ever Attended School</u>	
Yes	784 (35.6)
No	1418 (64.4)
<u>Estimation of overall happiness</u>	
Very happy	891 (40.4)
Somewhat happy	701 (31.8)
Neither happy nor unhappy	488 (22.1)
Somewhat unhappy	93 (4.2)
Very unhappy	29 (1.3)
<u>Marital Status</u>	
Currently married/in union	1983 (90.1)
Formerly married/in union	53 (2.4)
Never married/in union	166 (7.5)
<u>Ever given birth</u>	
Yes	1970 (89.5)
No	232 (10.5)
<u>Highest Level of School Attended</u>	
Primary	402 (51.3)
Lower Secondary	245 (31.3)
Upper Secondary	117 (14.9)
Other ^b	20 (2.5)

^aIn other: Jola, Serere, Manjago or unspecified. ^bIn other: vocational, diploma and higher.

Table 4: Description of JMP based water, sanitation, and handwashing facilities

	n (%)
<u>Water Service^a</u>	
Safely managed (improved water source accessible on premises)	87 (4.0)
Basic (improved water source with collection time < 30 minutes round trip)	1770 (80.4)
Limited (improved water source with collection time > 30 minutes round trip)	8 (0.3)
Unimproved (from an unprotected dug well or spring)	337 (15.3)
<u>Sanitation Service^b</u>	
Safely managed (improved facility not shared with other households & excreta are safely disposed)	10 (0.5)
Basic (improved facility not shared with other households)	573(26.0)
Limited (improved facility shared between households)	190 (8.6)
Unimproved (unimproved facility such as hanging latrines)	1409(64.0)
Open defecation (disposal of human feces in open spaces)	19 (0.9)
<u>Hand Washing Facility</u>	
Basic (Handwashing facility with water and soap available)	897 (40.7)
Limited (Handwashing facility lacking water and/or soap)	1203 (54.6)
No facility (no handwashing facility on the premises)	102 (4.6)

JMP: Join Monitoring Program created by WHO/UNICEF for water supply, sanitation and hygiene; ^aSurface water (last category of water service ladder) was not responded by the participants; ^bone case was missing hence the total sample size was 2201 for sanitation service.

Table 5: Logistics regression coefficients and odds ratios for women being happy

Estimation of Overall Happiness ¹			
	β (SE)	OR (95% CI)	p-value
<u>Handwashing²</u>			
Basic(ref)	---	---	---
No facility	0.367 (0.109)	1.369 (1.086,1.725)	.001
<u>Age (in months)</u>			
Younger(ref)	---	---	---
Older	0.440 (0.101)	1.553 (1.274, 1.892)	.001
<u>Wealth status³</u>			
Not wealthy (ref)	---	---	---
Wealthy	-.033 (0.103)	.968 (0.791, 1.183)	.750
<u>Ever Attended School</u>			
Yes (ref)	---	---	---
No	0.155 (0.107)	1.168 (0.946, 1.441)	.148

¹Probability of being happy: 2 cases were missing so the sample size for regression was 2202; Variable-Rural wealth quartile's ladder was regrouped into these two groups: not-wealthy (poorest; second; middle) vs wealthy (fourth and richest). Variable-Age group was regrouped into these following two categories: younger and older. Variable-Happy (ref 0) Unhappy (1)

Figure 3: Types of handwashing facilities used among rural households (n=2,202)

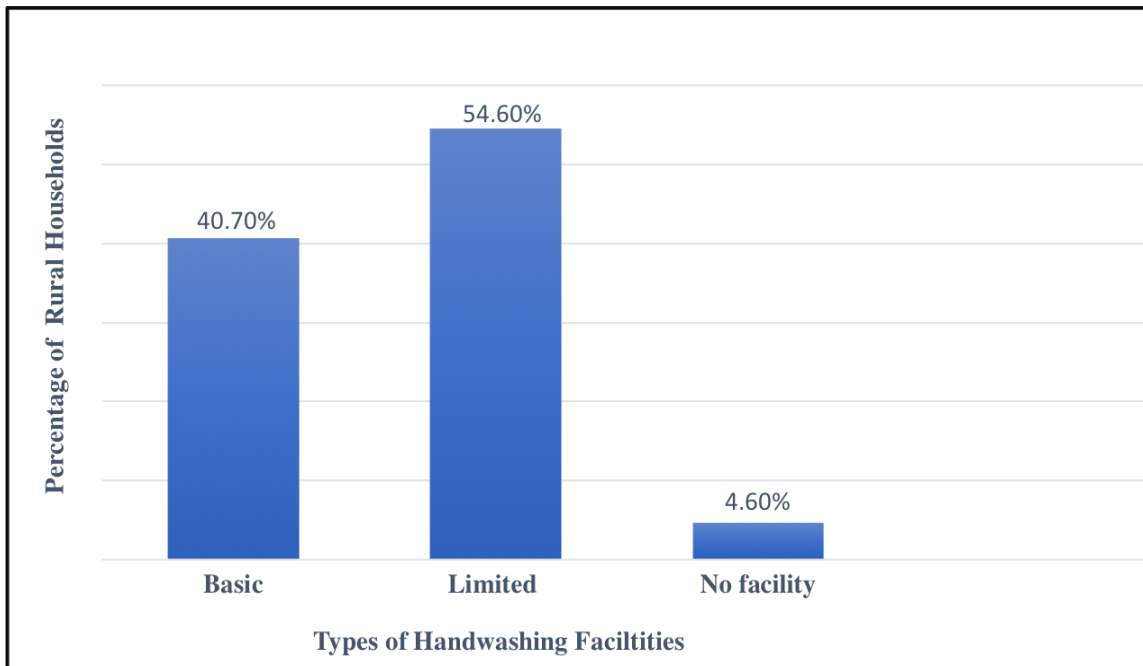
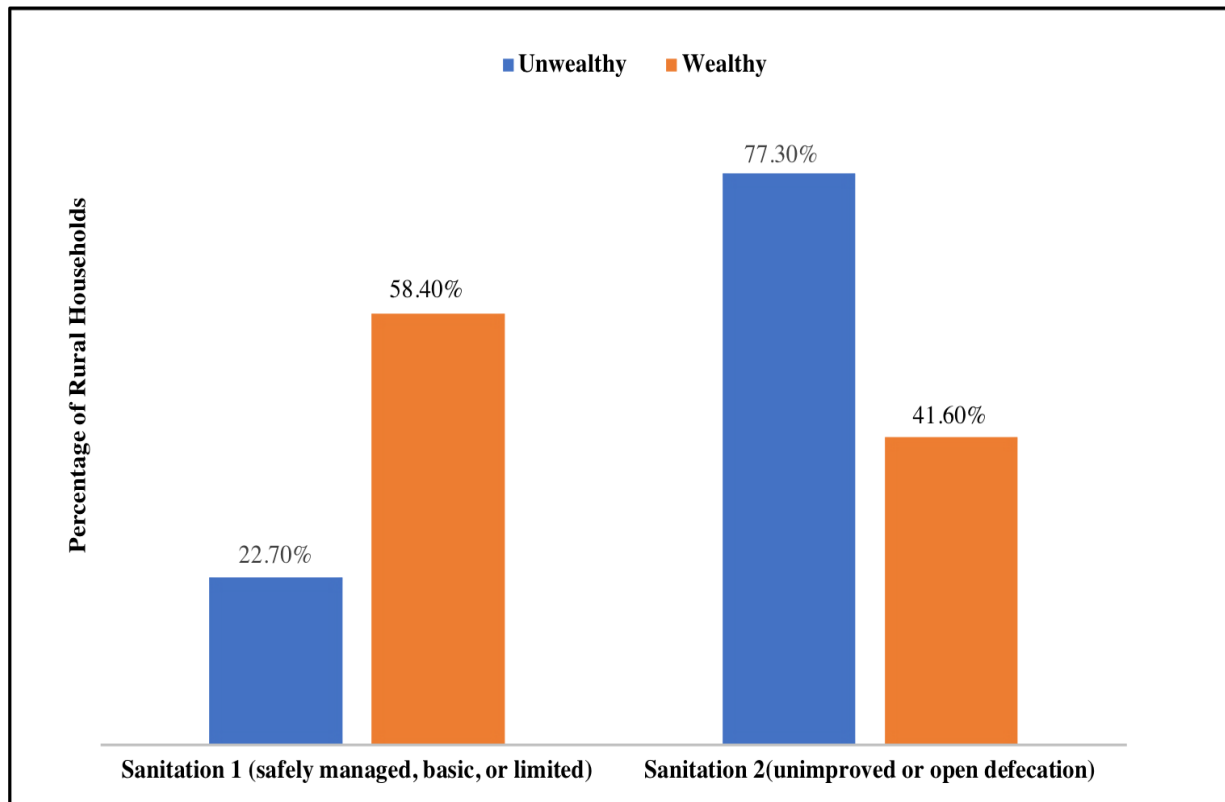
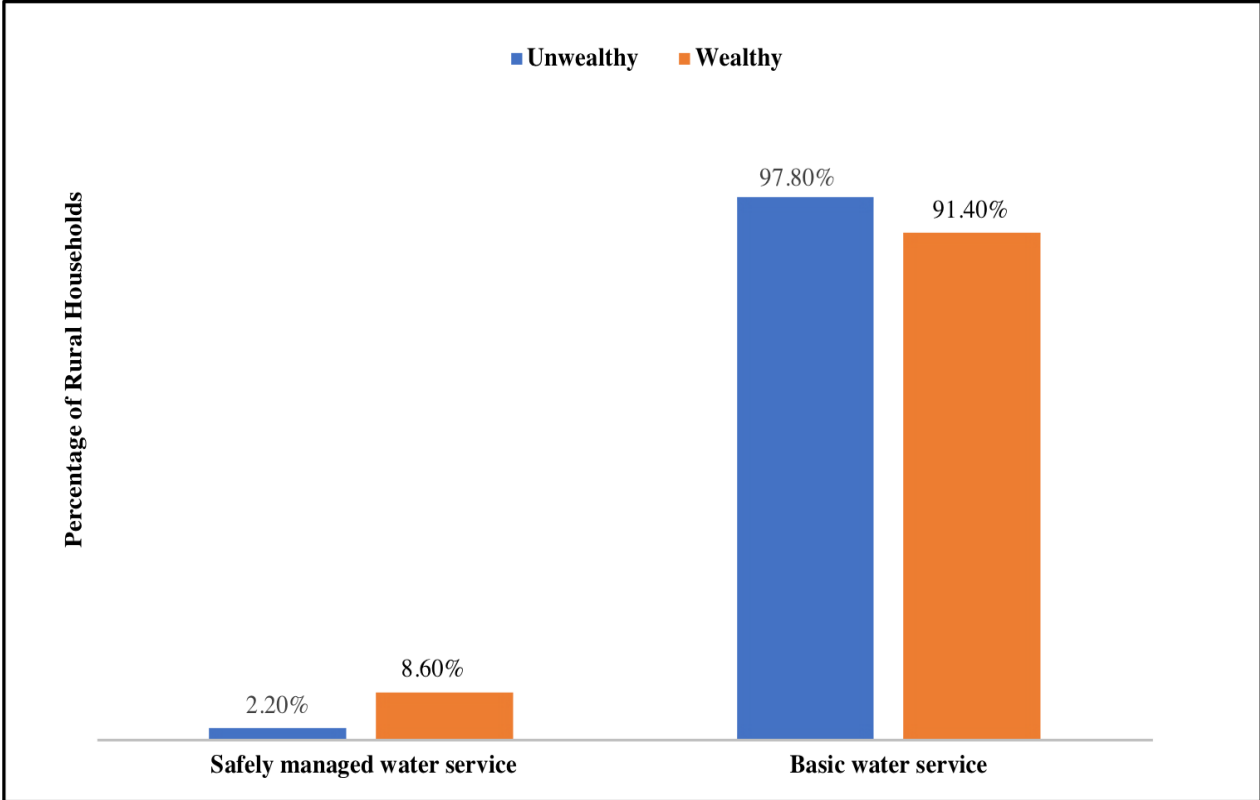


Figure 4: Comparison of sanitation facilities in rural households



Percentage values were based on chi-square test results. $P < .001$ Significant difference in access to the types of sanitation facilities were observed between un-wealthy vs wealthy households.

Figure 5: Comparison of water services between un-wealthy and wealthy rural households



Percentage values were based on chi-square test results. $P < .001$ Significant difference in access to the types of water services were observed between un-wealthy vs wealthy households.

CHAPTER IV: EPILOGUE

We started this project at the beginning of April 2021. We wanted to conduct a secondary study on water insecurity in developing countries. Dr. Dharod found the UNICEF MICS6 data sets that included extensive water related data from South African countries.

Initially, we wanted to analyze and compare data for nine countries: Chad, Central African Republic, Gambia, Ghana, Guinea Bissau, Sao Tome & Principe, Sierra Leone, Togo, and Democratic Republic of Congo. During the summer of 2021, Dr. Dhaord and I worked closely on the datasets. We picked out the household and children's questionnaires as they contained variables of our initial interest.

However, the merging and organization of the datasets became quite time consuming, so we decided to focus on only one country (the Gambia) instead of nine countries. The Gambia was selected since the latest data from UNICEF-MICS was available. Rural regions of Gambia represented a common situation that many other Sub-Saharan countries face, which was economic scarcity prevails over physical scarcity of water.

Meanwhile, I started writing my thesis proposal. My initial thesis objective was to: 1) examine water fetching burden in rural areas in one of the Western African Countries- the Gambia using the national level data of UNICEF-MICS 2018; 2) examine the association between water access (time, distance and number of trips to water sources) and maternal and child health outcomes among rural households in the Gambia. Then, I switched and shifted my focus solely on women as the study object.

Since the beginning of this semester (spring 2022), I have been working on data analysis with the goal of accessing the relationship between water access and women's overall estimation of happiness, education, and income levels.

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APPENDIX A: QUESTIONNAIRES AND THEIR RELATED INFORMATION

SUMMARY TABLE OF SURVEY IMPLEMENTATION AND THE SURVEY POPULATION

Survey sample and implementation			
Sample frame	2013 The Gambia Population and Housing Census	Questionnaires	Household Women (age 15-49) Men (age 15-49) Children under five Children age 5-17 Water Quality Testing
- Updated	August-September, 2017		
Interviewer training	Dec 2017-Jan 2018	Fieldwork	Jan-April, 2018
Survey sample			
Households			
- Sampled	7,750 ¹	Children under five	
- Occupied	7,517	- Eligible	10,156
- Interviewed	7,405	- Mothers/caretakers interviewed	9,907
- Response rate (Per cent)	98.5	- Response rate (Per cent)	97.5
Women (age 15-49)			
- Eligible for interviews	14,298	Children age 5-17	
- Interviewed	13,640	- Eligible	5,850
- Response rate (Per cent)	95.4	- Mothers/caretakers interviewed	5,696
		- Response rate (Per cent)	97.4
Men (age 15-49)			
- Eligible for interviews	5,225	Water Quality Testing	
- Interviewed	4,522	- Eligible	1,951
- Response rate (Per cent)	86.5	- Interviewed	1,865
		- Response rate (Per cent)	95.6

Survey population			
Average household size	8.0	Percentage of population living in	
Percentage of population under		- Urban areas	67.6
- Age 5	15.4	- Rural areas	32.4
- Age 18	51.1	- Banjul	1.3
Percentage of women age 15-49 years with at least one live birth in the last 2 years	25.5	- Kanifing	19.9
		- Brikama	39.6
		- Mansakonko	4.2
		- Kerewan	10.8
		- Kuntaur	4.6
		- Janjanbureh	7.0
		- Basse	12.6

Household Questionnaire	Questionnaire for Individual Women / Men	Questionnaire for Children Age 5-17 Years
List of Household Members Education Household Characteristics Household Energy Use Insecticide Treated Nets Indoor Residual Spraying Water and Sanitation Handwashing Salt Iodisation	Woman's Background ^[M] Mass Media and ICT ^[M] Fertility ^[M] /Birth History Desire for Last Birth Maternal and Newborn Health Post-natal Health Checks Contraception Unmet Need Female Genital Mutilation/Cutting Attitudes Toward Domestic Violence ^[M] Marriage/Union ^[M] Adult Functioning ^[M] Sexual Behaviour ^[M] HIV/AIDS ^[M] Circumcision ^[only M] Tobacco and Alcohol Use ^[M] Life Satisfaction ^[M]	Child's Background Child Labour Child Discipline Child Functioning Parental Involvement Foundational Learning Skills
Water Quality Testing Questionnaire		Questionnaire for Children Under 5 Under-Five's Background Birth Registration Early Childhood Development Child Discipline Child Functioning Breastfeeding and Dietary Intake Immunisation Care of Illness Anthropometry

^[M] The individual Questionnaire for Men only included those modules indicated.

QUESTIONNAIRES

Six questionnaires were used in the survey: 1) a household questionnaire to collect basic demographic information on all *de jure* household members (usual residents), the household, and the dwelling; 2) a water quality testing questionnaire administered in 5 households in each cluster of the sample; 3) a questionnaire for individual women administered in each household to all women age 15-49 years; 4) a questionnaire for individual men administered in every second household to all men age 15-49 years; 5) an under-5 questionnaire, administered to mothers (or caretakers) of all children under 5 living in the household; and 6) a questionnaire for children age 5-17 years, administered to the mother (or caretaker) of one randomly selected child age 5-17 years living in the household.⁴ The questionnaires included the following modules:

HOUSEHOLD INFORMATION PANEL		HH	
HH1. Cluster number: _____		HH2. Household number: _____	
HH3. Interviewer's name and number: NAME _____		HH4. Supervisor's name and number: NAME _____	
HH5. Day / Month / Year of interview: ____ / ____ / 2 0 1 8		HH7. LGA:	
HH6. AREA:		BANJUL 1	
URBAN 1		KANIFING 2	
RURAL 2		BRIKAMA 3	
HH8. Is the household selected for Questionnaire for Men?		MANSAKONKO 4	
YES 1		KEREWAN 5	
NO 2		KUNTAUR 6	
		JANJANBUREH 7	
		BASSE 8	
HH9. Is the household selected for Water Quality Testing?		HH10. Is the household selected for blank testing?	
YES 1		YES 1	
NO 2		NO 2	

<p>Check that the respondent is a knowledgeable member of the household and at least 18 years old before proceeding. You may only interview a child age 15-17 if there is no adult member of the household or all adult members are incapacitated. You may not interview a child under age 15.</p>	HH11. Record the time.
	HOURS : MINUTES ____ : ____
<p>HH12. Hello, my name is (<i>your name</i>). We are from The <i>Gambia Bureau of Statistics</i>. We are conducting a survey about the situation of children, families and households. I would like to talk to you about these subjects. This interview usually takes about 45 minutes. Following this, I may ask to conduct additional interviews with you or other individual members of your household. All the information we obtain will remain strictly confidential and anonymous. If you do not wish to answer a question or stop the interview, please let me know. May I start now?</p>	
<p>YES 1 NO / NOT ASKED 2</p>	<p>1 ⇨ LIST OF HOUSEHOLD MEMBERS 2 ⇨ HH46</p>

HOUSEHOLD CHARACTERISTICS		HC
HC1A. What is the religion of (<i>name of the head of the household from HL2</i>)?	ISLAM1	
	CHRISTIANITY2	
	TRADITIONAL3	
	OTHER RELIGION (specify).....6	
	NO RELIGION.....7	
HC1B. What is the nationality of (<i>name of the head of the household from HL2</i>)?	GAMBIAN01	
	SENEGALESE02	02 ⇨HC3
	GUINEAN03	03 ⇨HC3
	BISSAU GUINEAN04	04 ⇨HC3
	MALIAN05	05 ⇨HC3
	NIGERIAN06	06 ⇨HC3
	SIERRA LEONEAN07	07 ⇨HC3
	MAURITANIAN.....08	08 ⇨HC3
	GHANAIAN.....09	09 ⇨HC3
	LIBERIAN.....10	10⇨HC3
	OTHER WEST AFRICAN11	11 ⇨HC3
	OTHER AFRICAN12	12 ⇨HC3
	NON-AFRICAN13	13 ⇨HC3
HC1C. What is the mother tongue/native language of (<i>name of the head of the household from HL2</i>)?	MANDINKA01	
	WOLLOF.....02	
	FULA.....03	
	JOLA04	
	SARAHULE05	
	SERERE06	
	MANJAGO.....07	
	CREOLE/ AKU MARABOUT08	
	BAMBARA09	
	OTHER LANGUAGE (specify).....96	

Note: Only the variables highlighted in yellow were used in the study.

WATER AND SANITATION		WS	
<p>WS1. What is the main source of drinking water used by members of your household?</p> <p><i>If unclear, probe to identify the place from which members of this household most often collect drinking water (collection point).</i></p>	PIPED WATER		
	PIPED INTO DWELLING	11	11 ⇒ WS7
	PIPED TO YARD / PLOT	12	12 ⇒ WS7
	PIPED TO NEIGHBOUR	13	13 ⇒ WS3
	PUBLIC TAP / STANDPIPE	14	14 ⇒ WS3
	TUBE WELL / BOREHOLE	21	21 ⇒ WS3
	DUG WELL		
	PROTECTED WELL	31	31 ⇒ WS3
	UNPROTECTED WELL	32	32 ⇒ WS3
	SPRING		
	PROTECTED SPRING	41	41 ⇒ WS3
	UNPROTECTED SPRING	42	42 ⇒ WS3
	RAINWATER	51	51 ⇒ WS3
	CART WITH SMALL TANK	71	71 ⇒ WS4
	SURFACE WATER (RIVER, DAM, LAKE, POND, STREAM, CANAL, IRRIGATION CHANNEL)	81	81 ⇒ WS3
	PACKAGED WATER		
	BOTTLED WATER	91	
SACHET WATER	92		
OTHER (<i>specify</i>)	96	96 ⇒ WS3	

<p>WS2. What is the <u>main</u> source of water used by members of your household for other purposes such as cooking and handwashing?</p> <p><i>If unclear, probe to identify the place from which members of this household most often collect water for other purposes.</i></p>	<p>PIPED WATER</p> <p>PIPED INTO DWELLING11 PIPED TO YARD / PLOT12 PIPED TO NEIGHBOUR.....13 PUBLIC TAP / STANDPIPE14</p> <p>TUBE WELL / BOREHOLE.....21</p> <p>DUG WELL</p> <p>PROTECTED WELL31 UNPROTECTED WELL.....32</p> <p>SPRING</p> <p>PROTECTED SPRING41 UNPROTECTED SPRING.....42</p> <p>RAINWATER51 TANKER-TRUCK61 CART WITH SMALL TANK71 SURFACE WATER (RIVER, DAM, LAKE, POND, STREAM, CANAL, IRRIGATION CHANNEL)81</p> <p>OTHER (<i>specify</i>)96</p>	<p>11 ⇒WS7 12 ⇒WS7</p> <p>61 ⇒WS4 71 ⇒WS4</p>
<p>WS3. Where is that water source located?</p>	<p>IN OWN DWELLING.....1 IN OWN YARD / PLOT2 ELSEWHERE.....3</p>	<p>1 ⇒WS7 2 ⇒WS7</p>
<p>WS4. How long does it take for members of your household to go there, get water, and come back?</p>	<p>MEMBERS DO NOT COLLECT000</p> <p>NUMBER OF MINUTES _ _ _</p> <p>DK998</p>	<p>000 ⇒WS7</p>

Note: Only the variables highlighted in yellow were used in the study.

<p>WS11. What kind of toilet facility do members of your household usually use?</p> <p><i>If 'Flush' or 'Pour flush', probe: Where does it flush to?</i></p> <p><i>If not possible to determine, ask permission to observe the facility.</i></p>	<p>FLUSH / POUR FLUSH</p> <p>FLUSH TO PIPED SEWER SYSTEM11</p> <p>FLUSH TO SEPTIC TANK12</p> <p>FLUSH TO PIT LATRINE.....13</p> <p>FLUSH TO DK WHERE18</p> <p>PIT LATRINE</p> <p>VENTILATED IMPROVED PIT LATRINE21</p> <p>PIT LATRINE WITH SLAB22</p> <p>PIT LATRINE WITHOUT SLAB / OPEN PIT23</p> <p>NO FACILITY / BUSH / FIELD95</p> <p>OTHER (<i>specify</i>)96</p>	<p>11 ⇒WS14</p> <p>18 ⇒WS14</p> <p>95 ⇒End</p> <p>96 ⇒WS14</p>
<p>WS12. Has your (<i>answer from WS11</i>) ever been emptied?</p>	<p>YES, EMPTIED</p> <p>WITHIN THE LAST 5 YEARS1</p> <p>MORE THAN 5 YEARS AGO2</p> <p>DON'T KNOW WHEN3</p> <p>NO, NEVER EMPTIED4</p> <p>DK8</p>	<p>4 ⇒WS14</p> <p>8 ⇒WS14</p>

Note: Only the variables highlighted in yellow were used in the study.

<p>WS13. The last time it was emptied, where were the contents emptied to?</p> <p><i>Probe:</i> Was it removed by a service provider?</p>	<p>REMOVED BY SERVICE PROVIDER TO A TREATMENT PLANT 1 BURIED IN A COVERED PIT 2 TO DON'T KNOW WHERE 3</p> <p>EMPTIED BY HOUSEHOLD BURIED IN A COVERED PIT 4 TO UNCOVERED PIT, OPEN GROUND, WATER BODY OR ELSEWHERE 5</p> <p>OTHER (<i>specify</i>) 6</p> <p>DK 8</p>	
<p>WS14. Wheres this toilet facility located?</p>	<p>IN OWN DWELLING 1 IN OWN YARD / PLOT 2 ELSEWHERE 3</p>	
<p>WS15. Do you share this facility with others who are not members of your household?</p>	<p>YES 1 NO 2</p>	<p>2⇒End</p>
<p>WS16. Do you share this facility only with members of other households that you know, or is the facility open to the use of the general public?</p>	<p>SHARED WITH KNOWN HOUSEHOLDS (NOT PUBLIC) 1 SHARED WITH GENERAL PUBLIC 2</p>	<p>2⇒End</p>
<p>WS17. How many households in total use this toilet facility, including your own household?</p>	<p>NUMBER OF HOUSEHOLDS (IF LESS THAN 10) 0 ___</p> <p>TEN OR MORE HOUSEHOLDS 10</p> <p>DK 98</p>	

Note: Only the variables highlighted in yellow were used in the study.

WOMAN'S INFORMATION PANEL		WM
WM1. Cluster number: _____	WM2. Household number: _____	
WM3. Woman's name and line number: NAME _____	WM4. Supervisor's name and number: NAME _____	
WM5. Interviewer's name and number: NAME _____	WM6. Day / Month / Year of interview: _____/_____/ 2 0 1 8	

<p>Check woman's age in HL6 in LIST OF HOUSEHOLD MEMBERS, HOUSEHOLD QUESTIONNAIRE: If age 15-17, verify in HH33 that adult consent for interview is obtained or not necessary (HL20=90). If consent is needed and not obtained, the interview must not commence and '06' should be recorded in WM17.</p>	WM7. Record the time:	
	HOURS	: MINUTES
	_____	: _____
WM8. Check completed questionnaires in this household: Have you or another member of your team interviewed this respondent for another questionnaire?	YES, INTERVIEWED ALREADY 1 NO, FIRST INTERVIEW 2	1 ⇒ WM9B 2 ⇒ WM9A
WM9A. Hello, my name is (<i>your name</i>). We are from the <i>Gambia Bureau of Statistics</i> . We are conducting a survey about the situation of children, families and households. I would like to talk to you about your health and other topics. This interview usually takes about 50 minutes. We are also interviewing mothers about their children. All the information we obtain will remain strictly confidential and anonymous. If you wish not to answer a question or wish to stop the interview, please let me know. May I start now?	WM9B. Now I would like to talk to you about your health and other topics in more detail. This interview will take about 50 minutes. Again, all the information we obtain will remain strictly confidential and anonymous. If you wish not to answer a question or wish to stop the interview, please let me know. May I start now?	
YES 1 NO / NOT ASKED 2	1 ⇒ WOMAN'S BACKGROUND Module 2 ⇒ WM17	

WOMAN'S BACKGROUND		WB
WB1. Check the respondent's line number (WM3) in WOMAN'S INFORMATION PANEL and the respondent to the HOUSEHOLD QUESTIONNAIRE (HH47):	WM3=HH47 1 WM3≠HH47 2	2⇒WB3
WB2. Check ED5 in EDUCATION Module in the HOUSEHOLD QUESTIONNAIRE for this respondent: Highest level of school attended:	ED5=2, 3 OR 4 1 ED5=0, 1, 8 OR BLANK 2	1⇒WB15 2⇒WB14
WB3. In what month and year were you born?	DATE OF BIRTH MONTH DK MONTH 98 YEAR DK YEAR 9998	
WB4. How old are you? <i>Probe: How old were you at your last birthday?</i> <i>If responses to WB3 and WB4 are inconsistent, probe further and correct. Age must be recorded.</i>	AGE (IN COMPLETED YEARS).....	
WB5. Have you ever attended school or any early childhood education programme?	YES 1 NO 2	2⇒WB14
WB6. What is the highest level and grade or year of school you have attended?	EARLY CHILDHOOD EDUCATION..... 000 PRIMARY 1 ___ LOWER SECONDARY 2 ___ UPPER SECONDARY 3 ___ VOCATIONAL 4 ___ DIPLOMA 5 ___ HIGHER 6 ___	000⇒WB14
WB7. Did you complete that (grade/year)?	YES 1 NO 2	
WB8. Check WB4: Age of respondent:	AGE 15-24 1 AGE 25-49 2	2⇒WB13

Note: Only the variables highlighted in yellow were used in the study.

MARRIAGE/UNION		MA
MA1. Are you currently married or living together with someone as if married?	YES, CURRENTLY MARRIED.....1	3⇒MA5
	YES, LIVING WITH A PARTNER.....2	
	NO, NOT IN UNION3	

FERTILITY/BIRTH HISTORY		CM
CM1. Now I would like to ask about all the births you have had during your life. Have you ever given birth? <i>This module and the birth history should only include children born alive. Any stillbirths should not be included in response to any question.</i>	YES.....1	2⇒CM8
	NO2	

LIFE SATISFACTION	LS	
<p>LS1. I would like to ask you some simple questions on happiness and satisfaction.</p> <p>First, taking all things together, would you say you are very happy, somewhat happy, neither happy nor unhappy, somewhat unhappy or very unhappy?</p> <p>I am now going to show you pictures to help you with your response.</p> <p><i>Show smiley card and explain what each symbol represents. Record the response code selected by the respondent.</i></p>	<p>VERY HAPPY1 SOMEWHAT HAPPY2 NEITHER HAPPY NOR UNHAPPY3 SOMEWHAT UNHAPPY4 VERY UNHAPPY5</p>	

