Multiple jeopardies: COVID-19 related health and wellbeing among older

adults in Uganda

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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ABSTRACT

The COVID-19 pandemic has highlighted the disparities in access to water, sanitation, and hygiene (WASH) resources and health among various populations and regions, with sub-Saharan Africa (SSA) being affected more than most other regions. Older adults are particularly vulnerable to the consequences of WASH insecurity and COVID-19. Several researchers have investigated the impacts of national government responses on people's behavior toward COVID-19 prevention and access to essential resources. However, there has been limited research exploring how these factors affect health and wellbeing, particularly among the elderly population, who are considered most vulnerable during the pandemic. The thesis fills this gap by examining access to WASH services among older adults living in marginalized communities in Uganda during the COVID-19 pandemic with a particular emphasis on how social, economic, and demographic factors, as well as pandemic knowledge, attitudes and practices, influenced their psychosocial health and wellbeing. To this end, the objectives of this research are threefold: (1) *to examine the barriers to WASH access among older adults during the COVID-19 pandemic;* (2*) to assess older adults' knowledge, attitudes, risk perceptions, and practices (KARP) regarding COVID-19 prevention and management; and* (3) *to investigate the impact of WASH-related barriers and experiences of COVID-19 on the psychosocial health and wellbeing of older adults.* Using a cross-sectional survey, the data for this research was collected from older adults (n=288) living in social isolation in four rural communities within the Greater Mukono Region of central Uganda. The results indicate that older adults in the study area experienced limited access to safe WASH services, which hindered their ability to effectively engage in COVID-19 preventive practices, such as handwashing. Their efforts to adapt to this lack of access – including obtaining water from remote sources, waiting in queues at community water collection points, and borrowing water from neighbors – inadvertently exposed them to a heightened risk of COVID-19 infections. Furthermore, older adults demonstrated substantial knowledge, moderate levels of reported

attitudes and practices, and low levels of risk perception toward COVID-19. These issues are influenced by various socio-economic and demographic factors, including the frequency of information received, education level, gender, trust in the Ugandan government, satisfaction with the government's response to COVID-19, food security, the availability of space for isolating COVID-19 patients, and the presence of children within the household. Ultimately, barriers to accessing WASH services not only inhibit older adults' COVID-19 prevention and management practices but also adversely impact their psychosocial health and wellbeing. Access to WASH services is essential, as are other resources for daily living, such as food, income, and housing. This thesis demonstrates that the inadequacy of these resources, exacerbated by the COVID-19 pandemic, affects older adults' ability to practice COVID-19 preventive measures, heightens their concern about COVID-19, and hinders their capacity to meet their basic needs, resulting in emotional distress and lower levels of wellbeing. The findings of the thesis contribute to the literature on WASH insecurity, COVID-19, and psychosocial health and wellbeing of older adults in SSA in three significant ways. First, by uncovering the role of trust in governments in shaping vulnerable people's psychosocial health and wellbeing during the COVID-19 pandemic, this research advances the proposition that trust in political authority is a critical determinant of population health, especially during health emergencies. Secondly, this research highlights how emerging infectious diseases intersect with resource scarcities in low- and middle-income countries, affecting the health and wellbeing of vulnerable populations. Lastly, by revealing the unique WASH vulnerabilities confronting older adults in LMICs during health emergencies, this research provides valuable insights for policymakers and practitioners on how to address the WASH and health needs of elderly people in resource-limited contexts during health emergencies.

ACKNOWLEDGEMENT

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER ONE
INTRODUCTION

1.1 Research Problem

The outbreak of the Novel Coronavirus Disease (COVID-19) caused by SARS-CoV-2, which began in late 2019, is a major public health concern, with over 600 million infected individuals and killing over 6.5 million people worldwide (WHO, 2022c). People aged 60 and above are particularly vulnerable, and they account for the greatest number of fatalities and severe illnesses caused by COVID-19 (Centers for Disease Control and Prevention, 2021; HelpAge International, 2020; United Nations, 2020a; World Health organisation, 2020; World Health Organisation, 2021). For example, in 2020, 95 percent of COVID-19 deaths in European countries were people aged 65 and older (World Health Organization, 2020), and more than half of all COVID-19 deaths in Africa were those aged 60 and older (WHO Regional Office for Africa, 2020).

Frequent handwashing with soap under clean running water has been strongly recommended as one of the most potent non-pharmaceutical preventive measures against the spread of COVID-19, along with other measures, such as avoiding crowded places, physical distancing, and self-isolation (CDC, 2022; WHO & UNICEF, 2020; WHO, 2019, 2020). Jefferson et al. (2009, 2020) shows the importance of handwashing in the reduction of acute respiratory viruses such as influenza (HINI) and severe acute respiratory syndrome (SARS). For instance, they found that handwashing was very effective, with a meta-analytic summary of a 45–55 percent reduction in virus spread compared to other non-pharmaceutical measures. Handwashing is thus crucial in preventing the transmission of the COVID-19 pandemic and other infectious diseases. Unfortunately, many people in low- and middle-income countries (LMICs), specifically those in sub-Saharan Africa (SSA), do not have access to adequate water, sanitation, and hygiene (WASH) services. To illustrate, at the

start of the COVID-19 pandemic, the Joint Monitoring Programme (JMP) report — Progress on household drinking water, sanitation, and hygiene 2000–2020 — estimated that 2 billion people worldwide did not have access to safely managed drinking water (i.e., one located on premises, available when needed, and free from contamination); 2.3 billion did not have basic handwashing facilities in their homes; and 3.6 billion did not have access to safely managed sanitation services. According to this report, half of these people live in SSA, mostly in rural areas, and the poorest demographic groups experience worse outcomes. (WHO/UNICEF, 2021).

There is rich literature confirming that most SSA countries lack access to safe WASH services, and that there are significant variations across places and among different population groups (Ato Armah et al., 2018; Brauer et al., 2020; Ekumah et al., 2020; Jiwani & Antiporta, 2020; Stoler et al., 2021). For example, an observational study of 16 SSA countries found that only 5% of households in Burundi had a basic handwashing facility, compared to 64% in Angola and 63.7% in South Africa (Jiwani & Antiporta, 2020). Ato Armah et al. (2018) investigated spatial disparities in WASH access across fifteen SSA countries and found that rural areas were 29% less likely to have access. The study also found that households headed by older adults and those with less education had less access to improved water sources than did younger and more educated households. Furthermore, people in this context encounter additional barriers to accessing WASH services. Most households predominantly rely on WASH services located outside their homes (Adams et al., 2021; Ekumah et al., 2020), which entails traveling long distances (Adams et al., 2021; WHO & UNICEF, 2021), navigating difficult geographic terrains (i.e., steep hills, ravines, and flooded roads), facing issues of physical safety, and queuing in crowded spaces with other households to compete for water collection (Adams et al., 2021; Bisung & Elliott, 2018). Moreover, during periods of severe WASH insecurity – the lack of sufficient, safe, reliable, and convenient access to water,

sanitation, and hygiene services (Adams et al., 2021) –and access disparities, households' resort to water borrowing water from other households (Wutich et al., 2022) as well as utilize shared toilet facilities (Bisung & Elliott, 2017). According to research, people living in these disadvantaged contexts who lack access to safe, adequate, and reliable WASH services and engage in sharing WASH spaces find it difficult to comply with most non-pharmaceutical preventive measures initiated during the pandemic (Ekumah et al., 2020; Tetra Tech, 2020; Zvobgo & Do, 2020). This presents an opportunity for possible COVID-19 transmission (WHO, 2021a).

Women bear the greatest brunt of WASH access challenges in SSA due to entrenched sociocultural norms that assign them the primary roles of water collection and sanitation management for household use (Adams et al., 2021; Nounkeu & Dharod, 2022; WaterAid, 2021c; Watershed, n.d.). These roles may expose women to higher risk of COVID-19 infection and other COVID-19 related health and wellbeing effects during the pandemic (Adams et al., 2021). Moreover, older women, face unique multiple exposure pathways and are deemed the most vulnerable within the WASH discourse due to weaker and more painful joints that make it difficult for them to stand in long queues and navigate undulating geographic terrain to access WASH services, limiting their ability to meet WASH needs (Cavill et al., 2022). They are also more likely to touch surfaces and stools when using unimproved and shared toilet facilities because most of these facilities in the SSA context are designed such that they are forced to squat, which is challenging owing to their aging physiology (Cavill et al., 2022). Stool exposure is emerging as a potential pathway of COVID-19 transmission (Ng & Tilg, 2020; Zhang et al., 2020). Therefore, older adults are at greater risk of being exposed to COVID-19 infection in the context of WASH insecurity.

WASH insecurity is not only a risk factor for COVID-19 infection but is also linked to psychosocial and physical health problems. For example, quantitative research in the Peruvian

Amazon, found that higher levels of water insecurity were associated with poorer self-reported health outcomes and a higher risk of reporting back pain, migraines, chest pain, and diarrhea, among other symptoms (Tallman et al., 2022). Similar health outcomes were observed among Cameroonian women (Nounkeu & Dharod, 2022) and Ghanaians aged 50 and above (Gyasi et al., 2022). WASH insecurity has also been linked to intimate partner violence (Nunbogu & Elliott, 2022) and emotional distress (Bisung & Elliott, 2017).

Indeed, some researchers posit that WASH insecurity issues during the pandemic, coupled with the challenges associated with COVID-19 public health restrictions, may increase vulnerability to COVID-19 infection and other health problems, and affect the quality of life of people in LMICs (Brauer et al., 2020; Stoler et al., 2021). Likewise, there are concerns that the guidelines implemented to slow the spread of COVID-19 may perpetuate health inequities, resulting in a disproportionate burden on COVID-19-related health and well-being issues for disadvantaged groups (Adams et al., 2021; United Nations, 2020b; World Health Organization, 2020).

Overall, these studies clearly demonstrated substantial inequities in WASH access and health that persist between regions and among different population groups. More importantly, the literature on WASH access and health disparities consistently emphasizes that these vulnerabilities are intersectional, characterized by complex interactions between sociocultural, economic, environmental, and political factors (Abu & Elliott, 2022; Bisung & Elliott, 2017; Nunbogu & Elliott, 2021, 2022; Rishworth & Elliott, 2022; Wutich et al., 2022). For instance, in Uganda, household variables such as gender, age, occupation, household size, and region of residence, as well as government policies, were found to affect equitable water supply to households during the COVID-19 pandemic (Sempewo et al., 2021a).

Amidst recognizing the inequities in health and access to basic resources during the pandemic, the UN called for worldwide solidarity and socio-economic support, especially for

older adults and women (UN, 2020). Following this call, the UN Global Humanitarian Response Plan for COVID-19 (HRP) stated that covid-19 prevention activities are being carried out in all countries, including the distribution of soap, awareness-raising campaigns, and assessment and mapping of the capacities of health and WASH facilities (United Nations, 2020a). "This assistance is desperately needed to ensure that older adults have the information they need, have good access to water and sanitation facilities, can access health services, and may self-isolate when needed. Without this support, many lives will be lost." (HelpAge International, 2020, p. 3). However, it remains uncertain whether these support initiatives reached older persons in underserved communities in SSA (HelpAge International, 2020). According to key informants from the public health sector in Kisuma, Kenya, relief packages intended to be distributed for the benefit of citizens during the COVID-19 pandemic were influenced by corruption from government officials (Abu & Elliott, 2022).

Furthermore, the United Nations and the World Health Organisation launched various measures, such as the UN Research Roadmap for COVID-19 Recovery (UNRRCR), to identify key research priorities to support an equitable global socioeconomic recovery from the pandemic. The UN Research Roadmap identifies women and older persons as some of the world's most vulnerable populations and sub-Saharan Africa as one of the world's most vulnerable regions during the COVID-19 pandemic due to multiple challenges and risks that these groups and regions face in terms of health, economic and environmental dimensions (United Nations, 2020b). Hence, the UN and WHO actively promote gender-sensitive research and prioritize research involving vulnerable populations, including women and older adults, especially those residing in under-resourced contexts. Yet, there has been limited focus on investigating the effects of COVID-19 preventative measures on the health and wellbeing of older adults in sub-Saharan Africa (Giebel, Ivan, Burger, et al., 2022).

Additionally, since handwashing has been recognized as one of the most effective COVID-19 prevention strategies highly recommended by health authorities, many researchers have shown increased interest in understanding the impacts of WASH insecurity and COVID-19 in SSA (Abu & Elliott, 2022; Amuakwa-Mensah et al., 2021; Ekumah et al., 2020; Sempewo et al., 2021; Zvobgo & Do, 2020). While some of this emerging research has focused on the impact of WASH insecurity on behavioural practices toward COVID-19 prevention among diverse population groups, there is, limited knowledge of the influence of WASH insecurity and other multifactorial COVID-19 related issues on the psychosocial health and wellbeing of older adults during the pandemic. Yet, psychosocial health problems have become a leading cause of death and disability worldwide, including SSA. Women in Africa are 1.5 times more likely than men to suffer from psychosocial health consequences such as depression, anxiety, and stress (World Economic Forum, 2022).

Therefore, this research aims to complement existing literature by assessing the gendered nature of (WASH) insecurity among older adults in Sub-Saharan Africa (SSA), with a particular focus on Uganda. Drawing on the Feminist Political Ecology of Health (FPEH), this research seeks to examine how gendered power relations shape access to WASH resources and how this affects the ability of older adults to cope with the COVID-19 pandemic. Additionally, the research aims to investigate the impact of WASH insecurity and other multifactorial COVID-19 related issues on the psychosocial health and wellbeing of older adults in SSA, contributing to a better understanding of the intersectionality of environmental, social, and health factors that affect vulnerable populations.

1.2 Research Context

Uganda reported its first case of COVID-19 on March 21, 2020, and by October 2022, the country had recorded approximately 170,000 cases and over 3,600 deaths attributed

to COVID-19 (Ministry of Health, 2022; WHO, 2022). As observed globally and in SSA, COVID-19 has had a disproportionate impact on older adults in Uganda. (Maragakis, 2021; United Nations, 2020b; WHO Regional Office for Africa, 2021). The case fatality rate among older adults aged 60 years and above was nearly ten times higher than that among adults aged < 60 years. (WHO Regional Office for Africa, 2021). In response to the severe impacts of COVID-19, the Ugandan government initiated a range of non-pharmaceutical measures, which varied over time depending on the disease incidence and prevalence in the country (Margini et al., 2020). These measures included a stringent national lockdown that lasted nearly three months, border closure, school closures and a ban on public gathering and public transport use (Margini et al., 2020; UBOS, 2020).

These measures followed the implementation of but not limited to frequent handwashing, physical distancing, and wearing masks in public places (Ministry of Health, 2022a). Although all these measures are essential in reducing the spread of the disease, the Ministry of Health in Uganda emphasized regular handwashing, which it chose to place at the top of its list of non-pharmaceutical measures recommended for the public to reduce the spread of COVID-19. The Ministry continues to encourage all citizens, specifically those at the highest risk of severe illness, to frequently wash their hands and disinfect surfaces through regular cleaning with soap and water to protect themselves, their families, and the community from COVID-19 (Ministry of Health, 2022a). Although vaccination is crucial for decreasing the transmission of COVID-19, as of September 2022, only 27.3% of the population in Uganda has been fully vaccinated (Ministry of Health, 2022b). Thus, consistent handwashing practices remain critical for many people in Uganda to stay safe from COVID-19 infection.

Yet, most people in Uganda, especially those living in rural communities, do not have safe and reliable water, sanitation, and hygiene (WASH) services to practice these simple yet

effective preventive measures. Uganda typifies many of the characteristics of SSA in terms of the wide disparities in the provision of WASH services. Historically, the provision of WASH services has been focused on urban centers to the neglect of impoverished rural communities (Uganda Ministry of Gender, 2020), even though rural areas make up the majority (74%) of the Ugandan population (The World Bank, 2022). According to the Ugandan 2018-2019 Malaria Indicator Survey, there is a 59% gap in basic water coverage (i.e., water from an improved source that is collected within 30 minutes or less per round trip (WHO/UNICEF, 2021) between the capital Kampala (97%) and Karamoja region (38%). There is also a 31% gap between urban areas (79%) and rural areas (48%), as well as a 36% gap between the richest (80%) and the poorest (44%) (Uganda National Malaria Control Division (NMCD) et al., 2020).

As previously discussed, older adults are disproportionately affected by pronounce WASH challenges. For instance, access to toilet facilities is a big challenge for older people in Uganda, especially those living in rural areas. Only 21% of older adults in rural areas have improved toilet facilities (i.e., toilet facilities designed to hygienically separate excreta from human contact (WHO/UNICEF, 2021), compared to 49% in urban areas (Uganda Ministry of Gender, 2020). These limitations to basic sanitation mean that the majority (79%) of older adults who are left without access to improved toilet facilities in rural areas are likely to be exposed to COVID-19 in Uganda owning to touching faeces and surfaces, which are potential routes to COVID-19 transmission (Ng & Tilg, 2020; Zhang et al., 2020). When it comes to accessing sources of drinking water, though a relatively larger proportion (69%) of the older adults in rural areas have access to improved drinking water sources, they access water from communal boreholes located far from their homes. Thus, older adults are required to walk long distances, pay charges, and form long queues to compete for water (Uganda Ministry of Gender, 2020). This situation not only undermines the social distancing protocols (Zvobgo & Do, 2020)

necessary to reduce COVID-19 spread (Ministry of Health, 2022a; WHO, 2021) but also means that older people are unlikely to have adequate safe water for handwashing (Stoler et al., 2021).

To illustrate the vulnerability of older adults more evidently, drawing from a recent study conducted in the Greater Mokono area of central Uganda involving older adults —The context of this study, some older adults expressed their challenges with WASH access as follows :

"Water is a problem. It's collected from very far, three miles. Yet I don't have energy, it's hard to move. The most I can do is three liters, sometimes only one. When you get there, the water might be so low you can't get any. The droughts are creating water shortages. Even if you're lucky and get some, you must carry it back, and that means going up a hill. It takes hours. You're in pain and don't have the energy so it's hard. So, our health is highly affected by not having enough water. To manage, you do different things. Some drink every other day, some pray for a good Samaritan to pass by others pay people to carry for them. For me. I have three small jerry cans. I fill them all and just keep removing one by one. When you're done, you're faced with a challenge. Most of the time, you go without" -FG, M, Buikwe 50–70+

"Since I can only carry one liter, with that, I have to drink, bath, cook. You make tough choices between your thirst and your cleanliness. Because we're old, when we use the latrine, we can't squat, so you touch the ground and everything that's there. The structure is no good. When it rains, it floods. And if you don't have water, you can't clean so it makes us sick. We know it makes us sick, but there's not much we can do. - FG, F, Mukono, 70+". (Rishworth & Elliott, 2022, p. 32).

It is clear from the above that older adults are seriously challenged with getting access to safe WASH services in Uganda, especially those who are poor and /or living in rural areas. Though they are at the highest risk of severe illness and death from COVID-19, due to a lack of reliable, safe WASH services, they are likely to trade off water for handwashing—a critical measure for COVID-19 prevention, to drinking. These challenges not only put older adults at increased risk of COVID-19 exposure (Adams et al., 2021; Stoler et al., 2021) but also affect their physical and mental wellbeing (Uganda Ministry of Gender, 2020).

The proportion of older adults is increasing in Uganda (Uganda Ministry of Gender, 2020) but represent the poorest population group in the country (74% live below the international poverty line). Most (85%) of those living under these extreme chronic poverty conditions reside in rural areas (Uganda Bureau of Statistics, 2019; USPP/UNICEF, 2017). As of 2020, the older adult population in Uganda was estimated at 1.5 million (i.e., 4.3% of the total population of Uganda) and is projected to reach 6.2 million by 2050 (Uganda Ministry of Gender, 2020). This dramatic increase underscores the need to take measures to promote healthy aging.

The continuing health and wellbeing of older adults in Uganda, remains very critical as they have historically provided an essential contribution to Ugandan society through the engagement in caregiver responsibilities to numerous grandchildren, who have been left under their care primarily due to the HIV epidemic in the country that killed a majority of their adult children (Ntozi & Nakayiwa, 1999; Uganda Ministry of Gender, 2020). One pathway to ensuring that Uganda's older adults continue to live in good health and remain productive requires the government to prioritize delivering sufficient, reliable, and safe WASH services. The factors that impede WASH access among vulnerable populations in Uganda are rooted in social, economic, environmental, technological and political factors (IRC Uganda, 2019). For example, according to the International Rescue Committee (IRC) of Uganda on WASH access,

the government of Uganda's efforts to achieve universal WASH coverage are hindered by the limited budgetary allocation of only 3% to the WASH sector (IRC Uganda, 2019).

During the COVID-19 epidemic in Uganda, the government launched several interventions to support its citizens cope with the challenges of the pandemic. Notably, within the context of WASH, three key initiatives were introduced. Firstly, to reduce the transmission of the virus in crowded public spaces, it has been reported that the government rolled out an intervention to extend water and sanitation services. This involved the installation of over 300 water points where the public could access handwashing and disinfection services free of charge (Amaechina et al., 2020a; Sebwami S Javira, 2020). Secondly, as part of the emergency response, water services were extended to informal settlements in urban areas that were previously not served with access to potable water. These facilities were used jointly by different households within the catchment area. Finally, to alleviate the financial burden on households, the government suspended disconnection of those who defaulted in payment of their water bills. These interventions were crucial in ensuring access to clean water and proper sanitation, which played a significant role in controlling the spread of COVID-19 in Uganda. (Bukenya Bedru, 2020).

While previous studies focused on the impacts of the pandemic on the population, as well as the responses of the government to the pandemic, WaterAid examined how the vulnerable and excluded groups in East Africa were put at risk in their ability to meet their WASH needs due to the pandemic (WaterAid, 2021a). Their gender, equity, and inclusion study revealed that, generally, women in East African households were unable to meet their needs as a result of continued systemic, widespread gender inequality, and social exclusion. They suggested that even in instances where efforts were made to meet the needs of women through the implementation of emergency services such as communal water points and sanitation facilities, only the practical needs of these women were met, with limited response

to their strategic interests (WaterAid, 2021b). This negatively impacts the psychosocial health of these women, in addition to other environmental risks and the deepening of socio-economic vulnerabilities. Again, the senior population, who are often faced with higher degrees of social exclusion, are at the apex of the risk group concerning such varied levels of deprivation (HelpAge International, 2020).

There is thus an increasing call for interventions into the most sustainable policy approaches and practices to ensure that such vulnerabilities are reduced to enhance the adaptive capacities of households. Evidence in policy for sustainable adaptive practices suggests a higher likelihood of policy success based on evidence from the targeted beneficiary group (Mayne et al., 2018).

1.3 Research Objectives

This research is part of a larger research program investigating the health and wellbeing impacts of COVID-19 in SSA. The research program aims to foster cross-national learning and knowledge exchange across countries and regions that are vulnerable and faced with emergencies related to health, environment and the economy. The main goal of this thesis is to explore the psychosocial health and wellbeing of older adults in Uganda, by examining their WASH access challenges as well as their perceptions and behaviours related to COVID-19 in order to inform best practices in the ongoing COVID-19 pandemic, future pandemics and other health emergencies.

Specifically, this thesis seeks to address the following objectives:

1. To examine the barriers to WASH access among older adults during the COVID-19 pandemic in SSA, using Uganda as a case study.

2. To assess older adults' knowledge, attitudes, risk perceptions and practices (KARP) around COVID-19 prevention and management in Uganda.

3. To examine the effects of WASH-related barriers and experiences of COVID-19 on the psychosocial health and wellbeing of older adults in Uganda.

1.4 Potential Research Contributions

This research is a response to recent calls for health geographers to investigate how the convergence of emerging infectious diseases and the lack of resources in developing countries affect the health and wellbeing of older adults (Elliott, 2022). By examining the links between WASH barriers, COVID-19 KARP, and health and wellbeing of older adults in Uganda, the research specifically contributes to understanding how resource access relates to vulnerable people's KARP in the context of the COVID-19 pandemic. It also illuminates how the resource constraints on vulnerable people's KARP affects their general health and wellbeing. Finally, the research comes at a time countries globally are still finding means to cope with the effects of the current pandemic whiles drawing lessons for future. In this regard, the research provides a timely contribution to policy by revealing the unique WASH vulnerabilities confronting older adults during health emergencies and suggesting ways to tackle them.

1.5 The geographies of health, pandemics, and WASH

This research is situated within health geography to take advantage of the developments in the sub-discipline, particularly the move away from a biomedical perspective of health to the incorporation of broader social and cultural theory of health and the reconceptualization of place as a relational concept (Crooks et al., 2018; Gatrell & Elliott, 2015), to examine the direct and indirect impacts of COVID-19 among older adults in Uganda.

Health geography is a growing and methodologically diverse sub-discipline of human geography that followed years of evolution of positivist medical geography. Medical geography primarily focused on geographical patterns of disease, environmental determinants

and the spatial distribution of disease, and health care access and the idea that health and illness are produced by the role of biomedicine and formal healthcare systems (O'Brien, 2015). However, it became clear that socio-environmental factors and behavioural variables were key contributory factors to population health and illness. This realization was partly influenced by the 1957 WHO definition of health as "a complete state of physical, mental and social wellbeing and not merely the absence of diseases or infirmity". This notion of health made it obvious that people who in their everyday life seem physically fit and free from diseases might technically be unhealthy, and hence health could also be understood as the availability of resources, both personal and societal, that help us to achieve our individual potential (Gatrell & Elliott, 2015).

This transition in the conceptualization of health led health geographers to begin exploring ways to understand the questions of health and wellbeing through the reconceptualization of place. Unlike positivist medical geographers who conceptualized place as a mere geographical location where they can map the health of medical subjects, health geographers view place as "… a setting imbued with meaning and experiences" (Gatrell & Elliott, 2015, p. 23). These settings and experiences are recognized through the social, cultural, economic, or political processes that shape and affect people's health and wellbeing (O'Brien, 2015). Thus, place is a relational concept constituting social relations and health-promoting resources relevant to health, which are in turn shaped by political, sociocultural, and economic factors critical in producing health inequalities (Gatrell & Elliott, 2015; Kuuire & Dassah, 2020).

Aside from the reconceptualization of place, health geography also advocates a move towards a multiscale analysis of health and disease formation, with the idea that changes in the pattern of diseases and health over time do not only occur at the individual level of risk but are also influenced by decision-making, power relations, and interactions at community, national,

and international levels (Crooks et al., 2018; Rishworth & Elliott, 2022). This move is largely influenced by wider social science debates, particularly issues of structure-agency dynamics.

The introduction of structure-agency dynamics in health geography analysis led to the recognition that health and wellbeing are produced by multiple processes that cut across scales. This transition provided health geographers the "capacity to integrate people and places" and "the local and the global" (Kearns & Moon, 2002, pg. 614), to reveal the intrinsic interconnections between the health of people and the health of place (Gatrell & Elliott, 2015).

The conceptualization of place as containing social relations and physical resources, including WASH, relevant to health and the multi-scaler analysis of health geography has collectively proven to be a useful analytical prism for studying the spread and management of infectious disease. Health geographers have argued that globalization and increased mobility are accelerating the temporal and spatial spread of infectious diseases, including the ongoing COVID-19 pandemic (Changruenngam et al., 2020; Findlater & Bogoch, 2018; Mahmud et al., 2019; Oppong, 2020). Storer et al. (2022) have gone beyond the drivers of the spread of the COVID-19 virus across place to examine how governments' mapping of the pandemic interacts with local politics to produce "geographies of blame" and fosters acts of discrimination against groups perceived to be driving the spread of the virus. In studying the management of the virus, health geographers have suggested that the resources in particular places play significant roles in determining whether people and communities can manage the spread of the pandemic. For example, Abu & Elliott (2022) revealed that inadequate WASH in healthcare facilities in Kisumu, Kenya hindered effective response to the COVID-19 pandemic. Similarly, Stoler et al. (2021) argued that water insecurity in LMICS made it challenging for households to observe handwashing and physical distancing guidelines, which are critical for preventing the spread of the virus.

Although health geographers continue to explore these diverse topics within pandemic contexts, there appears to be little emphasis on how infectious diseases, including COVID-19 and the uniqueness of place (e.g., access to resources), affect the most vulnerable in society (e.g., older adults). Multiple social determinants of health and existing inequalities contribute to unequal disease burden among places and population groups (Quinn & Kumar, 2014). For example, while older people worldwide are known to be vulnerable to COVID-19 morbidity and mortality, those living in LMICs, have inadequate access to WASH, and lack access to adequate healthcare, are more likely to be infected (HelpAge International, 2020b). Similarly, the urban poor in developing countries and racialized minorities in Europe and North America have suffered disproportionate impacts of the pandemic due to the confluence of risk factors that make it impossible for them to practice social distancing, observe regular hand washing, and avoid sharing private spaces (Hasan et al., 2021). This implies that disadvantaged groups worldwide face unique challenges during pandemics. Yet, studies exploring the geographies of pandemics have made little attempts to engage disadvantaged populations in order to address the impacts of pandemics on their health (Kondo et al., 2022; Quinn & Kumar, 2014).

1.5.1 Global pandemics and disaster risk reduction policies

Similar to understanding the general health and wellbeing of populations as a social and cultural construction, health geographers have also engaged with the concept of place and power to understand the emergence, transmission, impacts, and management of pandemics (Fayet et al., 2020; O'Brien, 2015b; Storer et al., 2022). For example, O'Brien, (2015) draws on the concepts of place and power to explain how HIV infection rates and care access varies across different population groups. Reflecting on Craddock's framework for mapping vulnerabilities and proposing HIV prevention strategies (Craddock, 2000), they suggest that people with limited power and lack control of their bodies were conduits for disease transmission. Similarly, Quinn & Kumar (2014) examined how place and the distribution of

social determinants of health result in unequal distribution of morbidity and mortality burdens of the influenza virus. They argued that effective policy response to infectious diseases risk reduction must engage with the social determinants of health. Overall, this literature draws attention to the need to pay particular attention to existing vulnerabilities that shape the impacts of public health emergencies and policy responses (The Sphere Project, 2011).

In line with these calls, policymakers have adopted frameworks over the years that reflect a move towards a holistic approach to addressing issues of pandemics. Starting with the Hyogo framework for action, a ten-year action plan (2005-2010) for disaster risk reduction, including reduction of losses in lives, livelihoods, infrastructure, and other economic and socio-environmental assets of communities and nations, was adopted by UN member states in 2005 (UN, 2005). Despite the framework's ambitious nature, critics argue that it failed to engage with the extensive risks (e.g., everyday needs and risks such as water and food security or floods and droughts that are lived with) that affect the poorest and marginalized in society (Oxfam International, 2013). Additionally, the framework insufficiently addressed the needs of the most vulnerable and marginalized, particularly women, children, and older people who bear the disproportionate burden of disaster risks.

Most notably also, the Hyogo framework did not place health-related disasters at its center like its successor frameworks such as the Sendai framework for disaster risk reduction (SFDRR), the Health Emergency and Disaster Risk Management Framework (HEDRMF), and the UN framework for the immediate socio-economic response to COVID-19. While the successor frameworks emphasize the need for placing the needs of the most vulnerable and marginalized groups at the center of disaster risk reduction policy, they both fail to outline the importance of place, power, and time in shaping vulnerabilities to disasters. For example, the frameworks tend to ascribe vulnerability status to specific groups of people (e.g., women, disabled, older populations) without paying attention to the uniqueness of power and place

shaping disaster risks. "Treating these people as a long list of vulnerable groups can lead to fragmented and ineffective interventions, which ignore overlapping vulnerabilities and the changing nature of vulnerabilities over time" (The Sphere Project, 2011, p. 11).

It is evident from the foregoing that health geographers can contribute to more effective disease risk reduction policies (Craddock, 2000). This can be done by, for example, integrating place, power, and time concepts of geography into the study of disease exposure and management in order to explain the social, economic, political, and cultural construction of COVID-19 morbidity and mortality. This research is situated within this context and seeks to explain how older people in different places are likely to be at risk of COVID-19 exposure due to social, political, economic, and cultural factors that construct health, disease, and wellbeing inequalities. The findings of this research would contribute to ensuring that socially disadvantaged subpopulations do not go unnoticed during pandemic response strategies implemented by policymakers and other stakeholders.

1.6 Thesis Outline

This thesis is organised after the traditional monograph thesis structure. Given this, the thesis is logically organized into five progressive chapters. The first chapter contains a general overview: the research problem, context, objectives and contributions. A brief description of the sub-discipline within which this thesis is located, geographies of health, further provides a disciplinary context for the work. The second chapter contains a review of relevant literature on the vulnerabilities of older adults to WASH services as well as implications for their adaptive capacities to the COVID 19 pandemic. It also discusses the theoretical underpinnings of the thesis. This is then advanced by the third chapter, which builds on the literature review to present the research design and methods. The methods of data collection, units of measurement and

analysis, are presented in this chapter. The fourth chapter presents the results organized around the research objectives. The final chapter concludes the research with a summary of key findings, discussion of the findings in the context of the relevant literature, contributions of the work to knowledge, and implications for policy and practice.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

The COVID-19 pandemic has had far-reaching impacts on population health and wellbeing globally, particularly for vulnerable populations and regions with limited resources (UN, 2020). This research contributes to understanding the complex interplay between COVID-19 and WASH access in shaping the psychosocial health and wellbeing of older adults in Uganda. Therefore, this chapter of the thesis is structured to discuss the emergence of the COVID-19 pandemic and examine how the lack of access to safe WASH services can be a conduit for disease exposure and negative health and wellbeing outcomes. It begins by exploring the emergence of COVID-19 across space and place, pointing out how different geographical locations have been impacted differently (section 2.2). The researcher argues that even within particular geographical locations, certain population groups are more vulnerable by virtue of their demographic and socio-economic composition (section 2.3). This point is illustrated using how the lack of access to safe WASH services in SSA, and particularly among older adults, hinders handwashing practices and contributes to increased exposure to COVID-19 infections and poor psychological health outcomes (section 2.4). Finally, the feminist political ecology of health is introduced (section 2.5) as a useful theoretical lens in understanding how access to basic necessities for everyday living – water, sanitation, and hygiene services – influences health behaviours as well as health and wellbeing outcomes of older adults in Uganda during the COVID-19 pandemic.

2.2 Geographies of infectious diseases: COVID-19 pandemic in space, place, time, and scale

In recent years, the emergence and scale of infectious disease with pandemic potential has been on the rise. Within the last two decades alone, the world has recorded four major pandemics, which is as many as the number recorded in the entirety of the twentieth century (Figure 1) (Piret & Boivin, 2021). These pandemics have posed devastating burden on human health and wellbeing, thus making the prevention and management of infectious diseases a priority area for the WHO (WHO, n.d.). As shown in Figure 1, the latest among the growing list of pandemics in the 21st century is the COVID-19 pandemic, which began in late 2019 and has continued till date. This novel coronavirus disease is caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) virus and was first detected in Wuhan, China. Beginning as an epidemic in China, the virus spread rapidly across international borders and was subsequently declared a pandemic by the WHO on March 11th, 2020, barely three months after its detection. As at the time of writing (October 10, 2022), the COVID-19 virus had infected over 600 million people globally and killed over 6.5 million people (WHO, 2022c).

Pandemic	Years	Age groups most affected
1918 Spanish flu	1918-1919	Adult, Children, & Pregnant women
Asian flu	1957-1959	Children & Elderly
7th Cholera	1961-ongoing	No data
Hong Kong flu	1968-1970	Elderly
SARS	2002-2003	Adults (25-70)
Swine flu	2009-2010	Adolescent & young adults
MERS	2015-ongoing	No data
COVID-19	2019-ongoing	Elderly

Figure 2.1. Pandemics in the 20th and 21st centuries. Adapted from Piret & Boivin (2021)

As the frequency of pandemics increase, our understanding of the origins, mechanisms of spread, and implementation of control measures of infectious diseases have also improved. Prior to the 19th century, the emergence and spread of infectious diseases in particular places were explained by religion (Chowell & Rothenberg, 2018). For example, during the Black Death and the Justinian Plague, people believed to be "grave sinners", such as women and minorities, were targeted as the causes of the infections (Huremović, 2019). This lack of knowledge about the origins and disease transmission routes resulted in catastrophic effects (e.g., over 200 million people died in Eurasia and between 30-60% of Europe's population died within 5 years during the Black Death) (Yan & Chowell, 2019). In contrast, recent advances in technology have facilitated the application of advanced spatial and statistical models to understand the geographic point-of-origin and spatiotemporal patterns of infectious disease emergence and spread (Adiga et al., 2020; Chowell & Rothenberg, 2018). This has facilitated

rapid responses such as prescribing preventive measures against further spread of more recent pandemics like the swine flu, the Ebola virus, and the ongoing COVID-19 pandemic.

Despite these advancements in the 21st century, the health impacts of pandemics have remained extremely high, have become easily transmissible across geographical locations (Akin & Gözel, 2020), and have disproportionately affected disadvantaged populations worldwide (Chung et al., 2020). These dynamics have attracted growing interest from health geographers who leverage the concepts of place, space, time, and scale to help understand why pandemics reach larger scales in shorter amounts of time and why it affects people in certain locations more than others. For example, Andrews & Moon (2005, pp. 56–57) indicate that diseases emerge in and spread through space, thereby imparting certain spatial patterns, which help "… determine when (and where) diseases will occur and how they spread". This approach was used to great effect at the start of the COVID-19 pandemic to examine the origin of the virus and the patterns through which it travelled from its first victim in Wuhan across China and the global scale (Pranzo et al., 2022).

A recent review found that in the first year of the COVID-19 pandemic, approximately 35% of epidemiological geography papers conducted some form of spatiotemporal analyses revealing useful insights that informed pandemic control policies (Pranzo et al., 2022). According to the review findings, about 20% of the studies reported that confirmed cases were spatially autocorrelated, 7% found a positive correlation between local propagation and proximity to known outbreaks, 7% found a positive correlation between secondary outbreaks and proximity to primary outbreaks, and 12% found a positive correlation between the insurgence of secondary outbreaks and the level of connectedness between areas of secondary outbreaks and areas of primary outbreaks. These findings demonstrate that human movement across space was a major contributor to the spread of the COVID-19 pandemic. Consequently, policy measures such as border closures and mobility restrictions were implemented in cities

and countries in most parts of the world to limit human interactions across space (Bates et al., 2021; H. Lau et al., 2021; Teachout & Zipfel, 2020).

As the pandemic evolved over time, data from the several monitoring organizations such as the WHO, John Hopkins, the CDC, and CDC Africa revealed wide disparities in COVID-19 cases and fatalities between countries and regions. For example, by the end of the first year of the pandemic (March 31, 2021), Europe had confirmed over 40 million cumulative cases and nearly a million deaths, representing 31% and 27% of the total confirmed cases and deaths, respectively. Similarly, North America recorded over 35 million cases and over 800,000 deaths, representing 27% and 27% of total confirmed cases and deaths, respectively. In contrast, Africa recorded a little over 4 million cases and 112,755 deaths, representing 3.3 % and 3.8% of total confirmed cases and deaths, respectively (Our World in Data, 2022). There were also variations within regions. For example, South Africa recorded about 36.7% and 46.9% of the total confirmed cases and deaths in Africa, respectively. These variations led to suggestions that the pandemic might be manifesting differently in different contexts (Mogi & Spijker, 2021; Van Damme et al., 2020), and thus called for research that examines the contextual factors influencing the variations in COVID-19 infections and fatalities (United Nations, 2020c).

In response, several scholars analysed how contextual (i.e., variables relating to the wider nature of the environments – social and physical opportunities in places where people live, including the availability of and access to services) and compositional factors (i.e., variables relating to the socio-demographic features of people living in a particular place such as gender, age, employment, ethnicity, and personal economic resources, among others) (Collins et al., 2017; Macintyre et al., 2002) shaped the disease's spread and impact between and within countries and regions. At the regional level, Biccard et al. (2021), examined the impact of resources availability, comorbidities, and critical care interventions on the outcome

of COVID-19 mortality in Africa. Using data from 3140 COVID-19 patients from 64 hospitals across 10 African countries, the authors revealed that increased mortality rates of critically ill COVID-19 patients (mean age of 55.6 years) in Africa were associated with insufficient critical care resources and comorbidities of HIV/AIDS, diabetes, and other chronic illnesses. This resulted in 10-23 more deaths per hundred compared to the global average. It is worth noting that this research focused on tertiary hospitals, which are relatively well-resourced. Given that lower-level healthcare facilities often lack critical care resources, these statistics may have underestimated the severity of the situation but nonetheless demonstrates the importance of using contextual factors to explain the varied impacts of the pandemic. Related research by Kreienbrinck et al. (2021) in SSA also draw attention to the influence of socio-economic, demographic, and public health indicators on COVID-19 case-fatality rates. They found that higher human development index, higher political stability index, higher number of hospital beds, and higher population density were associated with lower COVID-19 case fatality rates in SSA.

Research focusing on country and regional level disparities often mask the variations that exist within countries such as the differences between communities and individuals. Yet some scholars have suggested that in many cases, the COVID-19 virus extended to disadvantaged communities who are usually impoverished, lacking access to health services, safe WASH, and limited capacity to comply with public health measures (de Souza et al., 2020; Van Damme et al., 2020), which could result in higher risks of exposure. For instance, Devan Hawkins compared data on COVID-19 cases, tests, and rates to social determinants of health variables such as poverty, income, employment, renting, and insurance coverage to explain variations in COVID-19 rates in US communities (Hawkins, 2020). Their findings showed that communities with higher poverty, high unemployment, low incomes, lower insurance coverage, and higher proportion of their workforce employed in essential services

had higher rates of COVID-19 infections. Similarly, Ha & Lee (2022), also studying in the US and controlling for spatial autocorrelation, found that percentage of people in poverty, number of restaurants, and percentage of people working remotely were associated with COVID-19 incidence rate. While both studies were conducted in a high-income country, they revealed how compositional factors at the community level can influence the spread and impacts of the pandemic.

In LMICs, research has mainly focused on how poor access to quality WASH services contributed to the spread of the virus and limited people's capacity to comply with public health measures such as frequent handwashing and physical distancing. For example, Zvobgo & Do (2020) investigated the challenges poor municipalities in Zimbabwe, an SSA country, face in their quest to comply with WHO's handwashing guidelines. Drawing on interviews with residents of Chitungwiza, the results showed that the communities lacked adequate access to safe water and sometimes gathered in queues of over 100 people without adherence to social distancing protocols. Thus, lack of adequate access to water did not only restrain their compliance to handwashing guidelines but also hindered their ability to observe physical distancing and stay-at-home orders during national lockdowns. Stoler et al. (2021), drawing on surveys from 8,297 households across 29 sites in LMICs, revealed that 45.9% of participating households either were unable to wash their hands or borrowed water from their neighbours. Another 70.9% faced one or more water-related challenges, including insufficient water for bathing, drinking from unsafe sources, and going to bed thirsty, among others. These factors undermine households' ability to practice handwashing and physical distancing. Thus, inadequate access to WASH services place multifaceted limitations on households during the COVID-19 pandemic.

The foregoing demonstrates that pandemic health impacts vary across space, place, and scale over time. Additionally, contextual and compositional factors underscore the disparities

in health outcomes observed within and across regions, countries, and communities. However, it also points to the importance of analysing socio-demographic and socio-economic status (SES) to help identify populations most at risk of COVID-19 infections and death.

2.3 Population groups at highest risk during pandemics: older adults in sub-Saharan Africa and the COVID-19 pandemic

Although people of all ages are at risk of getting infected and dying from COVID-19, it has been widely recognized that older adults are at a much higher risk of severe illness and death following a COVID-19 infection (Centers for Disease Control and Prevention, 2021; UN, 2020; World Health Organisation, 2021). The age group characterised as older adults or seniors vary in different contexts. However, in this research, the term older adult is used in line with the WHO definition and the official designation of older adults by the Ugandan ministry of Gender, Labour and Social Development as people aged 60 and above (Government of Uganda, 2009). Available statistics indicate that globally, these group of people have suffered significantly higher COVID-19 related deaths and severe illnesses compared to any age group. For example, a cross-sectional study of 20 sub-Saharan African countries revealed that as of September 1, 2020, a total of 1,650 (2.4% of total confirmed cases) deaths were reported out of a total of 69,580 COVID-19 cases. Out of this number, 850 deaths, representing 51.3% occurred among people aged 60+ (Dalal et al., 2021). In similar research using data from 16 countries in Europe, North America, and Asia, Yanez et al. (2020) found that compared to people aged 54 and below, the mortality rate among people aged 55-64 was 8.1 times higher and more than 62 times higher for people aged 65 and above. These statistics are not different from most pandemics in the world's history in terms of their disproportionate effects (hospitalizations and deaths) on older adults (Figure 1) (Akin & Gözel, 2020).

Older people suffer disproportionate effects of the COVID-19 virus due to declining immune function associated with aging. Unlike younger people, older adults experience immunosenescence – i.e., the gradual decline of the immune function that hampers pathogen recognition, alert signaling, and clearance and inflammageing – i.e., the overactive and ineffective system alert instigated by elevated levels of blood inflammatory markers (Ferrucci & Fabbri, 2018) as they age. These processes significantly reduce the ability of the immune system to protect the body against viral infection and have been found to be associated with the susceptibility of older adults to COVID-19 symptoms severity and fatality (Mueller et al., 2020). While age is by far the strongest predictor of COVID-19 symptoms severity and death, chronological age or age alone is not an adequate explanation for the COVID-19 severity and fatality among older adults (Bello-Chavolla et al., 2021; Mallapaty, 2020). Several studies from the around the world suggest that older people living with underlying health conditions and lacking access to resources relevant for coping COVID-19 are at a higher risk of severe illness and death from COVID-19 (Bajgain et al., 2021; Bambra et al., 2020; Dalal et al., 2021; ISS Working Group for Translational Research COVID-19., 2020; Mueller et al., 2020). For example, Bajgain et al. (2021) reviewed 27 articles consisting of 22,753 (median age of 56) patient cases worldwide to determine the association between comorbidities and adverse COVID-19 outcomes. They found that among the fatal cases, 84.1% of them had at least one comorbidity and were mainly aged 60+. A China CDC study during the initial stages of the COVID-19 epidemic in China revealed similar results, indicating that the majority of deaths were aged 60+ and lived with one or more comorbid conditions (China CDC, 2020). Regarding the effects of the lack of resources to cope with COVID-19, Bello-Chavolla et al. (2021) revealed that access to private health facilities and the Social Lag Index (i.e., a composite measure of social disadvantage and structural inequality using factors such as illiteracy, healthcare services, access to water, etc.) of the municipalities where COVID-19 patients lived

increased the risk of COVID-19 lethality and fatality among older adults in Mexico. These factors are not universal but are tied to places where people live and work.

Unfortunately, SSA countries and other LMICs are at the wrong side of nearly all the factors that increase the risk of COVID-19 symptoms severity and fatality of older adults. First, LMICs bear the highest burden of chronic underlying conditions in the world. The WHO estimates that about three quarters of deaths from non-communicable diseases (NCD) come from LMICs (WHO, 2022b), the majority of which occur among the older cohorts (Gyasi et al., 2022). This puts older adults in these countries at a greater risk of suffering severe illness and death from COVID-19 virus compared to those in high income countries. Second, older adults in LMICs lack social safety nets from governments. For example, compared to almost 90% of OECD countries, only 29% of SSA economies have old-age pension programs (World Bank Group, 2018). Additionally, the extended family system which provided social support for older adults in most SSA countries is collapsing, leaving them with no social support to access basic life needs such as obtaining drinking water, cooking, and washing (Braimah & Rosenberg, 2021; Rishworth & Elliott, 2022). These challenges are compounded during health emergencies and limit older adults' capacity to cope. Third, LMICs lack adequate access to basic services that will enable them to practice COVID-19 preventive measures. For example, many people in SSA do not have access to basic WASH services essential for practicing handwashing and are unable to practice physical distancing or to self-isolate when they suspect COVID-19 exposure (Stoler et al., 2021; Zvobgo & Do, 2020). The situation is even worse for older adults who are frail and lack access to social support from government and families (Braimah & Rosenberg, 2021; Rishworth & Elliott, 2022).

Therefore, although older adults globally are considered the most at risk of COVID-19 illnesses and death, those in SSA experience unique challenges, such as having the highest burden of chronic illnesses and lacking social support. This is in addition to lacking adequate

access to WASH, which can increase their risk of infection and undermine preventive practices. As the WHO and countries continue to promote non-pharmaceutical preventive measures against the spread of the COVID-19 virus, there is a need for a critical retrospection of the many factors that intersect to undermine their adoption among the most vulnerable groups in society.

2.4 WASH as an effective intervention against the spread of COVID-19 virus in SSA

In the absence of vaccines or any known effective pharmaceutical interventions to curb the spread of the COVID-19 virus and treat infections during the initial stages of the outbreak, the WHO and several governments worldwide implemented non-pharmaceutical measures to reduce the disease's spread within and across national and local borders (Lai et al., 2020; Mendez-Brito et al., 2021; WHO, 2019). These non-pharmaceutical interventions varied from country to country and over time but generally included mandatory stay-at-home policies, restrictions to public gatherings, forced closure of schools and non-essential businesses, wearing of face mask, and regular handwashing procedures, to name a few. Even with the advent of COVID-19 vaccines, which facilitated drastic declines in COVID-19 mortality and morbidity in most parts of the world, the CDC and the WHO continue to promote these non-pharmaceutical measures (Zhang et al., 2021) for preventing the disease's spread due to the likelihood of "vaccine breakthrough infections" – i.e., the likelihood of fully vaccinated people to still get infected and spread it to others (WHO, 2021; CDC, 2022). Although several of the non-pharmaceutical measures such as self-isolation and quarantine, stay-at-home policies, closure of schools and public gatherings, have been effective in reducing the spread of the pandemic (Bo et al., 2021; Lai et al., 2020; Mendez-Brito et al., 2021), they proved challenging to implement over extended periods mainly due to the disruptions to social and economic systems and the resulting negative repercussions on individuals and countries (Hartley &

Perencevich, 2020; Zhang et al., 2021). These negative impacts are more pronounced in poor countries in SSA that suffered economic crises, disruption to school programmes (especially because limited internet access hindered remote schooling), and increased hunger among the large population who depend on casual labour and daily income for their livelihoods (Haque, 2020; Umviligihozo et al., 2020). For example, estimates by the International Growth Centre, using data from 32 SSA countries, show that 9.1% of the population in SSA immediately fell into extreme poverty because of the COVID-19, with about 65% of the poverty resulting from the lockdowns, whiles 3.6% of the population became severely food deprived after 8 weeks of lockdowns (Teachout & Zipfel, 2020).

These challenges suggest that most of the non-pharmaceutical measures that disrupted economic processes are not feasible or appropriate for SSA countries. This, coupled with the fact that the region has one of the lowest proportions of fully vaccinated people in the world (as of October 15, 2022, only 24.18% of Africans were fully vaccinated compared to 77.06%, 72.29%, 66.35%, 65.18% and 62.93% in South America, Asia, Europe, North America, and Oceania (Our World in Data, 2022)), implies that non-pharmaceutical measures remain extremely critical in the region. Consequently, frequent handwashing with soap under clean running water is believed to be one of the most effective and yet less disruptive preventive measures against the spread of the COVID-19 disease in SSA (WHO 2021; CDC, 2022). Indeed, historically, effective handwashing has proven to be successful in breaking the viral transmission cycle of most infectious diseases, including the ongoing COVID-19 disease (Jefferson et al., 2009, 2020; WHO, 2019). Thus, the provision of adequate WASH services is essential for effective handwashing practices (Coultas et al., 2020; Howard et al., 2020; White et al., 2020; WHO & UNICEF, 2020). Unfortunately, many people in SSA lack access to adequate WASH. According to official estimates from the WHO and UNICEF, only 30% of the population in SSA uses a safely managed drinking water source (i.e., water from an

improved source, accessible on premises, available when needed and free from contamination), while only 21% and 26% uses safely managed sanitation services (i.e., sanitation facilities that are improved, not shared with other households, and those that the excreta is treated and disposed off in-situ) and have handwashing facilities with soap and water available at home, respectively (Figures 2, 3 and 4). In order words, at least 35% of the population in SSA do not have access to safe drinking water or must walk for over 30 minutes to access water; at least 68% either defecate openly, use unimproved sanitation services, or share sanitation services with one or more households; and at least 74% have handwashing facilities without soap and running water or do not have handwashing facilities at all.

It is important to recognise that these regional variations do not tell the full story, as vast inequalities in WASH access exist between rural and urban populations, between the poor and the rich and between vulnerable and less vulnerable population groups (WHO & UNICEF, 2021). According to the 2021 JMP report, globally, 8 out of 10 people who still lack access to basic drinking water services (i.e., water from an improved source which can be collected within 30 minutes or less) live in rural areas. Additionally, two-thirds of those lacking basic sanitation (i.e., a toilet facility that allows for safe disposal of human waste) and 92% of those practicing open defecation live in rural areas. Finally, over half of those lacking handwashing facilities also live in rural areas (WHO & UNICEF, 2021). In SSA, access to safely managed water varied from 46% in Congo to just 6% in Chad (Tetra Tech, 2020; UN Water, 2020). Fifty-four percent (54%) of the urban population has access to safely managed water, and only 13% of the rural population do. In contrast, only 1% of the urban population in SSA drink from surface water sources compared to 11% in rural areas. Aside from the contextual factors that make people in SSA more likely to suffer from inadequate WASH access, compositional factors such as age, gender, education, and wealth further shape which households or individuals get access to WASH or suffer the negative repercussions of inadequate WASH. For

example, existing social norms require women and girls to provide water at the household level. This often means that they spend several hours, walking long distances and staying in queues, to access water for their households (Adams et al., 2021). Sometimes, they suffer several abuses while performing these tasks (Nunbogu & Elliott, 2022). Similarly, older adults suffer from multiple vulnerabilities in WASH access due to physical challenges (e.g., weaker muscles, poor eyesight, and hearing challenges), limited participation in household and community level WASH decision-making and lack of disability friendly WASH designs, including boreholes and square toilets that do not cater for the needs of older adults (Cavill et al., 2022).
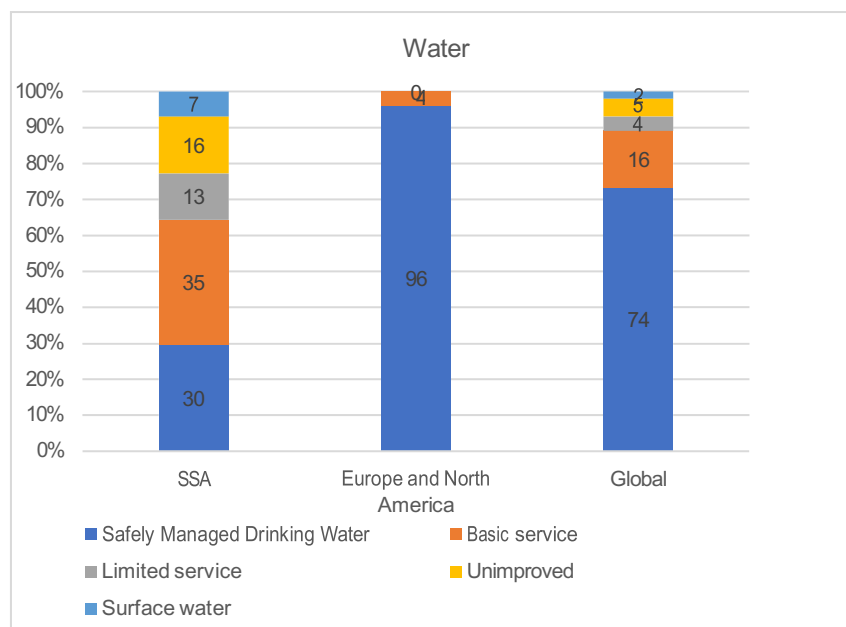
Figure 2.2 Proportion of population with access to safely managed water

Source: Data from WHO & UNICEF 2021
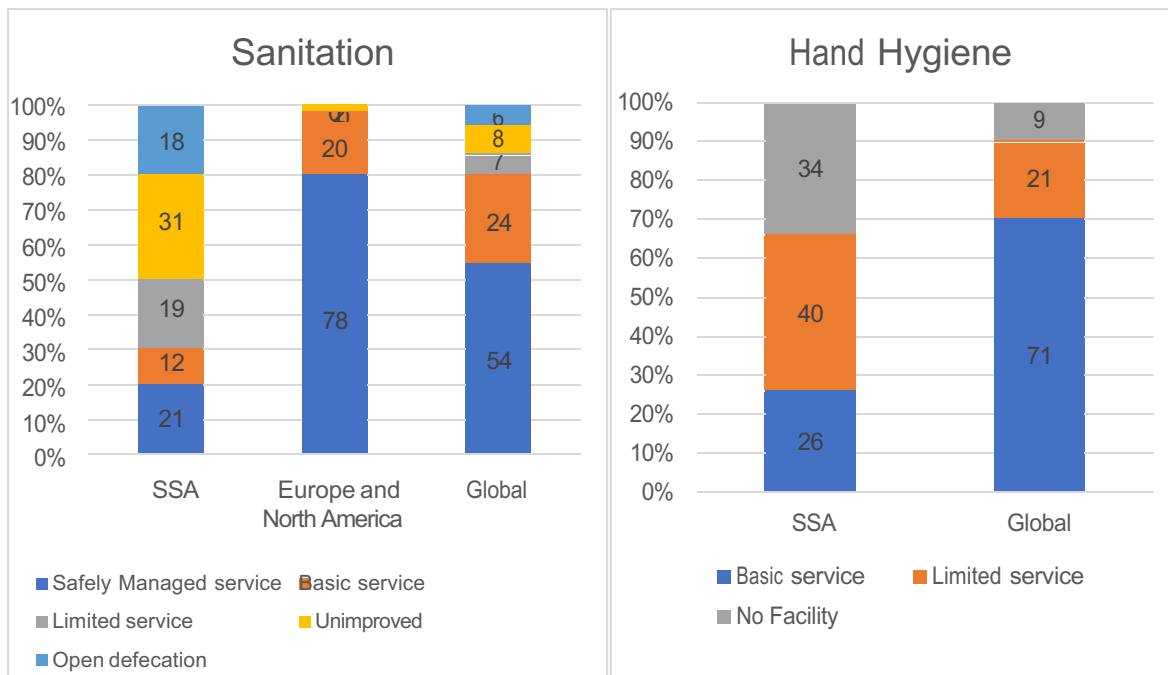
Figure 3. Proportion of population with access to safely managed sanitation services
Source: Data from WHO & UNICEF, 2021

Figure 4. Proportion of population with access to handwashing facilities with soap and water at home
Source: Data from WHO & UNICEF, 2021

2.5 Behavioural and health and wellbeing outcomes associated with WASH insecurity

WASH insecurities – i.e., the combination of physical scarcity and lower levels of WASH services (Adams et al., 2021; UNICEF, 2021) – directly hinder handwashing practices and indirectly impede compliance with other COVID-19 preventive practices (Ekumah et al., 2020; Stoler et al., 2021; Zvobgo & Do, 2020). Stoler et al. (2021) revealed in a pre-COVID-19 survey that 45.9% of 8,297 households in LMICs were unable to wash their hands in the four weeks prior to the survey. This was primarily due to lack of access to adequate water for various household uses regardless of whether it was located within or outside household premises. However, as Amuakwa-Mensah et al. (2021) found in their study of 12 SSA countries, households with water outside of their premises were less likely to wash hands under running water with soap for 20 seconds compared to those with water within their premises. This may be because of households' tendency to prioritize water for cooking and drinking to

cut down on expenses or time and energy invested in fetching water from outside of their premises (Rishworth & Elliott, 2022; Stoler et al., 2021). Similar findings have been reported for the effects of access to handwashing facilities on handwashing behaviour. For example, an integrative review by White et al. (2020) found associations between having a handwashing facility with soap and water, having a handwashing facility close to a kitchen or toilet, and having handwashing facility that is desirable and user friendly and household handwashing behaviours. Thus, both availability and convenience of access to water and handwashing facilities are important considerations for household handwashing behaviours. In addition to directly influencing handwashing behaviours, WASH insecurity is also reported to encourage violations of other preventive practices, particularly lockdowns (Ekumah et al., 2020; Zvobgo & Do, 2020). This is because households without access to WASH services within premises are forced to go out to access them elsewhere and may come into contact with others, violating lockdowns and physical distancing protocols in the process (Ekumah et al., 2020).

WASH insecurity is associated with several negative psychosocial or mental health outcomes such as stress, anxiety, worry, frustrations, and feelings of harm, among others (Brewis et al., 2021; Kangmennaang et al., 2020; Nunbogu & Elliott, 2022). These negative psychosocial health outcomes emanate from uncertainty regarding material resources relevant to WASH (Wutich et al., 2020), fear of physical harm (Stoler et al., 2021), injustice in water sharing and use (Brewis et al., 2021), and community conflicts (Brewis et al., 2021; Wutich et al., 2020). Whiles very few studies have examined the effects of WASH insecurity on mental health during the current pandemic, past experiences have shown that during health emergencies, the negative psychosocial health outcomes associated with WASH insecurity are elevated (Lau et al., 2008). This is because of increased anxiety due to the fear of contracting infections, trauma of stigma and discrimination in WASH access and worry over the lack of

resources to implement preventive practices and cope with the negative socio-economic impacts (Amuakwa-Mensah et al., 2021; Lau et al., 2008; UN, 2020).

These mental health stressors may be higher among vulnerable populations such as women and older adults (Tyler et al., 2021), who are already WASH distressed (Cavill et al., 2022; Rishworth & Elliott, 2022), have higher risk perceptions (Amuakwa-Mensah et al., 2021), and fear they may not be able to access WASH to facilitate preventive practices. For example, Lau et al. (2008) examined the impact of the 2003 SARS outbreak in Hong Kong on subjective wellbeing of older adults. They found that although overall (for both older and younger adults) subjective wellbeing remained comparable to pre-SARS levels, older adults (65+) had significantly lower levels of subjective well-being compared to younger adults (35-46 years). Additionally, older adults living in heavily infected districts, women, less educated people, people with underlying conditions, and unemployed people had significantly lower levels of subjective well-being. At the same time, these groups, particularly older adults, women, and the less educated, were less likely to adopt preventive measures due to limitations relating to resource access. This is also confirmed by a more recent study by Amuakwa-Mensah et al. (2021), who revealed that older adults in SSA have high COVID-19 risk perception and yet lack access to adequate water to practice frequent handwashing. These imply that higher levels of resource vulnerability, in this case WASH insecurity, and higher levels of COVID-19 risks can contribute to heightened anxiety and stress, leading to poor mental health and wellbeing outcomes.

2.6 The feminist political ecology of health framework in the COVID-19 context

This research draws on the feminist political ecology of health (FPEH) framework (Nunbogu & Elliott, 2021) to examine how access to basic necessities for everyday living – water, sanitation, and hygiene services – influences health behaviours as well as health and wellbeing

outcomes of older adults in Uganda during the COVID-19 pandemic. The FPEH is an amalgamation of theoretical perspectives from feminist political ecology (FPE) and political ecology of health (PEH). PEH, as the name implies, takes a health-centred approach to understanding how human health and well-being is influenced by social, economic, and environmental factors across space and time (Nichols & Del Casino, 2021). The utility of the PEH is in its ability to (1) show the effects of diseases on livelihoods and how societies respond to these effects, (2) reveal how health is contextualized, and how the existing unequal power relations shape access to resources and even health information, and (3) reveal how socio-political decisions influence power relations and lead to particular health and wellbeing outcomes (Nunbogu & Elliott, 2021). Whiles PEH has been very successful in explaining how political and power structures and relations shape health and wellbeing outcomes, it pays little attention to how gender dimensions determine access to resources and the resulting effects on human health and well-being (Nunbogu & Elliott, 2021; Senanayake, 2022). In this regard, the FPE uses a gender lens to explain the construction of power relations in space and how they shape who has access and control over resources (Adams et al., 2018; Elmhirst, 2011). Due to its focus on gender and power relations, FPE can explain how unequal political and economic power relations influence access to resources and lead to gendered inequalities and marginalization (Adams et al., 2018). Despite its central focus on gender, FPE scholars also recognize the complex interactions between gender and other sources of social disadvantage such as race, class, disability, age, and ethnicity and have increasingly advocated for a more intersectional approach when conceptualizing gender (Mollett & Faria, 2013). Additionally, FPE, like PEH makes a strong case for exploring how actions at higher scales of social organization (e.g., global, and national levels) influences access to resources at the local level (e.g., community and household levels).

The integration of FPE and PEH provides two important insights relevant to understanding how socio-political structures shape access to WASH for older adults, and how access to WASH can influence their COVID-19 related behaviours and health and wellbeing outcomes. First, the FPEH posits that human health is mediated by inequalities and deprivation (e.g., WASH insecurity), which are collectively produced by several factors – political, social, economic, environmental, and cultural – operating at multiple scales (e.g., micro, meso, and macro scales) (Nunbogu & Elliott, 2021). This implies that understanding human health and well-being requires both an investigation into the pathways through which inequalities, deprivation, and marginalization affect health and wellbeing and how socio-political structures at different scales shape resource access or (re)produce inequalities. This research employs this construct to examine the variety of factors that shape unequal access to WASH among older adults in Uganda and the resulting health and wellbeing outcomes within the context of the COVID-19 pandemic. Second, the FPEH points out that social structures influence human agency – i.e., the capacity of an individual to freely select their behaviours. That is, although, individuals may be willing to perform certain actions, the broader social, economic, political, and environmental context can hinder their capacity to implement their preferred behaviours. For example, Amuakwa-Mensah et al. (2021), revealed that although older adults in SSA were willing to practice frequent handwashing, they were limited by water insecurity. On the other hand, broader social structures can facilitate the implementation of preferred behaviours. The current research uses this construct to examine how access to WASH affects COVID-19 related risk perceptions, attitudes, and practices among older adults in Uganda.

2.7 Chapter summary

The literature review provided an overview of the current state of knowledge regarding WASH issues during the COVID-19 pandemic, starting with a brief history of pandemic

impacts and responses. The review identified key recurring themes and research gaps, including the increasing frequencies of pandemic emergence and its devastating effects on human health and wellbeing. Additionally, it emphasised the role of contextual and compositional factors in producing disproportionate adverse impacts on specific geographical regions and population groups. In this regard, SSA has been identified as a region with limited access to safe WASH services, and older adults and women in the region are among the most vulnerable population groups. These inequities contributed to difficulties in complying with COVID-19 preventive measures in the region. Thus, the review emphasized the importance of addressing inadequate WASH services to reduce disease exposure and improve direct and indirect health outcomes among vulnerable populations.

Overall, the literature review underscores the need for a comprehensive approach that addresses both the direct impacts of COVID-19 and the indirect effects of inadequate WASH services. It also emphasizes the importance of considering vulnerable populations when developing interventions to mitigate the effects of COVID-19. The literature recommends further research on the impact of socio-demographic and economic factors on COVID-19 infections and other COVID-19-related health outcomes, specifically the role of safe WASH services in reducing disease exposure and adverse health outcomes, particularly for vulnerable populations.

To address these gaps, this thesis draws on key health geography concepts and utilizes feminist political ecology of health to examine the health and wellbeing of older adults in the context of WASH and COVID-19. Specifically, it uses data from a cross-sectional survey of Ugandan older adults to explore their psychosocial health and wellbeing by examining their WASH access challenges and their perceptions and behaviours related to COVID-19 to inform best practices.

CHAPTER THREE
RESEARCH DESIGN AND METHODS

3.1 Introduction

This chapter describes the research design and methodology employed to address the research objectives: (1) to examine the barriers to WASH access among older adults during the COVID-19 pandemic in SSA, using Uganda as a case study; (2) to assess older adults' knowledge, attitudes, risk perceptions and practices (KARP) around COVID-19 prevention and management in Uganda. and (3) to explore the effects of WASH-related barriers and experiences of COVID-19 on the psychosocial health and wellbeing of older adults in Uganda. The chapter begins with a comprehensive description of the research context, followed by an overview of the survey instrument and methods of used in administering the survey. Finally, the chapter concludes by explaining the statistical analyses used and ethical considerations addressed in the research.

3.2 Research Context

3.2.1 Selection of Research setting

This research was conducted in four rural communities, which were randomly selected within four districts (e.g., Mukono District, Kyunga District, Buikwe District and Buvuma Island Districts), all in the Greater Mukono Region Area of Central Uganda (Figure 3.1). Uganda was purposively chosen for this research in the context of the COVID-19 pandemic for two main reasons. First, lockdowns and movement restrictions during the COVID-19 pandemic were found to have devastating impacts on economic and social life as well as the health and wellbeing of people globally (Buheji et al., 2020; Posel et al., 2021; Tyler et al., 2021; Wei et al., n.d.). Yet Uganda was one of the countries with the longest and strictest lockdown periods during the pandemic (Datzberger et al., 2022; Development Initiatives, 2020). Therefore, it was very important to undertake research in this context to investigate

the extent to which older adults had access to resources for everyday living, such as water, sanitation, hygiene and food to cope during the pandemic. Second, the choice of the research setting was informed by the strong and supportive network of research partners that the researcher had in Uganda, which is Reach One, Touch One Ministry (ROTOM). ROTOM work to support older adults' needs and improve their lives in the country. As such, they provided valuable insights into the specific challenges and needs of older adults in Uganda. This helped in designing the research questions to ensure that they are culturally appropriate and relevant for transforming the lives of older people during and after the crises. Also, ROTOM played a critical role in assisting the researcher in locating older adults living in social isolation in the research areas.

3.2.2 Geographies of Uganda

As earlier indicated, this research was conducted in Uganda, specifically in the Greater Mukono Area of Central Uganda. The country is located in East Africa and lies between Longitude 29o34'E & 35o0'E and Latitude 4o12'N & 1o29'S, enclosed by territories of five countries —Sudan to the North; Tanzania to the South, Rwanda to the Southwest; Kenya to the East and Democratic Republic of Congo to the West. In terms of land size, Uganda is a relatively small country compared to its neighbouring countries like Tanzania and the Democratic Republic of Congo, with a total land area of about 241,555 square kilometers (93,065 square miles) (Uganda Bureau of Statistics, 2016; Uganda Bureau of Statistics (UBOS), 2023; *Uganda Country Handbook*, n.d.). Being a landlocked country and a gateway to other landlocked neighbouring countries, the country was at a higher risk of COVID-19 exposure due to cross-border trade that makes it a transit point for access to the transportation of goods and services (Development initiative, 2020; Storer et al., 2022).

Uganda is divided into four administrative regions, with a total of 146 districts (Uganda Bureau of Statistics (UBOS), 2023). The Central Region, where the research sites are located,

is the most populated region because it houses Kampala, the country's largest urban center (UBOS and ICF, 2018; Uganda Bureau of Statistics, 2016; World Population Review, 2023). The country is predominantly rural (Uganda Bureau of Statistics, 2016; World Population Review, 2023), with about 74% of the population residing in rural communities (World Bank, 2023c).

Uganda is home to a wide variety of ecosystems, including rich water resources (lakes, rivers, streams and swamps) (National Planning Authority (NPA), 2020). The central region is partly characterised by lakes and swampy forests. Water areas cover approximately 15.5% of the country's total land area. Lake Victoria, which is the largest lake in Africa and the second largest in the world, shares a larger portion of its western shoreline with Uganda, which serves as a source for most of the rivers in the country (*Uganda Country Handbook*, n.d.).

Climate conditions in Uganda vary significantly across different regions of the country. The Northern part of the country is generally drier compared to the rest of the country, which can have a significant impact on rainfall variability (Uganda Bureau of Statistics, 2016; *Uganda Country Handbook*, n.d.). The central part of the country, which includes areas around Lake Victoria, experiences a well-distributed rainfall season throughout the year. The Central, Western and Eastern regions enjoy two rainy seasons, with the first rains occurring in March to May and the second rains from September to November. In contrast, the Northern region receives only one rainy season from April to October (Uganda Bureau of Statistics, 2016). The mean annual rainfall in most parts of the country hovers around 750 mm and 2100 mm, with wide disparities across the country, as earlier indicated. Similarly, the mean annual temperature ranges from 21.7 degree Celsius to around 23.9°C degrees Celsius, with the Northern and Eastern (lowland areas) experiencing relatively high temperature compared to low temperatures in the Central and South-Western (highland areas).

Despite these favourable climate conditions, the country faces significant challenges related to climate change, including increased temperatures, reduced rainfall, and increased frequency of extreme weather events such as droughts and floods (*Uganda Country Handbook*, n.d.). These challenges are in part due to anthropogenetic phenomenon, as the majority of the population (about 94%) rely on wood and charcoal as their primary sources of fuel for cooking (Uganda Bureau of Statistics (UBOS), 2021); as a result, they typically engage in illegal logging, charcoal making and firewood gathering (*Uganda Country Handbook*, n.d.). These phenomena could partly explain the frequent and severe incidence of flooding, droughts and landslides in the country, which in turn have profound implications for food security, water availability, and economic development in the country (National Planning Authority (NPA), 2020; *Uganda Country Handbook*, n.d.).
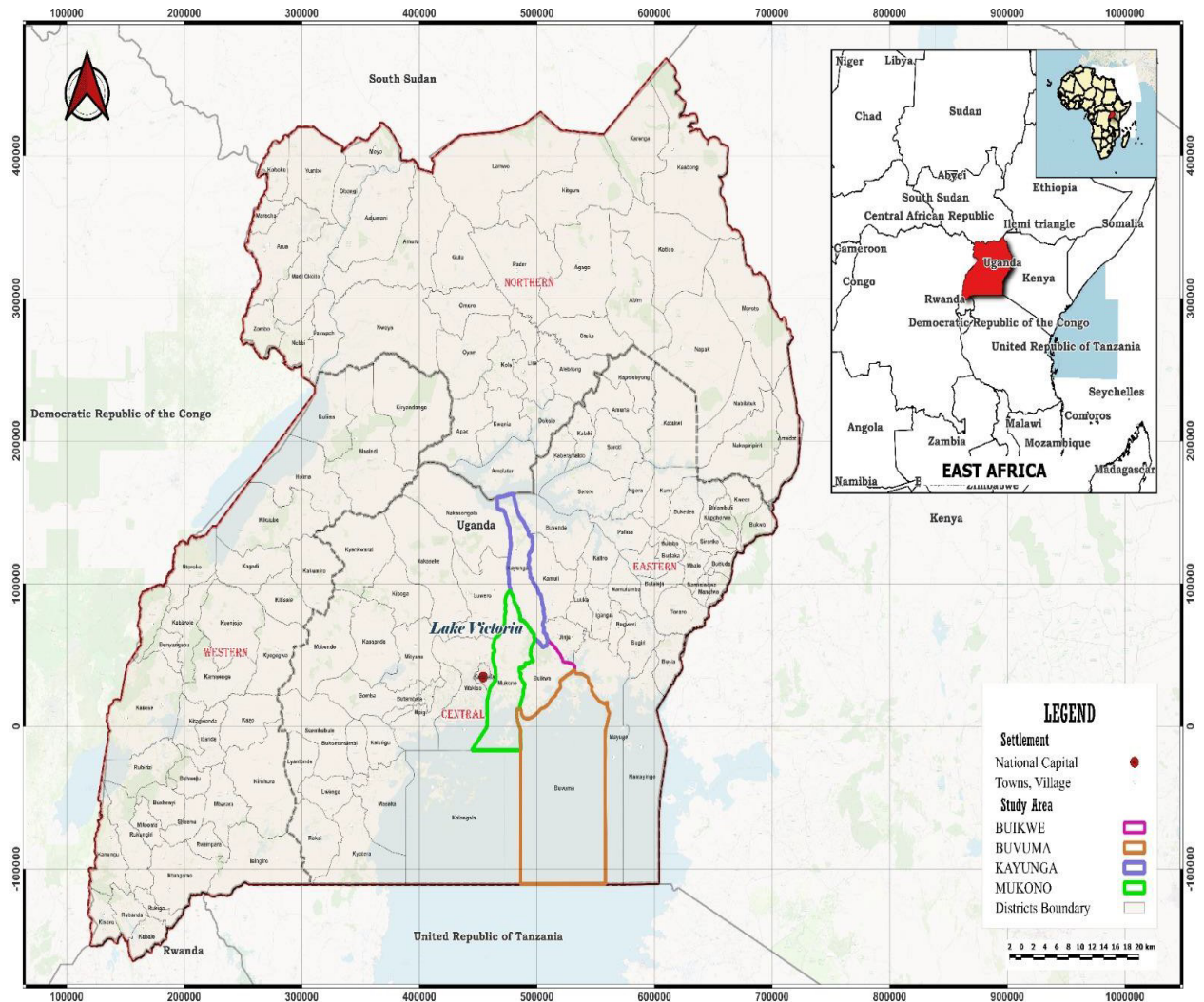
Figure 3.1: Map of Uganda showing research communities
Source: Authors Construct in 2023

3.2.3 Demographic Characteristics

The population of Uganda has been increasing rapidly over the past few decades, growing from around 7.6 million to approximately 45.8 million between 1960 and 2021, respectively, representing a six-fold increase in the last 61 years (World Bank, 2023c). It has been estimated that over 1 million people are being added to the population of Uganda each year, and as such, the country's population is projected to reach 58.4 million by 2030 and 87.6 million by 2050, which is predicted to overtake Egypt—Africa's second-largest country by population (World Population Review, 2023). This exponential growth has significant implications for ageing population and sustainable development.

Uganda has an extremely youthful population (National Planning Authority (NPA), 2020; World Bank, 2023c; World Population Review, 2023), with about 78% of the population under the age of 30 years (National Planning Authority (NPA), 2020), while older adults (60 + years) constitute only 4.3% of Uganda's total population (Uganda Ministry of Gender, 2020). This demographic makes Uganda the second youngest country globally (World Population Review, 2023). The country's population is steadily ageing, and in the next 30 years, Uganda's older adults are projected to increase to 6 million and 15 million by 2070 (Uganda Ministry of Gender, 2020). The geographical population distribution shows that the majority of older adults (about 98%) reside outside the urban areas in the Central region, with women slightly being the majority (Uganda Ministry of Gender, 2020). In the context of educational attainment, majority of older adults who were born in the early 1900s, particularly in rural areas, did not have the opportunity to access modern education that was introduced in Uganda by the British Colonial missionaries across the Urban areas. Consequently, the majority of older adults currently living in rural areas are illiterates (i.e., they are unable to read nor write). This has affected older adults' capacity to access high-paying jobs and participate in other economic activities (Uganda Ministry of Gender, 2020). Aside, it may also have serious consequences for their health, as they may be unable to read medications, express their concerns to physicians, or understand health messages communicated in English (Raphael et al., 2020). Since the introduction of the Ugandan National Development Plan with its overarching goal to improve the quality of life and wellbeing of Ugandans, the government has made a significant investment in the education sector, which has resulted in the increase in literacy rate from 70% in 2013 to 74 % in 2017(National Planning Authority (NPA), 2020).

Uganda has a diverse ethnic population with varying spoken languages embedded in unique cultures and norms, though the country's official languages are English and Swahili. The Banganda—located in the Central region, constitutes the largest ethnic group in the

country. According to the 2014 census data, most Ugandans (about 84%) identify as Christians, while 14% are Muslims, with just 2% as traditional African religion/have no affiliation (Uganda Bureau of Statistics, 2016; *Uganda Country Handbook*, n.d.). These languages and religious diversities mean that public health messaging related to the COVID-19 pandemic must take into account these diversities to ensure that the health information communicated to the general public is effective, culturally appropriate and accessible to all individuals regardless of language proficiency and age.

3.2.4 Socio-economic context

The economy of Uganda has grown significantly over the past five years. In 2018, the country saw a rebound in GDP growth at 6.2% compared to sluggish growth of 3.6% in 2013 (National Planning Authority (NPA), 2020).Despite this progressive growth in GDP and the success story of the country's economy, poverty and inequality persist within and between regions and among certain population groups in the country (National Planning Authority (NPA), 2020; OXFARM International, 2023; *Poverty Assessment*, 2016; Uganda Bureau of Statistics (UBOS), 2021). The socio-economic inequalities in the country are concentrated in the central part of the country, with poverty being more pronounced in the rural areas. According to a recent household survey, even though the Central region has a higher average income compared to the rest of the regions in the country, there are disparities in terms of rural and Urban and across Sub-regions. In particular, Urban areas grew by 0.4%, while rural areas declined (-0.9%); additionally, Buganda South saw a growth of 3.1% while Buganda North, which is our research site, recorded negative growth (Uganda Bureau of Statistics (UBOS), 2021). Nearly 70 % of households in Uganda still rely on land-based subsistence farming as their primary source of income/livelihood, especially among those living in rural areas. These are mostly smallholder farmers who have small plots of land and grow crops primarily for their personal consumption, with little or no surplus for the market (National Planning Authority

(NPA), 2020). Additionally, despite the fact that majority of the population depends directly on land for their livelihoods, majority, especially vulnerable and marginalised groups, lack tenure security due to the country's existing structural systems (laws and policies) governing land use and management, which primarily prioritises the interest of commercial investors and wealthy individuals rather than the interest of smallholder farmers. As a result, many smallholder farmers stand a greater chance of losing their land. This situation perpetuates a cycle of poverty and food insecurity and reinforces existing social and economic inequalities in the country (OXFARM International, 2023).

It is worth noting that the prevalence of poverty in rural areas is higher compared to urban areas. Recent estimates show that about 30.1% (12.3 million) of the Ugandan population are living in poverty (using the international poverty line of $1.77 per person per month), with the rural population experiencing poverty more than twice as urban population (Uganda Bureau of Statistics (UBOS), 2021). The elderly population (60+) is among the most economically challenged persons in Uganda, especially those living in rural areas. Overall, about 74% of older adults in Uganda are living below the international poverty line, and this number increases to approximately 85% for older adults in rural communities. This could partly be explained by the fact that majority of older adults in rural communities engage in non-paying caregiving activities. It is worth mentioning that the majority of older adults in Uganda provide caregiving responsibilities to millions of grandchildren left under their care due to the prevalence of HIV/AIDS that claimed the lives of their children (Ntozi & Nakayiwa, 1999; Sengupta & Kidd. S., n.d.; Uganda Ministry of Gender, 2020). These burdens of non-paid caregiving responsibilities may make it difficult for the aging population in Uganda, especially women, to achieve financial stability. Additionally, close to 90% of older adults do not have any form of social security or pension benefits (Sengupta & Kidd. S., n.d.; Uganda Ministry of Gender, 2020). This is partly explained by the majority of older adults working in subsistence

agriculture and in the informal sector, making them ineligible for the private and public pension schemes available in the country (Sengupta & Kidd. S., n.d.). The Ugandan government introduced the Senior Citizens Grant to address the growing poverty among older adults; however, the scheme pays 25,000 UGX (about 7 USD) to eligible older adults on a bimonthly basis, which is yet to reach the majority of older adults in the country (Uganda Ministry of Gender, 2020).

The COVID-19 pandemic, which came with prolonged period of lockdowns and border closures in Uganda, significantly disrupted the country's economy leading to a reduction in GDP (of 3% in 2019/2020). Uganda was one of the countries in SSA that imposed very severe restrictions on movements as a measure to stop the spread of the COVID-19 virus. These measures resulted in major job and income losses, especially among those engaged in the informal sector. Though the government provided relief services to support vulnerable populations during the pandemic, it has been reported that such relief assistance was mainly focused on urban areas and formal sectors, neglecting rural areas and informal sectors where majority of the poor people live and work (Development Initiatives, 2020; National Planning Authority (NPA), 2020; Uganda Bureau of Statistics (UBOS), 2021). There are, therefore, predictions that the COVID-19 pandemic may increase the vulnerability of the population already living in poverty as well as those who recently got out of poverty (Development Initiatives, 2020).For instance, a national survey conducted in pre-COVID-19 and during the COVID-19 found that there was a significant increase in the share of people living in poverty (21.9%) compared to the pre-COVID-19 period (18.7%) (Uganda Bureau of Statistics (UBOS), 2021).

3.2.5 State of health and wellbeing

Uganda has made significant progress in improving health and wellbeing over the past few decades (National Planning Authority (NPA), 2020; Republic of Uganda, n.d.). The

country's Human Development Index (HDI) score—which measures a nation's health, education and standard of living has increased to about 59.6%, from 0.329 in 1990 to 0.525 in 2021. Nonetheless, the country still remains in the low human development category compared to most developed countries that have an HDI score above 0.8, and it is even slightly below the SSA HDI score of 0.55 for 2021 (National Planning Authority (NPA), 2020; United Nation Development Programme (UNDP), 2022). Similarly, life expectancy at birth increased by 9 years, from 54.5 years in 2012 to 63.3 years in 2017 (National Planning Authority (NPA), 2020; Republic of Uganda, n.d.). However, life expectancy varies by gender, geographic location and other socio-socioeconomic status. For instance, men have a lower life expectancy, at 61 years, compared to 65 years for women. Though life expectancy in the country has improved, there is a 20-year gap compared to high-income countries (World bank, 2023).

Generally, the major aggregate factors contributing to the increase in life expectancy in the country have been associated with improvement in a number of health indicators, including investment in building new healthcare facilities, particularly in areas of cardiology and gynaecology. Heart and cancer institute, among others, has led to increasing utilisation of health services which in turn has resulted in a declining child and maternal mortality and stabilised HIV/AIDS prevalence among others (Bureau, 2018; National Planning Authority (NPA), 2020).

Despite these improvements, they still remain unsatisfactory, and disparities in health and healthcare services exist across geographies in the country partly due to the inability of healthcare systems to keep pace with the country's significant population growth. Other factors include low levels of income, education, access to safe WASH services and poor housing conditions that serve as major determinants of health in Uganda (Health System in Uganda -2021, n.d.). Rural areas in Uganda, which are home to the majority of older adults, tend to have poor healthcare infrastructure (*Uganda Country Handbook*, n.d.); despite older adults being 65% more likely to experience illness, over 60% living

with one or more physical or mental disabilities (UBOS 2020) and being ten times more likely to die from COVID-19 (WHO Regional Office for Africa, 2021). Countrywide, the physician-to-population ratio in Uganda is estimated at two physicians per 10,000 population (World Bank, 2023b). Similarly, the ratio of hospital beds to population stands at 0.5 beds per 10000 people (World Bank, 2023a), and over 94% of the population lacks health insurance (Bureau, 2018; National Planning Authority (NPA), 2020). Rural areas experience worse outcomes, including inadequate supply of medications, medical personnel, and inadequate access to safe WASH service, among others (*Uganda Country Handbook*, n.d.; WHO, 2018). Uganda is one of the countries experiencing a higher burden of WASH-related diseases, such as Neglected Tropical Diseases (NTDs), which predominantly affect rural populations (WHO, 2018). This is not surprising, given the increased levels of water pollution primarily stemming from open pit latrines and mercury from mining sites in the country (National Planning Authority (NPA), 2020; Uganda Country Handbook, n.d.). The health conditions of vulnerable populations were further exacerbated during the COVID-19 pandemic. Individuals with health conditions unrelated to COVID-19 (e.g., hypertension, hepatitis B, sickle cell, HIV/AIDS), experienced severe complications and death due to transport restrictions and lockdowns during the pandemic (Republic of Uganda, n.d.). Yet these diseases account for over 50% of illnesses and death in Uganda (HEALTH SITUATION, 2018).

3.2.6 The status of water, sanitation and hygiene services in Uganda

The national policy and legal framework of Uganda recognises the provision of safe water, sanitation and hygiene as a human right (National Planning Authority (NPA), 2020). However, structural challenges, such as social, economic, environmental, institutional, technological and legal factors, have continued to undermine the full enjoyment of these rights by certain population groups (IRC Uganda, 2019). For instance, despite significant

strides made by the government of Uganda to provide universal access to safe WASH service among its citizens, access to this service still remains a challenge for majority of people in the country (IRC Uganda, 2019; National Planning Authority (NPA), 2020; Development Initiatives, 2020).

Historically, the provision of WASH services has been focused on urban centers to the neglect of impoverished rural communities (Uganda Ministry of Gender, 2020; Uganda National Malaria Control Division (NMCD) et al., 2020) although the rural residents form the majority of Ugandan population (The World Bank, 2022). According to the Ugandan 2018-2019 Malaria Indicator Survey, there is a 59% gap in basic water coverage (i.e., water from an improved source that is collected within 30 minutes or less per round trip (WHO/UNICEF, 2021)) between the capital Kampala (97%) and Karamoja region (38%); there is also a 31% gap between urban areas (79%) and rural areas (48%); as well as a 36% gap between the richest (80%) and the poorest (44%) (Uganda National Malaria Control Division (NMCD) et al., 2020).

3.3 Project context

This research is part of a larger research program investigating the health and wellbeing impacts of COVID-19 in SSA. The project emphasised the role of power dynamics in shaping health outcomes. Specifically, it draws attention to the ways in which power relations (e.g., between genders, between different social classes) intersect with environmental and health inequalities to create unique health challenges for different populations (see chapter 1 for the discussion of the theoretical framework). The project aimed to examine the impact of the COVID-19 pandemic on access to resources for everyday living including water, sanitation, hygiene and food in order to develop a sustainable intervention for coordinated management of COVID-19 among under-served elderly populations in SSA for the current and/or potentially future pandemics.

The research sites span across East Africa (i.e., Uganda and Kenya) and West Africa (Ghana). This research is situated in Uganda and investigates the barriers to WASH access, COVID-19 KARP, and factors influencing the health and wellbeing of older adults.

3.4 Research design

The research adopts a quantitative research approach to address the research objectives. The practice of quantitative research and the application of its diverse techniques situates it to a particular methodological approach. This approach involves the use of standardised and structured approaches to data collection and analysis to derive objective results (Creswell w. J, 2014; Edmonds & Kennedy, 2017; Goodman & Thompson, 2018; Kumar & Ranjit, 2011). As such, quantitative research provides an accurate, reliable and statistically valid data (Kumar & Ranjit, 2011; Stockemer, 2019), which allows for replicability of the research findings and a generalisability of the population being studied (Goodman & Thompson, 2018; Hay & Cope, 2021; Kumar & Ranjit, 2011; Stockemer, 2019). As Kumar & Ranjit (2011) suggests, quantitative methods are particularly useful or suitably placed to help answer questions that require measuring and quantifying variables of interest, rather than providing in-depth explanations or descriptions of the research questions. As such, quantitative approach provides valuable insights into understanding patterns (differences and commonalities) across representatives and the issue under investigation (Hay & Cope, 2021; Kumar & Ranjit, 2011; Stockemer, 2019).

In this thesis, the research questions are approached from a quantitative standpoint in order to measure the prevalence of WASH barriers as informed by the political ecology of health theoretical framework (see chapter 1 for the discussion of the theoretical framework): How many people had adequate access to WASH? What was the level of

knowledge, attitude, risk perception and practice towards COVID-19? What was the level of psychosocial health and wellbeing? and ultimately what factors are contributing to such outcomes? By gathering and analyzing these numerical data, precise and meaningful conclusions about the issues are drawn, which in turn helps to identify potential areas for policy interventions to address the specific needs of the study population (Kumar & Ranjit, 2011) — the aim of this research.

This research uses a cross-sectional survey approach in addressing the research objectives. According to (Goodman & Thompson, 2018; Kumar & Ranjit, 2011), cross-sectional research provides a valuable means of obtaining a snapshot of the issue under investigation as at the time of the research to determine exposures and outcomes among a population sharing a common experience of a phenomenon, thus allowing researchers to gain a comprehensive understanding of the current status of the subject of interest. This approach underscores the theoretical assumptions of the research — i.e., people's experience of health and wellbeing are shaped in place and at a specific time. Given the rapidly evolving nature of the pandemic and the pressing need to provide timely assistance to vulnerable populations including older adults' such that they can maintain health, physical function and social connection while undergoing physical distancing and lockdowns during a pandemic— all key metrics identified by the WHO and HelpAge International (HelpAge International, 2020; WHO, 2021a), the cross-sectional survey approach was deemed suitable for this research as it aims at facilitating the collection of data within a short period of time to inform policy (Goodman & Thompson, 2018).

3.5 Data collection

Surveys were designed and used for the data collection. Surveys are standardized quantitative data collection tools that allow for the collection of data on a large sample of participants and

on a wide range of topics (Kumar & Ranjit, 2011; Stockemer, 2019). Additionally, it allows the researcher to ask the same questions across the study population which in turn allows for accurate estimates of the subject of interest and easy comparison of results across the study population (Edmonds & Kennedy, 2017; Stockemer, 2019). This approach was particularly valuable in this research as it allowed several questions to be asked within a shorter period of time across the lager sample population, which enabled the assessment of the differences in WASH access, COVID-19 KARP and psychosocial health and wellbeing across the sample population.

3.5.1 Survey development

The questionnaire used for the survey (see appendix 1 for the breakdown of the survey instrument) comprised a combination of pre-validated scales and bespoke questions developed in consultation with the research team including the partner, ROTOM. The survey was designed to determine the access to basic necessities relevant for everyday living (e.g., water, toilet facilities, handwashing facilities and food), and to establish the level of knowledge, attitude, practice and risk perception around COVID-19 pandemic; and finally, to determine the level of psychosocial health and wellbeing of the sample population.

The research questionnaire consisted of seven main parts. The first section addresses basic socio-demographic factors of the sample population including sex, age, gender, educational level, occupation, marital status and so on. These variables are included to ensure that the sample is representative of the population under study and allow further inferences to be made between groups. These sociodemographic variables are considered potential mediators of COVID-19 knowledge, attitude, and practice as well psychosocial health and wellbeing outcomes, which are analysed in this thesis. The demographic questions for this research were informed by the 2016 Uganda Demographic and Health Survey, which is a comprehensive and reliable source of population and health indicators in the country

(Uganda Bureau of Statistics (UBOS) and ICF, 2018). Using this as a reference point in designing the current research questions related to demographics helps to ensure that the questions being asked are relevant and appropriate for the local context and can allow for comparison.

The second part of the questionnaire comprised of the Equity Tool, which is designed for creating a relative Household wealth index using a series of context-dependent questions. This research adopted the Uganda Equity Tool version, utilizing the 12 item questions. These questions pertain to the type of materials used in constructing the house occupied by a household and the availability of relevant items present in the household (EquityTool, 2022).

The third section of the survey instrument include household water, sanitation and hygiene access questions. The participants were asked to indicate their main source of drinking water and sanitation as well as the distances to these sources. Additionally, household WASH insecurity experiences scale was measured using 12 items, asking participants questions related to having safety and adequate concerns of WASH services within household in the past 30 days. The 8-item water insecurity scale was adapted from (Young et al., 2019), and 4 items related to sanitation and hygiene questions were included to measure household WASH insecurity scale. A five-point Likert scale was used, ranging from very often, often, sometimes, rarely and never. WASH insecurity could be a linchpin in health disparities, especially in the context of COVID-19, where frequent handwashing is critical for the prevention of the virus (WHO & UNICEF, 2020, 2021; WHO, 2019). Therefore, providing evidence-based data on the prevalence of WASH insecurity among vulnerable population groups could assist in developing effective interventions that improve access to WASH. This, in turn, would promote public health and reduce health disparities, particularly in the context of the COVID-19 pandemic.

Indeed, WASH (in) security could be mediating factor to COVID-19 attitude, risk perception and practice (Ekumah et al., 2020; Staddon et al., 2020; Stoler et al., 2021), as well as psychosocial health impacts (Brewis et al., 2021; Kangmennaang et al., 2020; Stevenson et al., 2012) and physical health outcomes (Tallman et al., 2022). Hence there are concerns that WASH insecurity during the COVID-19 pandemic in LMICs could exacerbate these health impacts among vulnerable populations, especially women (Adams et al., 2021). Thus, this section of the survey instrument documents questions that are relevant in assessing WASH insecurity prevalence in the context of the pandemic.

The fourth section of the survey instrument comprised of 9-items measuring food insecurity over the past four weeks, using the adult version of the food insecurity questionnaire developed by Coates (2004). It consisted of questions relating to respondents or their household reducing their food intake because there was not enough food due to lack of money or resources (Coates, 2004). In creating a food insecurity index, the responses for each question (i.e., Never, rarely, sometimes, often and very often) were dichotomised ("Yes"/ "No") and recoded into binary variables as (1/0) respectively. The sum for each participant was then determined, and the cut-off point was set at 4. Individuals with a sum of 4+ assumed being food insecure.

The fifth section contains 12-item questions pertaining to participants' general health. It is a standardised scale developed by (Goldberg, 1972). The 12-item general health questionnaire (GHQ) was designed to ensure a quick and reliable self-reported assessment of participant's recent experience of psychosocial/emotional distress, including social dysfunction and severe depression. Half of the questions are worded positively whiles half are worded negatively with 4-point Likert scale (i.e., Better than usual, Same as usual, less than usual and much less than usual) and an additional "Do not answer" or "refuse to answer" response option.

The GHQ was developed for use in general population surveys to identify two main

classes of problems: inability to carry out normal functions and the appearance of new phenomena of distressing nature (McDowell, 2006; Goldberg, 1972). The focus of the instrument items is on assessing changes in an individual's condition rather than the absolute level of a problem. The items compare the individual's current state to their perceived normal situation, in order to identify any deviations or disruptions from their usual functioning. As such, the 12-item GHQ makes a comprehensive tool for assessing the prevalence of emotional distress of population in the context of the COVID-19 pandemic due to concerns that the pandemic has introduced new phenomenon of distressing nature (Suubi et al., 2022).

The sixth section of the questionnaire is concerned with participants wellbeing measured using 7-items adapted from the Canadian community wellbeing index (Kangmennaang & Elliott, 2023). There is no universally accepted measure or definition of human wellbeing due to its complexity and multidimensional nature. Wellbeing encompasses various dimensions embedded in economic status, social relationships, mental and physical health, as well as environmental conditions, which are interconnected (Clark & McGillivray, n.d.; Rogers et al., 2012). Thus, the meaning and understanding of wellbeing is highly subjective, personal and context based (Rogers et al., 2012). Consequently, the research team modified the version of wellbeing from the Canadian context to include salient factors that are potential determinants of wellbeing across Uganda, drawing on UBOS and ICF (2018) and Kangmennaang et al. (2019). Participants were asked to indicate their agreement along a 5-point Likert scale from 1 "Never" to 5 "Very often" to questions pertaining to the frequency of not being able to meet an expense for basic necessities of life including food, housing, health services, water, electricity and so on.

The final section of the survey instrument includes measures of knowledge, attitude, risk perception and practices (KARP) related to COVID-19 management and prevention. The questions were an adapted version of questionnaires previously used in the research

context and published in the literature (Austrian et al., n.d.; PERC, n.d.) and based on WHO guidelines. The research team made some slight changes to the adapted questions to ensure that the questionnaire was culturally appropriate for the study population. The knowledge questions consisted of 12 items pertaining to participants' knowledge about clinical symptoms, transmission routs, prevention and control of the disease. The response options for each item are in a scale ranged from a simple "Yes or No" response to a five-point Likert scale ("Strongly Agree," "Somewhat Agree," "Neutral," "Somewhat Disagree," and "Strongly Disagree") and four-point scale (e.g., "Definitely True," "Probably True," "Definitely False," "Probably False,"), depending on the nature of the question.

To identify the attitude of the participants, it included 6-item related to their behavior surrounding the use of hand sanitizers, handwashing, hand shaking, wearing facemask and going to crowded places. The response options for these questions were in five-point scale (i.e., 'Strongly disagree', 'Somewhat disagree' 'Neutral' Strongly agree 'Somewhat agree").

Additionally, in identifying the risk perception of participants towards the COVID-19 pandemic, the questions that were asked included participants belief and level of worry in susceptibility to COVID-19 either personally or that of members of their household and believe in the seriousness of the disease. Depending on the type of questions that were asked, the answer options ranged from (not at all worried, slightly worried, somewhat worried, moderately worried, Extremely worried); (Strongly disagree, Somewhat disagree, Neutral, Somewhat agree, Strongly agree); (Extremely unlikely, Moderately unlikely, Somewhat unlikely, Neutral, Somewhat likely, Moderately likely, Extremely likely).

In terms of COVID-19 preventive practices, the questions comprised of 11-items ranging from questions related to staying at home and avoiding crowded places, wearing of face mask, handwashing practices among others. The response options were either a yes/no

answer or "Strongly disagree", "Somewhat disagree", "Neutral", "Somewhat agree" and "Strongly agree", respectively depending on the question type.

3.5.2 Data collection procedure

The survey questions were developed and programmed into KoBoToolbox, an open-source suite of tools for quick, reliable and secure data collection and management, particularly developed for humanitarian crises. Four smartphones were then outfitted with a KoBo collect account for the data collection process. The researcher intended to travel to the research site, however travel restrictions due to COVID-19 prevented the researcher from doing so. Therefore, two research assistants —born and raised in the research area and trained in social science research methods were recruited to administer the survey in the field. The research assistants are affiliated with ROTOM, and given their status as community health workers, they were allowed to visit seniors in the country during the COVID-19 lockdown period. The local knowledge and language skills of the local research assistants likely resulted in greater data validity despite the researcher not being on-site during survey administration. 3.5.3 Survey Administration

A pre-test involving twenty randomly selected older adults across the four study sites was conducted on July 5th, 2021. Overall, the instrument performed well and none of the participants experienced difficulty comprehending the items. Each survey took less than 30 minutes to complete. Prior to the actual administration of the surveys, a one-day training was conducted on August 30th, 2021, to equip the two survey administrators with the necessary knowledge and instructions for administering the survey and obtaining informed consent. The training covered various aspects of the survey, including an understanding of the research questions and the use of the KoBo Collect tool. This was to ensure that the survey administrators were well-prepared and equipped to carry out their tasks efficiently and effectively. The research administrators were provided two smartphones each and power banks, in the event of their smartphone batteries running out of charge. The interviews were conducted from September 2021 to January 2022.

A total of 288 interviews were completed (Table 1), averaging 20 minutes in length to complete each survey.

The KoBo platform allowed for data to be tracked each time a survey was completed and downloaded into the server. Given that the researcher was not on site, this platform was useful as it allowed the researcher to monitor the progress of the data collection remotely, as well as check for any errors and inconsistencies. It also offered an additional layer by providing the researcher with password protection and two-factor authentication to ensure that the data is secured in the server and can only be accessed by those who have been given permission.

3.5.4 Statistical analyses

The data from the KoBo Collect was exported in an Excel format, after which it was loaded into STATA version 15.0 for data cleaning and analysis. Data cleaning involved identifying and correcting errors, inconsistencies, and missing values in the survey data. After that, descriptive statistics were calculated for continuous and categorical variables in the dataset. Means and their corresponding standard deviations (SDs) were presented for continuous variables, while the categorical variables were presented as frequencies with their corresponding percentages.

Regarding the analysis of the relationships between independent and dependent variables of interest in this research, the normality assumption was first tested using the Kolmogorov-Smirnov test to form a basis for using either parametric tests (e.g., t-test, ANOVA and Pearson's correlation) or nonparametric tests (e.g., Kruskal-Wallis test, Wilcoxon rank sum test, chi-squared test and Spearman's rank order correlation) (Blair & Higgins, 1980; Hilbe, 2016; Holt et al., 1980; McKight & Najab, 2010; Zar, 2014). The results confirmed that the data did not follow a normal distribution. Therefore, nonparametric tests such as the Kruskal-Wallis test, Wilcoxon rank sum test, chi-squared test, and Spearman's rank order correlation were deemed

appropriate for the tests. All the statistical tests were conducted at a 5% significance level corresponding to a 95% confidence level, a commonly accepted threshold for statistical significance (Goodman & Thompson, 2018).

In objective one of this research, the association between WASH insecurity (the dependent variable) and selected sociodemographic variables, including educational status, occupation, wealth and the sources of household WASH services (the independent variables), were analyzed using Kruskal-Wallis and Wilcoxon rank sum test. The Kruskal-Wallis test was used to test for the difference in medians for more than two groups, whiles the Wilcoxon rank-sum test was used to test for the differences in medians between two groups. Where the Kruskal-Wallis test detected significant differences between the groups being compared, a post-hoc analysis using a Dunn's test with Bonferroni correction was used to conduct pairwise comparisons to identify which specific groups differ significantly from the other.

Objective two of the research aimed to investigate potential factors influencing COVID-19 knowledge, attitudes, risk perceptions, and practices among older adults in Uganda. To achieve this, the association between COVID-19 KARP (the dependent variable) and selected demographic and socioeconomic variables (the independent variables) was analyzed using the Kruskal-Wallis test and Wilcoxon rank sum test. Where the Kruskal-Wallis test detected significant differences between the groups being compared, a post-hoc analysis using a Dunn's test with Bonferroni correction was conducted to identify which specific groups differed significantly from each other in terms of COVID-19 KARP. Additionally, where the dependent and independent variables were both continuous, the Spearman's rank order correlation was used to determine the relationship between the dependent variable (COVID-19 practices) and the independent variables (COVID-19 knowledge, attitude, risk perception and WASH in (security)).

61

Objective three aimed to investigate the factors related to the experience of emotional distress and wellbeing of older adults in Uganda during the COVID-19 pandemic. The chi-squared test of independence was conducted to determine the presence or absence of associations between selected demographic and socioeconomic factors (independent variables) and emotional distress and wellbeing (dependent variables). Additionally, binary logistic regression was run to assess the magnitude of such associations found whenever they existed. A high prevalence of emotional distress was observed among the research participants. As such, a multivariate binary logistic regression analysis was necessary to investigate further the impact of demographic and socioeconomic factors on emotional distress. This approach allowed for evaluating the independent effects of multiple variables while controlling for potential confounding factors.

3.5.5 Ethical consideration

The University of Waterloo Ethics Review Board provided ethics approval for the research. Prior to administering the study instrument to the research participants, their informed consent was obtained. The consent form was integrated in the KoBo collect as the first section of the survey. The survey administrators read aloud the consent to the participants in their local language, and they were given the option to check a box to indicate that their agreement to participate. The informed consent was saved separately from the survey responses to maintain participant confidentiality and ensure that the consent information is easily accessible if needed. Confidentiality was assured to respondents before each interview, and personal identifiers were not used during data entry. The data was protected with a password which the research team had exclusive access to all collected data.

3.5.6 Chapter Summary

This research used a cross-sectional case-study design to examine the COVID-19 and WASH-related experiences of older adults in the Mukono region of Uganda. This involved

administering a survey consisting of seven sections, which incorporated existing instruments, scaled responses, and open-ended questions that matched the components and constructs of the feminist political ecology of health framework. A total of 288 surveys were completed, which fell short of the expected 400 surveys due to the COVID-19 restrictions and lockdowns that hindered the recruitment and engagement of survey respondents. Despite these obstacles, the sample size remains sufficient to conduct a robust statistical analysis.

CHAPTER FOUR
RESULTS

4.1 Introduction

This chapter presents the findings of the research, which sought to investigate the barriers to safe water, sanitation, and hygiene (WASH) faced by older adults in Uganda during the COVID-19 pandemic, as well as the impact of these barriers on their psychosocial health and wellbeing. The research specifically aimed to: (1) examine the barriers to adequate and safe WASH access among older adults in SSA, using Uganda as a case study (2) assess older adults' knowledge, attitude, risk perception, and practise (KARP) regarding the prevention and management of COVID-19 in Uganda and (3) examine how WASH barriers and the impact of the COVID-19 pandemic contribute to the psychosocial health and wellbeing of older adults. The research employed a quantitative method and surveyed 288 older adults aged 60 and above. The findings are presented in four sections. The first section presents the characteristics of the research respondents. What follows is the presentation of the research findings corresponding to the three research objectives. The second section presents the findings related to the barriers to adequate and safe WASH access among older adults in Uganda. In this section, key barriers to WASH access are identified, including a lack of access to safe and reliable drinking water sources as well as inadequate sanitation and hygiene services. The section also examines the influence of socioeconomic and demographic factors, such as poverty, occupation, and gender, on WASH (in)security outcomes among the respondents. The third section presents the varying levels of older adults' KARP towards COVID-19. It includes the assessment of a range of factors, such as level of access to COVID-19 information and socioeconomic status, that influence KARP among the respondents. The fourth and final section looks at the effects of WASH barriers, COVID-19 KARP, and socioeconomic status on the psychosocial health and wellbeing of older of older adults in Uganda.

4.2. Characteristics of Respondents

A total of 288 respondents participated in the survey conducted from September 2021 to January 2022 out of the 400 anticipated (Table 4.1). The 400 expected sample was intended to be evenly distributed across the four communities of Buikwe, Kanyumga, Buvuma, and Mukono, with a target of 100 respondents for each. However, only Buikwe reached the target (105 respondents). The other three communities did not meet the target: Kanyumga (81), Buvuma (73), and Mukono (29). The smaller sample size is attributable to the constraints caused by COVID-19 related restrictions and lockdowns, which made it difficult to recruit and engage survey respondents. However, despite these challenges, the sample size is still sufficient for conducting a rigorous statistical analysis. Additionally, upon comparing key socio-demographic characteristics across the four communities, we discovered that there were no significant differences. Consequently, we aggregated the data for analysis to increase the statistical power, precluding comparability across the communities as intended. Overall, the descriptive results show that the average age of the respondents was about 73 years (SD ± 10 years), and more females (about 64%) than males made up the proportion of respondents. Most respondents (67%) were unpartnered, with a disproportionately high number of females (77%) being unpartnered, while most males reported they were partnered or married (52%). Additionally, the majority of the respondents owned homes (82%), 49% lived in small households (1–5), while about 10% lived in larger households (>10). Most of them (about 73%) had children living in the house. Regarding educational attainment, about 44% had no formal education, with more females (about 52%) than males (about 29%) having no formal education. A little over 38% had primary education, while only about 17% had attained above primary education. The majority of the respondents were engaged in subsistence farming (49%), followed by self-employment (9%) and other forms of work (about 5%). About 36% of respondents were not engaged in any form of work, and a relatively higher proportion of

females (about 41%) than males (about 26%) reported not working. On average, the household income of respondents in 2020 was USD91.7 (SD ± USD118.8), with females reporting a lower income ((USD80) (SD ± USD109.8)) than males (USD111.7) (SD ± USD131.4). A majority of both males and females (about 55% and 62%), respectively, fell into the poorest wealth quintile, compared to about 44% and 37% for the poor quintile. The respondents were asked questions regarding their health insurance coverage and how they perceive their general health in comparison to others their age. Almost all the respondents (97.2%) did not have health insurance. When it came to the state of respondents' self-reported health compared to others their age, the majority (59.4%) rated their health as poor, while 40.6% reported good health. Furthermore, the results showed differences between men and women's perception of their health, with more women reporting poor health (62.9%) compared to men (52.9%) (Table 4.1).

Table 4.1 Sociodemographic characteristics of Respondents (n=288)

Variables	Men		Women		Overall	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Sex	102	35.4	186	64.6	288	100.0
*Mean Age in years	71.9	9.3	74.3	10.3	73.4	10.0
Place of residence						
Buikwe	35	34.3	70	37.6	105	36.5
Kanyumga	22	21.6	59	31.7	81	28.1
Buvuma	34	33.3	39	21.0	73	25.4
Mukono	11	10.8	18	9.7	29	10.1
Marital Status						
Partnered	53	52.0	42	22.6	95	33.0
Unpartnered	49	48.0	144	77.4	193	67.0
Educational level						
No formal education	30	29.4	97	52.2	127	44.1
Primary	43	42.2	67	36.0	110	38.2
Above primary	29	28.4	22	11.8	51	17.7
Main occupation						

Variables	Men		Women		Overall	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Subsistence farming	57	55.9	84	45.2	141	49.0
Self-employed	10	9.8	16	8.6	26	9.0
Not working	27	26.5	78	41.9	105	36.5
Employed in the formal sector	8	7.8	8	4.3	16	5.6
*Household mean income in 2020, Ush (USD)	418250 ($111.74)	491720 ($131.37)	299565 ($80. 03)	410863 ($109.76)	343119 ($91.66)	444844 ($1I8.84)
Wealth						
Poor	45	44.1	69	37.1	114	39.6
Poorest	57	55.9	117	62.9	174	60.4
House ownership						
Own	80	78.4	157	84.4	237	82.3
Rent	7	6.9	8	4.3	15	5.2
Other family member	9	8.8	18	9.7	27	9.4
Other	6	5.9	3	1.6	9	3.1
Relationship to household head						
Self	96	94.1	142	76.3	238	82.6
Spouse	3	2.9	29	15.6	32	11.1
Other	3	2.9	15	8.1	18	6.3
Household size						
Small (1-5)	56	54.9	86	46.2	142	49.3
Medium (6-10)	33	32.4	82	44.1	115	39.9
Large (>10)	13	12.8	18	9.7	31	10.8
Children present						
Yes	64	62.8	148	79.6	212	73.6
No	38	37.3	38	20.4	76	26.4
Religion						
Christians	85	83.3	165	88.7	250	86.8
Muslims	17	16.7	21	11.3	38	13.2
Health Insurance status						
Uninsured	99	97.1	181	97.3	280	97.2
Insured	3	2.9	5	2.7	8	2.8
State of Respondents' health compared to others their age						

Variables	Men		Women		Overall	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Good	48	47.1	69	37.1	117	40.6
Poor	54	52.9	117	62.9	171	59.4

Note: The household mean income was converted from Ugandan local currency to US dollars using the exchange rate provided by OANDA on December 5th, 2022.

*Figures represent mean values and standard deviation, respectively.

4.3 Barriers to WASH access and WASH (in)security experienced among older adults in Uganda

Household access to water, sanitation, and hygiene (WASH) services

Majority of respondents faced several barriers to accessing safe WASH services during the COVID-19 pandemic. These included physical barriers, such as the lack of handwashing facilities in households, long distances to drinking water sources, and limited access to safe water and sanitation services. Social barriers, such as gender gaps in water collection and decisions pertaining to household WASH activities, were also reported. The factors associated with WASH insecurity experiences among respondents were also examined.

Physical barriers

4.3.1 Access to drinking water services

According to the Joint Monitoring Programme, drinking water services refers to the accessibility, availability, and quality of the primary water source used by households for drinking, cooking, personal hygiene, and other domestic purposes (WHO/UNICEF, n.d.).

The findings show that about 74% of respondents indicated they access their main source of drinking water off-premises, while 25% access water on-premises. The most common type of on-premises water source was piped water, accounting for about 42% of on-premises sources. However, among the off-premises sources, borehole was the most common water source used

by households (34%). It is worth noting that, in the context of SSA, a piped water source located on-premises could be shared by extended households living in the same compound (Bisung & Elliott, 2018). Moreover, the use of off-premises water sources, such as boreholes are mostly used by multiple households within a community that may lead to overcrowding at water points (Adams et al., 2021; Zvobgo & Do, 2020). While boreholes remain a valuable water source for the majority of respondents, sharing these sources with other households could create pathways for COVID-19 exposure (Stoler et al., 2021). Thus, putting older adults who are already vulnerable to the COVID-19 disease at greater risk. In terms of the level of drinking water service used by households, about 87% indicated they had access to improve water sources (Table 4.4). However, there were variations in terms of distance to water sources among households. While 50% used basic services that could be accessed within an average of 14.4 minutes (SD ± 10.12 min) per round trip, a significant proportion (37.8%) of respondents used limited services that took an average of 58 minutes (SD ± 22.1 min) for a single round trip, including queuing (i.e., limited service) (Table 4.2). Spending long hours accessing water can limit the amount of water households are willing and able to use to maintain hand hygiene COVID-19 and proper sanitation (Rishworth & Elliott, 2022), which are essential for COVID-19 prevention.

Table 4.2 Level of household access to water, sanitation, and hygiene (WASH) services

WASH services	Level of service n (%)			
	Basic	Limited	Unimproved	No service
Water	144 (50)	109 (37.8)	21 (7.3)	14 (4.9)
Sanitation	152 (52.8)	25 (8.7)	102 (35.4)	9 (3.1)
Hygiene	79 (27.4)	17 (5.9)	-	192 (66.7)

Definition and categorization of WASH service levels

Note: The research adopted the Criteria on the categorisation of WASH service levels between populations as provided by WHO/UNICEF Joint monitoring program 2020. According to JMP:

Drinking water service levels and definition:
1. Basic service: Households that have access to a drinking water source that is considered improved, and it takes them no more than 30 minutes to collect the water and return home, even when they have to queue.
2. Limited service: Households that have a drinking water source that is considered improved, but it takes them more than 30 minutes to queue, collect water and return home
3. Unimproved service: Households that obtain drinking water from a well or a spring that is not protected from contamination by external factors.
4. No service/Surface water: Households obtaining drinking water directly from a river, dam, lake, pond, stream, canal or irrigation canal.

Sanitation service levels and definition:
1. Basic service: Households that have access to sanitation facilities, such as a toilet facility that are considered improved, and are not shared with other households.
2. Limited service: Households that have access to sanitation facilities, such as toilet facilities that are considered improved, and are shared with other households.
3. Unimproved service: Households that use pit latrines that do not have a slab or platform to sit on, or use hanging latrines or bucket latrines.
4. No service /Open defecation: Households disposing of human feces in open areas such as fields, forests, bushes, open bodies of water, beaches, or other public places, or mix them with solid waste.

Hygiene service levels and definition:
1. Basic service: Households that have handwashing facilities with soap and water present.
2. Limited service: Households that have handwashing facilities available at home but lacking soap and/or water.
No service: Households that have no handwashing facility available.

Table 4.3: Location of main drinking water sources

Main source of drinking water	Location of water source		
	On-premises n (%)	**Off-premises n (%)**	**Total n (%)**
Borehole	5 (6.3)	74 (93.7)	79 (100)
Piped into compound, yard/plot	31 (88.6)	4 (11.4)	35 (100)
Protected spring	10 (14.9)	57 (85)	67 (100)
Protected well	3 (8.6)	32 (91.4)	35 (100)
Rainwater collection	16 (66.7)	8 (33.3)	24 (100)
Surface water	0 (0)	14 (100)	14 (100)
Unprotected spring	4 (36.4)	7 (63.6)	11 (100)
Unprotected well	1 (10)	9 (90)	10 (100)
Other	3 (23.1)	10 (76.9)	13 (100)
Total	73 (25.3)	215 (74.7)	288 (100)

Table 4.4: Quality of water sources

Improved water source	n (%)	Unimproved water source	n (%)	No facility	n (%)
Borehole	79 (27.4)	Unprotected spring	11 (3.8)	Surface water	14 (4.9)
Piped into compound, yard/plot	35 (12.2)	Unprotected well	10 (3.5)		
Protected spring	67 (23.3)				
Protected well	35 (12.2)				
Rainwater Collection	24 (8.3)				
Other	13 (4.5)				
Total	**253 (87.8)**		**21 (7.3)**		**14 (4.9)**

Definition of improved and unimproved water sources

Note: The research adopted the definition and categorisation of water sources WHO/UNICEF Joint monitoring program 2020. According to JMP:

1. Improved water sources: These are drinking water sources that supplies safe drinking water by the nature of their construction or design. These include Tap water in the dwelling, yard or plot, including piped to a neighbour, public taps or standpipes, Non-piped supplies, Boreholes/tube wells Protected wells and springs, Rainwater, Packaged water, including bottled, water and sachet water, Delivered water, including tanker, trucks and small carts/tanks/drums, Water kiosks
2. Unimproved water sources: these include non-piped water supplies, such as Unprotected wells and unprotected springs.
3. No facility: These include, Open water sources located above, ground, including rivers, lakes, ponds, streams, canals, reservoirs or irrigation channels.

4.3.2 Access to sanitation services

More than half of respondents (62%) had access to an improved toilet facility, while a significant proportion (35%) accessed unimproved toilet facilities, and roughly 3% had no toilet facilities and relied on fields or bushes for open defecation (Table 4.6). About 90% of all respondents reported having toilet facilities located on-premises. The majority (62%) of households with on-premises toilet facilities used pit or twin pit latrines with slabs, while a sizeable proportion (23%) relied on open pit latrines without a slab (Table 4.5). Regarding the levels of sanitation services, approximately 52% of households had access to basic sanitation facilities (i.e., improved toilet facilities that are not shared with other households), while only 8% used limited sanitation services (improved toilet facilities shared with other households) (Table 4.2). These imply that nearly half of the respondents either utilize unimproved sources or share their toilet facilities with other households, which could increase their risk of exposure to contaminated surfaces (Cavill et al., 2022; Rishworth & Elliott, 2022) and other people, thereby potentially contributing to the spread of COVID-19 infections.

Table 4.5: Location of main types of toilet facilities used by respondents' household.

Main source of toilet facility	Location of toilet facility		
	On-premises n (%)	**Off-premises n (%)**	**Total n (%)**
Bucket	1 (0)	0 (0)	1 (100)
Flush to piped sewer/ septic tank	2 (0)	0 (0)	2 (100)
hanging toilet/ latrine	28 (82.3)	6 (17.7)	34 (100)
No facility/Bush	0 (0)	9 (100)	9 (100)
Open pit/pit latrine without slab	59 (87.9)	7 (10.6)	66 (100)
Other composting toilet	8 (100)	0 (0)	8 (100)
pit/twin pit with slab	159 (92.2)	8 (4.8)	167 (100)
Neighbours' toilet	0 (0)	1 (100)	1 (100)
Total	257 (89.2%)	31 (10.8%)	288 (100%)

Table 4.6: Quality of toilet facility

Improved toilet facilities n (%)		Unimproved toilet facilities n (%)		No Facility n (%)	
Flush to piped sewer/septic tank	2 (0.7)	Open pit/pit latrine without slab	66 (22.9)	Bush/field	9 (3.2)
Other composting toilet	8 (2.8)	Hanging toilet	34 (11.8)		
Pit/twin pit with slab	167 (58)	Bucket	1 (0.4)		
		Other	1 (0.4)		
Total	**177 (61.6)**		**102 (35.1)**		**9 (3.2)**
Definition of improved and unimproved toilet facilities Note: The research adopted the definition and categorisation of sanitation services from the WHO/UNICEF Joint monitoring program 2020. According to JMP: 1. Improved sanitation service: These are facilities designed in a way that human excreta are kept separate from human contact in a hygienic manner. These include Flush and pour-flush toilets, Flush and pour-flush toilets or latrines connected to septic tanks or pits, ventilated improved pit (VIP) latrines, Pit latrines with slabs, composting toilets, including twin pit latrines with slabs. 2. Unimproved water sources: These are sanitation facilities that do not hygienically separate human excreta from human contact. They include Pit latrines without slabs, Open pits, hanging toilets/latrines, Bucket latrines, including pans, trays or other unsealed containers. 3. No facility: These include Defecation in the bush, fields or ditches, Defecation into surface water, including, beaches, rivers, streams, the sea, or drainage channels.					

4.3.3 Access to hygiene/ handwashing services

The data revealed a very low coverage of basic handwashing facilities. About two-thirds (66%) of respondents reported that they did not have any handwashing facilities at their homes. Approximately a quarter (27%) had access to basic hand hygiene facilities with soap and water available, while more than 5% had handwashing facilities but with no water or soap available at the time of the survey (Table 4.2). The low coverage of handwashing facilities among households implies that the fulfillment of frequent hand hygiene condition recommended by the WHO is dicey in this context. For example, when participants were asked to indicate the number of times, they had washed their hands the day before the survey, on average, respondents washed their hands four (4) times (SD ± 3 times). According to Beale et

al (2021), washing hands five times or below during the COVID-19 pandemic was associated with a higher chance of contracting coronavirus compared to those that washed their hands 6-10 times. This means that the comparatively lower frequency of handwashing reported in the current research could mean higher exposure to COVID-19 infections.

4.3.4 Household water insecurity coping measures

Nearly one-third (31%) of the respondents reported experiencing various water insecurity concerns, such as not having enough water on some days, having to go to bed thirsty, and feeling frustrated due to insufficient water. To cope with these issues, the most frequently utilized coping strategies among the participants were harvesting rainwater (64%), taking extra measures to store water (48%), and acquiring water from a distant source (42%) (Figure 4.1). Some of these strategies are either unreliable or exposed people to COVID-19 infections. For example, harvesting rainwater is only possible during periods of rainfall. Also, extra measures to store water and acquiring water from distant sources can often mean reducing water usage for handwashing and bathing.
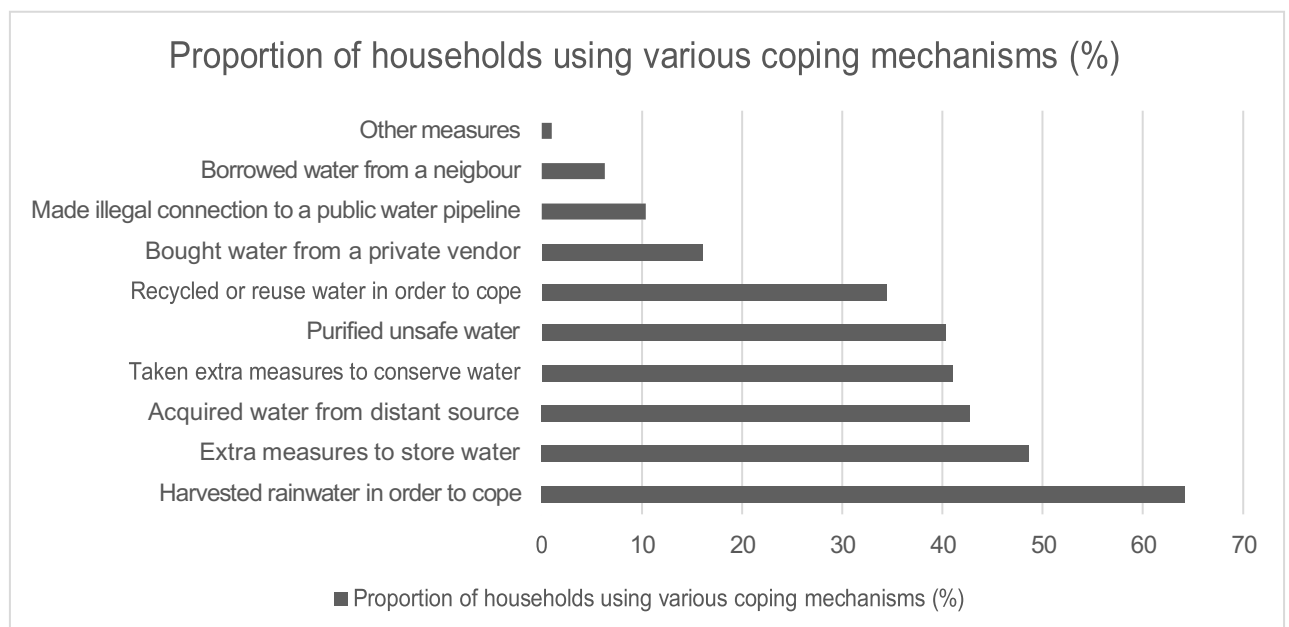
Figure 4.1: Water insecurity coping mechanisms among older adults during the COVID-19 pandemic

Social barriers

4.4 Burden of water collection and intra-household WASH decision making

4.4.1 Persons primarily responsible for collecting water in households

Out of the respondents that accessed water sources located off-premises, the greatest percentage identified adult females as the people primarily responsible for water collection, followed by boys aged 15 and below. Table 4.7 shows that more than half (56%) of female respondents and about 41% of male respondents in partnered households reported that an adult female was primarily responsible for water collection for household use. In unpartnered households, however, a majority of male respondents (62%) reported that the adult male assumed this responsibility. Furthermore, in partnered households, male respondents were more likely than female respondents to report that boys were responsible for water collection (29% and 13%, respectively). In contrast, fewer male respondents in unpartnered households reported that boys were primarily responsible (8%) compared to the 26% of female respondents who said so (Table 4.7). Thus, boys can take on the role of primary water collectors, which contradicts the prevailing literature claiming that girls and women are primarily responsible for water collection in SSA (Adams et al., 2021; Nunbogu & Elliott, 2021). Nonetheless, this finding aligns with Kamei's study in Uganda, which found that boys tend to increase their labour during climate shocks to cope with water scarcity more than girls (Kamei, 2022). As such, the heightened participation of boys in water collection may be a response to the amplified water demands triggered by the COVID-19 pandemic. Therefore, the results suggest that women, as primary water collectors, may be at greater risk of COVID-19 exposure. However, in unpartnered household, boys and older adult males also engage in water collection and were also at risk of exposure.

4.4.2 Persons responsible for decision-making regarding household WASH activities

Though there were some slightly unequal gender divisions of responsibilities in regard to WASH activities reported by respondents, particularly in partnered households, overall, decision-making regarding WASH activities was typically shared between respondents and their spouses (either females or males). Both parties reported that they decide on water collection, sanitation maintenance, attending community meetings, and making decisions concerning the expenditure on water and sanitation-related activities. In some cases, however, decisions may be made by other household or non-household members (Table 4.7).

To illustrate, in partnered households, females were predominantly responsible for making decisions regarding toilet maintenance and water collection. As Table 4.7 shows, in partnered households, more than 52% of male respondents reported that their spouses (i.e., females) were responsible for toilet maintenance, though about 37% of the males also indicated that they were involved in making such decisions. Also, half of the female respondents (50%) reported that they themselves made decisions. Similar trends are observed for decision-making about water collection; in partnered households, about 47% of male respondents said their spouse (i.e., female) and 54% of female respondents said they were responsible for making decisions. On the other hand, when it came to decision-making regarding community WASH meetings, there was not much difference in partnered households, as about 45% of male respondents and 40% of female respondents said they themselves made decisions regarding community WASH meetings. Furthermore, in unpartnered households, a greater percentage of respondents (73% males and 78% females) and (59% males and 70% females) indicated that they made decisions themselves regarding toilet maintenance and water collection, respectively.

Table 4.7: Responsibility for decision-making regarding WASH

Variable	Partnered household		Unpartnered household		Overall	
	Male	Female	Male	Female	Male	Female
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Person primarily responsible for collecting water each day in the household						
Adult female	18(40.9)	20(55.6)	5(14.3)	55(46.6)	23(29.1)	75(48.7)
Adult male	9(20.5)	5(13.9)	22(62.9)	17(14.4)	31(39.2)	22(14.3)
Boy (<15yrs)	13(29.6)	5(13.9)	3(8.6)	31(26.3)	16(20.3)	36(23.4)
Girl (<15yrs)	4(9.1)	6(16.7)	5(14.3)	15(12.7)	9(11.4)	21(13.6)
Person responsible for decision making regarding water collection in the last 12 months						
Self	18(34.0)	23(54.8)	29(59.2)	101(70.6)	47(46.1)	124(67.0)
Spouse	25(47.2)	12(28.6)	5(10.2)	2(1.4)	30(29.4)	14(7.6)
Other household member	15(28.3)	10(23.8)	7(14.3)	35(24.5)	22(21.6)	45(24.3)
Other non-household member	1(1.9)	1(2.4)	1(2.0)	3(2.1)	2(2.0)	4(2.2)
Person responsible for decision making regarding toilet maintenance in the last 12 months						
Self	20(37.7)	21(50.0)	36(73.5)	113(78.5)	56(54.9)	134(72.0)
Spouse	28(52.8)	12(28.6)	6(12.2)	0	34(33.3)	12(6.5)
Other household member	15(28.3)	13(31.0)	9(18.4)	44(30.6)	24(23.5)	57(30.7)
Other non-household member	1(1.9)	1(2.4)	2(4.1)	3(2.1)	3(2.9)	4(2.2)
Person responsible for decision making regarding community WASH meetings in the last 12 months						
Self	24(45.3)	17(40.5)	28(57.1)	81(56.3)	52(51.0)	98(52.7)
Spouse	14(26.4)	7(16.7)	5(10.2)	0	19(18.6)	7(3.8)
Other household member	13(24.5)	12(28.6)	8.2)4(	33(22.9)	17(16.7)	45(24.2)
Other non-household member	1(1.9)	1(2.4)	0	4(2.8)	1(1.0)	5(2.7)
Person responsible for decision making regarding household water expenditure in the last 12 months						
Self	35(66.0)	21(50.0)	34(69.4)	92(63.9)	69(67.7)	113(60.8)
Spouse	15(28.3)	8(19.1))	2(4.1)	0	17(16.7)	8(4.3)

Variable	Partnered household		Unpartnered household		Overall	
	Male	Female	Male	Female	Male	Female
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Other household member	9(17.0)	11(26.2)	5(10.2)	34(23.6)	14(13.7)	45(24.2)
Other non-household member	1(1.9)	1(2.4)	1(2.0)	1(0.7)	2(2.0)	2(1.1)
Person responsible for decision making regarding household sanitation expenditure in the last 12 months						
Self	38(71.7)	23(54.8)	35(71.4)	98(68.1)	73(71.6)	121(65.1)
Spouse	21(39.6)	9(21.4)	2(4.1)	0	23(22.6)	9(4.8)
Other household member	11(20.8)	11(26.2)	6(12.2)	35(24.3)	17916.7)	46(24.7)
Other non-household member	0	0	0	2(1.4)	0	2(1.1)

NB: These are multiple responses, so they do not sum up to 100%

In contrast to decision-making on water collection and toilet maintenance, which the majority of male and female respondents conceded to females making the decisions, in the case of decision-making on water and sanitation expenditure, the results from the survey were less certain. The majority of both male and female respondents reported themselves as responsible for decision-making regarding water and sanitation expenditure. For instance, in partnered households, 66% of male respondents reported making decisions on household water expenditure, while 71% reported making decisions on household sanitation expenditure. Similarly, about half of the female respondents (50%) and (54%) were also of the view that they made decisions on water and sanitation expenditure (Table 4.7). While a higher proportion of male respondents (66% and 71%) reported making decisions on these expenditures, the data also suggests that WASH decision-making is often a shared responsibility. For example, in 28.3% and 39.6% of the time, male respondents reported that their spouses made the decisions regarding water and sanitation expenditure, respectively. Also, 19% and 21% of female respondents reported that their spouses made these decisions.

4.4.3. Level of input into decision-making regarding WASH activities

      Table 4.8 shows the level of input about WASH made by male and female respondents across partnered and unpartnered households in the survey. In partnered households, there was a notable difference between the proportion of males and females making *Almost all* decisions regarding WASH; more males (77%) reported making *Almost all* decisions regarding water collection, in comparison to 43% of female respondents making such decisions. Similarly, 60% of males made *Almost all* decisions concerning the management of the toilet or hygiene facilities compared to females (47%). Furthermore, men (50%) made *Almost all* decisions on the attendance to community WASH meetings compared to females (35%). Overall, males were more likely to report making *Almost all* decisions in the three domains.

      However, both males and females were almost evenly split (52% vs 52%) in terms of making *Almost all* decisions regarding household sanitation expenditure. At the same time, 42% of males and females, respectively, indicated that they made some decisions regarding water expenditure. Therefore, it can be seen that in partnered households, both genders are equally involved in making decisions about sanitation and water expenditure. In households without a partner, both genders reported that they made *Almost all* of the decisions regarding WASH domains more often than they reported making *Some* or a *few* decisions.

Table 4.8: Level of input in decision-making regarding WASH

Variable	Partnered household		Unpartnered household	
	Men	**Women**	**Men**	**Women**
	n (%)	**n (%)**	**n (%)**	**n (%)**
Level of input made by respondent regarding household water collection in the last 12 months				
Almost all	14 (77.8)	10 (43.5)	26 (89.7)	75 (74.3)
Some	0	9 (39.1)	2 (6.9)	23 (22.8)
A few	4 (22.2)	4 (17.4)	1 (3.5)	3 (3.0

Variable	Partnered household		Unpartnered household	
	Men	Women	Men	Women
	n (%)	n (%)	n (%)	n (%)
Level of input made by respondent regarding management and maintenance of household toilet or hygiene facilities in the last 12 months				
Almost all	12 (60.0)	10 (47.6)	33 (91.7)	93 (82.3)
Some	8 (40.0)	8 (38.1)	2 (5.6)	15 (13.3)
A few	0	3 (14.3)	1 (2.8)	5 (4.4)
Level of input made by respondent regarding attendance to community WASH meetings in the last 12 months				
Almost all	12 (50.0)	6 (35.3)	24 (85.7)	54 (68.4)
Some	11 (45.8)	11 (64.7)	2 (7.1)	19 (24.1)
A few	1 (4.2)	0	2 (7.1)	6 (7.6)
Level of input made by respondent regarding household water expenditure in the last 12 months				
Almost all	18 (51.4)	10 (47.6)	31 (91.2)	74 (80.4)
Some	15 (42.9)	9 (42.9)	3 (8.8)	13 (14.1)
A few	2 (5.7)	2 (9.5)	0	5 (5.4)
Level of input made by respondent regarding household sanitation expenditure in the last 12 months				
Almost all	20 (52.6)	12 (52.2)	30 (85.7)	79 (81.4)
Some	17 (44.7)	11 (47.8)	4 (11.4)	16 (16.5)
A few	1 (2.6)	0	1 (2.9)	2 (2.1)

4. 5 Bivariate analyses

Results of a bivariate analysis of WASH insecurity (the dependent variable) and selected independent variables that could affect differing experiences of WASH insecurity are presented in Table 4.9.

The findings show that wealth, location of drinking water sources, source of toilet facilities, and levels of sanitation services had a significant association with WASH insecurity. In terms of wealth, the results show a significant association between WASH insecurity and wealth (p-value<0.01), with the poor reporting lower median WASH insecurity score (14, 12-54) than the less poor (18, 12-56). Additionally, the results show a significant association between WASH insecurity among poor and less poor males (p-value<0.05), while there is no

correlation between WASH insecurity and wealth among females (p-value>0.05). These suggest that wealthier individuals were more likely to experience WASH insecurity, which is counterintuitive as poorer households are generally more vulnerable to WASH insecurity due to their limited access to WASH facilities and resources (Morakinyo et al., 2015). Also, there may be gender differences in the relationship between wealth and WASH insecurity, with males potentially being more affected than females.

Additionally, there is a significant relationship between WASH insecurity and location of drinking water sources (p-value<0.05). Respondents who had their drinking water off-premises reported higher scores in WASH insecurity compared to those who had it on-premises. For both males and females, there is no difference in WASH insecurity between those who have their water off-premises and those who have it on-premises (p-value>0.05). Therefore, having access to water on-premises is a key factor in reducing WASH insecurity, but this relationship may not be related to gender.

The source of toilet facility had a significant influence on overall WASH insecurity (p-value<0.05). The pairwise comparison using Dunn's test with Bonferroni correction (i.e., the post-hoc text) indicated that for the overall sample, the median WASH insecurity score was significantly higher for those who had no facility (20, 12-32) compared to those who had improved facility (14, 12-54). Similarly, for males, the median WASH insecurity score was significantly higher for those who had no facility (28, 20-28) compared to those who had improved facility (15, 12-44). No other pairwise differences were statistically significant. The findings suggest that having access to improved toilet facilities is associated with lower experiences of WASH insecurity. Additionally, there may be gender differences in the relationship between access to toilet facilities and WASH insecurity, with males potentially being more affected than females.

There is no significant association between the levels of drinking water services and WASH insecurity (p-value>0.05) for the overall population. However, in terms of gender, levels of drinking water services were significantly associated with WASH insecurity scores among males (p-value<0.05) and not among females (p-value>0.05). Results of the post-hoc test indicated that, for males, the WASH insecurity score was significantly lower for those who had basic drinking water services (14, 12-48) compared to those who had limited (20, 12-40), unimproved (20.5, 12-44), or surface water (25, 12-34). No other pairwise differences were statistically different. This suggest that having access to basic water services is associated with lower experiences of WASH insecurity for males.

Furthermore, the results indicate that level of sanitation service is significantly associated with WASH insecurity (p-value<0.05). The post-hoc test indicates that households with unimproved sanitation services (18, 12-56) and no facility (20, 12-32) had significantly higher WASH insecurity scores than households with basic (14, 12-54) and limited sanitation services (12, 12-54). In terms of gender, levels of sanitation service were significantly associated with WASH insecurity among males only (p-value<0.05). Specifically, those with basic services (12, 12-44) had significantly lower WASH insecurity scores than those with limited (24, 12-33), unimproved (18, 12-48), or no facility (28, 20-28). This indicates that households with an improved, non-shared toilet facility are likely to experience lower WASH insecurity than those without. Moreover, the results suggest that gender differences may exist in the relationship between levels of sanitation services and WASH insecurity, with males being more susceptible than females.

Overall, respondents who are less poor, collect water off-premises, and have no toilet facility, scored highest for WASH insecurity than those who are poor, collect water on-premises and have higher service levels for toilet facilities, respectively. Additionally, it appears that males were more susceptible to WASH insecurity than women.

Table 4.9 Bivariate results from Wilcoxon rank sum test for 2 categories and Kruskal

Wallis for more than 2 categories prediction of WASH insecurity

Variables	WASH Insecurity		
	Overall	**Males**	**Females**
	Median (Range)	**Median (Range)**	**Median (Range)**
Educational level			
No education	16 (12-52)	18.5 (12-48)	15 (12-52)
Primary	16.5 (12-56)	17 (12-34)	14 (12-56)
Above primary	16 (12-44)	16 (12-44)	15 (12-39)
p-value	0.7644	0.3085	0.9678
Occupation			
Subsistence farming	18 (12-56)	18 (12-48)	17 (12-56)
Self-employed	17 (12-40)	20 (12-40)	16 (12-34)
Not working	13 (12-52)	16 (12-44)	12 (12-52)
Other	20 (12-40)	19 (12-34)	20 (12-40)
p-value	0.2487	0.7414	0.1835
Wealth			
Poor	14 (12-54)	16 (12-48)	13 (12-54)
Less Poor	18 (12-56)	20 (12-44)	18 (12-56)
p-value	**0.0054**	**0.0191**	0.0831
Household size			
Small (0-5)	16 (12-56)	16.5 (12-44)	14.5 (12-56)
Medium (6-10)	16 (12-54)	17 (12-48)	16 (12-54)
Large (>10)	20 (12-40)	21 (12-33)	12 (12-40)
p-value	0.7843	0.5063	0.9307
Gender			
Male	17 (12-48)		
Female	15 (12-56)		
p-value	0.3925		
Marital Status			
Partnered	17 (12-54)	18 (12-48)	16 (12-54)
Unpartnered	15 (12-56)	17 (12-44)	14 (12-56)
p-value	0.2963	0.4394	0.6764
Children present			
Yes	16 (12-56)	18.5 (12-48)	14 (12-56)
No	17 (12-44)	16 (12-44)	20 (12-44)
p-value	0.3443	0.2639	0.0532
Makes decision regarding WASH			
Yes	16 (12-56)	17 (12-44)	15 (12-56)

Variables	WASH Insecurity		
	Overall	Males	Females
	Median (Range)	Median (Range)	Median (Range)
No	16 (12-52)	17 (12-48)	16 (12-52)
p-value	0.9074	0.7446	0.8427
Location of drinking water			
On-premises	13 (12-54)	18 (12-48)	16 (12-56)
Off-Premises	17 (12-56)	14 (12-35)	12 (12-54)
p-value	**0.0220**	0.1292	0.0957
Source of drinking water			
Improved	16 (12-48)	17 (12-48)	15 (12-44)
Unimproved	18 (12-56)	25 (12-44)	15 (12-56)
p-value	0.1583	0.0969	0.6840
Location of toilet facility			
Off-premises	16 (12-56)	20 (12-34)	17 (12-37)
On-Premises	18 (12-37)	17 (12-48)	14 (12-56)
p-value	0.3115	0.5679	0.4303
Source of toilet facility			
Improved	14 (12-54) A	15 (12-44) A	14 (12-54)
Unimproved	18 (12-56) AB	18 (12-48) AB	18 (12-56)
No facility	20 (12-32) B	28 (20-28) B	18.5 (12-32)
p-value	**0.0117**	**0.0401**	0.1971
Presence of handwashing facility			
Yes	13.5 (12-48)	17 (12-48)	12 (12-44)
No	17 (12-56)	17 (12-40)	16 (12-56)
p-value	0.1238	0.9555	0.0725
Level of drinking water services			
Basic	14 (12-48)	14 (12-48) A	14 (12-42)
Limited	18 (12-44)	20 (12-40) B	16 (12-44)
Unimproved	18 (12-54)	20.5 (12-44) B	18 (12-54)
Surface water	20 (12-56)	25 (12-34) B	12 (12-56)
p-value	0.0760	**0.0160**	0.8239
Level of sanitation service			
Basic	14 (12-54) A	12 (12-44) A	14 (12-54)
Limited	12 (12-52) A	24 (12-33) B	12 (12-52)
Unimproved	18 (12-56) B	18 (12-48) C	18 (12-56)
No facility	20 (12-32) B	28 (20-28) B	18.5 (12-32)
p-value	**0.0304**	**0.0152**	0.2683
Level of hand washing service			
Basic	12 (12-48)	17 (12-48)	12 (12-44)

Variables	WASH Insecurity		
	Overall	Males	Females
	Median (Range)	Median (Range)	Median (Range)
Limited	17 (12-44)	19.5 (12-44)	15.5 (12-34)
No facility	17 (12-56)	17 (12-40)	16 (12-56)
p-value	0.1793	0.5796	0.1801

Notes:

1. p-value < 0.05

2. When the sample characteristic variable was a dichotomous (gender: male or female), the Wilcoxon rank sum test was used instead of a of a t-test, given that the distribution of the WASH insecurity scores was found to be significantly skewed, suggesting the presence of an underlying difference between the samples.

3. When the sample characteristic variable was polychotomous (education: no education, primary education, and above primary education), the Kruskal-Wallis test was used instead of a of ANOVA test for the reason stated in note 2 above.

4. When the Kruskal-Wallis test results in a significant p-value, Dunn's test with Bonferroni correction was used to conduct pairwise comparisons as a post hoc test to determine which groups were significantly different from the other. Similar alphabets indicate non-significant differences between the groups being compared., whiles different alphabets indicate significant differences between the groups being compared.

4.6 Knowledge, Attitudes, Risk Perception and Practice (KARP) towards Covid-19

This section reports the results of the analysis of objective two, which investigates Ugandan older adults' knowledge, attitudes, risk perceptions, and practices toward COVID-19. The results include a descriptive analysis of respondents' level of knowledge, attitudes, perceptions of risk, and practices, respectively. Additionally, bivariate analysis is used to illustrate the relationship between the independent variables (sample characteristics and WASH variables) and the outcome variable (KARP scores).

4.6.1 Knowledge of Ugandan older adults towards COVID-19

4.6.1.1 Questionnaire, scoring and coding

To measure participants' knowledge of COVID-19, twelve (12) questions were asked, eleven (11) of which were factual questions regarding clinical symptoms, transmission routes,

prevention and control of the disease, and one (1) question regarding rumours about the virus prevention strategy (i.e., K1-K11 and K12 respectively in Table 4.11). Participants were given four or five choices for each question, which were either "Definitely True," "Probably True," "Definitely False," "Probably False," and "Strongly Agree," "Somewhat Agree," "Neutral," "Somewhat Disagree," and "Strongly Disagree". To ensure robustness in the analysis, these answer options were calibrated to 'YES' or 'NO', or 'Don't Know/Not Sure' option. For example, "Definitely True," and "Probably True, and "Strongly Agree," "Somewhat Agree," have been categorized as 'YES' and "Definitely False," "Probably False,"; and "Somewhat Disagree," and "Strongly Disagree" as 'NO'. A correct answer to each question was assigned 1 point, while an incorrect answer, don't know/not sure, was assigned 0 points. To assess the internal consistency of the questions, Cronbach's alpha was used, and a coefficient with a total reliability of 0.685 was obtained. This was determined by excluding three questions (k10, k11 and K12) due to weak correlation. Thus, the overall knowledge score was calculated with nine questions with score ranging from 0 to 9, with a higher score signifying a better knowledge of COVID-19.

4.6.1.2 Knowledge of COVID-19

All the participants reported they had heard about COVID-19, with most (54.1%) indicating that they heard about the COVID-19 pandemic multiple times a week. Participants indicated that radio was the main source of information (68.6%) about COVID-19, followed by TV (13.4%), family/friends (12.4%), community health workers (2.1%), and community forums (1.8%) (Table 4.10).

As to knowledge about the symptoms, control and prevention of COVID-19, respondents had an average score of 7.32 (SD ± 1.7) out of 9, which translated to 81.3% (7.32/9× 100) correct response rate. The knowledge scores of male and female participants were slightly different, with males having a slightly higher average score (82.6%) compared to

females (80.5%). Most survey participants (91.3%) correctly identified that COVID-19 can be spread when an infected person touches someone's hand or face, kisses them, or sneezes or coughs near them. Nearly all respondents (94.8%) were aware that frequent handwashing can prevent the spread of COVID-19. Additionally, 81.3% of participants were aware that infected individuals may not show symptoms for 5 – 14 days. Also, the majority (89.9%) of respondents knew that if they were experiencing symptoms or suspected they had COVID-19, they should get tested (Table 4.11).

Despite the high knowledge of COVID-19, a worrying number of the respondents were either unsure or answered incorrectly about key COVID-19 knowledge questions. For example, a significant proportion of respondents (18.7%) gave an incorrect response or were unsure that infected people may not show symptoms for 5-14 days. Also, 1.4% gave an incorrect response, while 7.3% were unsure that the virus can spread through physical contact with an infected person or through droplets released by coughing or sneezing. These suggest that while most respondents have a good knowledge of COVID-19 transmission and prevention, there are still some knowledge gaps and misconceptions among the sample.

Table 4.10. COVID-19 awareness and source of information

Item	Response	
	Frequency (n)	**Percent (%)**
Have you heard about COVID-19		
Yes	283	98.3
No	5	1.7
How often this year have you heard about COVID-19		
Never	33	11.7
Once or twice a week	96	33.9
Several times a week	153	54.1
Daily	1	0.4
From what source do you frequently get information about COVI-19		
Community health worker	6	2.1
Community forum	5	1.8
Family/friend	35	12.4
Radio	194	68.6
TV	38	13.4
Neighbours	3	1.1
Other sources	1	0.4

Table 4.11. General knowledge of the respondents about COVID-19 in Uganda

Question	Response	Overall n (%)	Male, n (%)	Female, n (%)
K1: The virus can spread when an infected person touches someone's hand or face, kisses them, or sneezes or coughs near them	**Yes**	263 (91.3)	93 (91.2)	170 (91.4)
	No	4 (1.4)	2 (2.0)	2 (1.1)
	Not sure	21 (7.3)	7 (6.9)	14 (7.5)
K2: Washing hands frequently helps prevent the spread of COVID-19	**Yes**	273 (94.8)	97 (95.1)	176 (94.6)
	No	0	0	0
	Not sure	15 (5.2)	5 (4.9)	10 (5.4)
K3: Infected people may not show symptoms for 5 – 14 days	**Yes**	234 (81.3)	89 (87.3)	145 (78.0)
	No	19 (6.6)	4 (3.9)	15 (8.1)
	Not sure	35 (12.2)	9 (8.8)	26 (14.0)
K4: If you show symptoms or think you have it, you should get tested	**Yes**	259 (89.9)	93 (91.2)	166 (89.3)
	No	11 (3.8)	5 (4.9)	6 (3.2)

Question	Response	Overall n (%)	Male, n (%)	Female, n (%)
	Not sure	18 (6.3)	4 (3.9)	14 (7.5)
K5: To prevent you or your family from getting infected with COVID-19, you should Wash your hands frequently	**Yes**	253 (87.9)	88 (86.3)	165 (88.7)
	No	35 (12.2)	14 (13.7)	21 (11.3)
	Not sure	-	-	-
K6: To prevent you or your family from getting infected with COVID-19, you should wear face mask	**Yes**	250 (86.8)	93 (91.2)	157 (84.4)
	No	38 (13.2)	9 (8.8)	29 (15.6)
	Not sure	-	-	-
K7: To prevent you or your family from getting infected with COVID-19, you should social distance	**Yes**	183 (63.5)	68 (66.7)	115 (61.8)
	No	105 (36.5)	34(33.3)	71 (38.2)
	Not sure	-	-	-
K8: To prevent you or your family from getting infected with COVID-19, you should stay home	**Yes**	163 (56.6)	56 (54.9)	107 (57.5)
	No	125 (43.4)	46 (45.1)	79 (42.5)
	Not sure	-	-	-
K9: To prevent you or your family from getting infected with COVID-19, you should monitor your health and others.	**Yes**	9 (3.1)	2 (2.0)	7 (3.8)
	No	279 (96.9)	100 (98.0)	179 (96.2)
	Not sure	-	-	-
K10: To prevent you or your family from getting infected with COVID-19, you should Get tested if you suspect exposure	**Yes**	11 (3.8)	2 (2.0)	9 (4.8)
	No	277 (96.2)	100 (98.0)	177 (95.2)
	Not sure	-	-	-
K11: A person's temperature should be taken before they enter any public place	**Yes**	230 (79.9)	82 (80.4)	148 (79.6)
	No	58 (20.1)	20 (19.6)	38 (20.4)
	Not sure	-	-	-
K12: To prevent you or your family from getting infected with COVID-19, you should Pray	**Yes**	9 (3.1)	2 (2.0)	7 (3.8)
	No	279 (96.9)	100 (98.0)	179 (96.2)
	Not sure	-	-	-
Total knowledge score (MEAN ± SD)		7.32 ± 1.7	7.44 ± 1.4	7.25 ± 1.9
Total knowledge level (MEAN/9 ×100)		81.3%	82.6%	80.5%
Note:				

Question	Response	Overall n (%)	Male, n (%)	Female, n (%)
1. Cronbach's alpha coefficient was calculated to assess the internal consistency of the scale used in measuring the COVID-19 knowledge construct. The Cronbach's alpha coefficient was found to be 0.685, indicating moderate internal consistency (Nunally 1994). 2. The Cronbach alpha coefficient 0.685 was determined after question k10, k11 and K12 were deleted due to weak correlation.				

4.6.2 Attitudes of Ugandan older adults towards COVID-19

4.6.2.1 Questionnaire, scoring and coding

Participants' attitudes towards COVID-19 were assessed using six (6) questions (A1-A6), to seek their viewpoint about using hand sanitizers and handwashing after hand shaking, wearing facemask and going to crowded places (Table 4.12). Similar to the knowledge questions, participants were given four answer choices for each question (i.e., 'Strongly disagree', 'Somewhat disagree' 'Neutral' Strongly agree 'Somewhat agree'). These answer choices were recoded into 'YES' and 'No' option where "Strongly disagree, Somewhat disagree and Neutral "answers are categorised as 'No' to the question whereas "Strongly agree and Somewhat agree" is categorised into a 'YES' answer. A positive answer to each question was assigned 1 point, while a negative response was assigned a 0 point. To assess the internal consistency of the questions, Cronbach's alpha was used, and a coefficient with a total reliability of 0.708 was obtained when A3, "I dislike wearing a facemask", was excluded due to negative correlation. Hence, the total attitude score was calculated using five (5) questions with scores ranging from 0 to 5.

4.6.2.2 Attitude Scores towards COVID-19

The overall attitude score of the participants was 3.32 ± 0.81 out of 5, which translates to a 66.4% (3.32/5× 100) correct percentage rate of positive attitude toward COVID-19 prevention and management measures. A majority of respondents (90.3%) reported they found it bothersome when people do not cover their mouths when coughing or sneezing. Similarly,

91.3% of respondents reported they preferred to use hand sanitizer or wash their hands after shaking another's hand. About 86.1% of respondents found wearing a facemask acceptable, while 80.6% agreed that they would isolate at home for 14 days if they were symptomatic or had a positive COVID-19 test. However, 86.1% of respondents agreed that people who have recovered from COVID-19 should be avoided to prevent getting the disease. Moreover, 56.3% of respondents preferred not to go to crowded public places. Overall, there was no significant difference between male and female respondents. Both males and females had an overall mean score of 3.32 (SD ± 0.81) and a correct rate of 66.4%. The slightest difference between males and females was in the responses to questions related to going to crowded public places and self-isolating at home for 14 days if symptomatic or having a positive COVID-19 test. Females were slightly more likely to prefer not to go to crowded public places and to isolate at home for 14 days if symptomatic or with a positive COVID-19 test than males (Table 4.12).

Table 4.12. Attitude of respondents towards COVID-19 prevention and management in Uganda

Question	Response	Overall, n (%)	Male, n (%)	Female, n (%)
A1: It really bothers me when people cough or sneeze without covering their mouths.	**Yes**	260 (90.3)	91(89.2)	169(90.9)
	No	28 (9.7)	11(10.9)	17(9.1)
A2: I prefer to use hand sanitizer or wash my hands after shaking another's hand	**Yes**	263 (91.3)	95(93.1)	168(90.3)
	No	25 (8.7)	7(6.9)	18(9.7)
A3: I dislike wearing a facemask*	**Yes**	40 (13.9)	16(15.7)	24(12.9)
	No	248 (86.1)	86(84.3)	162(87.1)
A4: I am fine with going to very crowded public places*	**Yes**	126 (43.8)	41(40.2)	85(45.7)
	No	162 (56.3)	61(59.8)	101(54.3)
A5: I would isolate at home for 14 days if I were symptomatic or had a positive COVID-19 test	**Yes**	232 (80.6)	81(79.4)	151(81.2)
	No	56 (19.4)	21(20.6)	35(18.8)
A6: People who have recovered from COVID-19 should be avoided to prevent getting the disease*	**Yes**	248 (86.1)	91(89.2)	157(84.4)
	No	40 (13.9)	11(10.8)	29(15.6)

Question	Response	Overall, n (%)	Male, n (%)	Female, n (%)
Total attitude score (Mean ± Std. dev)		3.32 ± 0.81	3.32 ± 0.81	3.32 ± 0.81
Overall attitude rate (Mean/5 ×100)		66.4%	66.4%	66.4%

Note:
1. Cronbach's alpha coefficient was calculated to assess the internal consistency of the scale used in measuring the attitude construct. The Cronbach's alpha coefficient was found to be 0.708 indicating good internal consistency.
2. The Cronbach alpha coefficient 0.708 was determined after question A3 was excluded due to negative correlation.

4.6.3 Risk perception of Ugandan older adults towards COVID-19

4.6.3.1 Questionnaire, scoring and coding.

To identify participants' perception of risk towards COVID-19, seven (7) questions were asked (R1-R7); these included questions related to their belief and worry in susceptibility to COVID-19 infection personally or among their household or country (Table 4.13). At all risk perception questions, participants were given either five or seven possible answers, which included (Not at all worried, Slightly worried, Somewhat worried, Moderately worried, Extremely worried); (Strongly disagree, Somewhat disagree, Neutral, Somewhat agree, Strongly agree); (Extremely unlikely, Moderately unlikely, Somewhat unlikely, Neutral, Somewhat likely, Moderately likely, Extremely likely) respectively. At the analysis stage, these responses were regrouped into 'YES' and 'No' as follows (Not at all worried, Slightly worried and somewhat worried (NO); Moderately worried and Extremely worried (YES)); (Strongly disagree, Somewhat disagree, Neutral (No); Somewhat agree and Strongly agree (Yes)); (Extremely unlikely, Moderately unlikely, Somewhat unlikely, Neutral (No); Somewhat likely, Moderately likely, Extremely likely (Yes)). The 'Yes' responses were given a score of 1 and 'No' was scored 0. Cronbach's alpha was used to test the reliability of the of the data and a coefficient with a total reliability of 0.779 was obtained when R1, R2 and R3 were excluded due to negative correlation. Hence, the total risk perception score was calculated using four (4) questions with score ranging from 0 to 4 (see Table 4.13).

4.6.3.2 Risk perception scores regarding COVID-19

The overall risk perception mean score was 1.75 (SD ± 1.52) out of 4, with an overall risk perception rate of 43.75% (1.75 /4 × 100). Table 4.13 points out that majority of participants (67.4%) indicated they were worried about COVID-19, while 32.6% stated that they were not. Also, less than one-third (30.9%) of respondents believed they would probably get sick with the virus, compared to 69.1% who did not believe they would. When asked about the seriousness of getting sick with COVID-19, 53.5% respondents declared that getting sick with COVID-19 would be serious, while 46.5% indicated that it would not be serious. Concerning perceptions about being affected with COVID-19, 23.6% respondents believed that they would be directly and personally affected by COVID-19 in the next six months, compared to 78.4% respondents who believed that they would not be affected. Similarly, only 14.9% respondents believed their friends and family would be directly affected by the virus, compared to 85.1% of respondents reporting they did not believe their friends and family would be affected. Additionally, 42.7% respondents believed that COVID-19 would not affect many people in Uganda, while 57.3% believed it would. The major difference between male and female respondents was in the question of personal worry about COVID-19. More females (69.9%) reported being worried about COVID-19 compared to males (62.8%). Additionally, more females (48.4%) expressed a desire to keep their illness a secret if they did get sick with COVID-19, compared to males (46.1%). Further tests revealed that these differences were not statistically significant.

Table 4.13. Risk perception of respondents towards COVID-19 infection and transmission in Uganda

Risk perception questions	Response	Overall, n (%)	Male, n (%)	Female, n (%)
R1: Are you personally worried about COVID-19?	**Yes**	194 (67.4)	64 (62.8)	130 (69.9)
	No	94 (32.6)	38 (37.3)	56 (30.1)
R2: Do you think you will be directly and personally affected with COVID-19 over the next 6 months?	**Yes**	68 (23.6)	23 (22.6)	45 (24.2)
	No	220 (76.4)	79 (77.5)	141 (75.8)
R3: Do you think your friends and family will be directly affected with COVID-19 in the next 6 months?	Yes	43 (14.9)	10 (9.8)	33 (17.7)
	No	245 (85.1)	92 (90.2)	153 (82.3)
R4: COVID-19 will not affect many people in Uganda	**Yes**	123 (42.7)	48 (47.1)	75 (40.3)
	No	165 (57.3)	54 (52.9)	111(59.7)
R5: I will probably get sick with the COVID-19 virus	**Yes**	89 (30.9)	32 (31.4)	57 (30.7)
	No	199 (69.1)	70 (68.6)	129 (69.4)
R6: Getting sick with COVID-19 can be serious	**Yes**	154 (53.5)	57 (55.9)	97 (52.2)
	No	134 (46.5)	45 (44.1)	89 (47.9)
R7: If I get sick with COVID-19, I wouldn't want anyone to know because then they would treat me differently*	**Yes**	137 (47.6)	47 (46.1)	90 (48.4)
	No	151 (52.4)	55 (53.9)	96 (51.6)
Total Risk perception score (Mean ± Std. dev)		1.75 ± 1.52	1.80 ± 1.45	1.72 ± 1.56
Overall risk rate (Mean/4 ×100)		43.75%	45%	43%

Note:
1. Cronbach's alpha coefficient was calculated to assess the internal consistency of the scale used in measuring the COVID-19 perception of risk construct. The Cronbach's alpha coefficient was found to be 0.779 indicating good internal consistency.
2. The Cronbach alpha coefficient 0.779 was obtained after R1, R2 and R3 were excluded due to negative correlation

4.6.4 Practices of Ugandan older adults towards COVID-19

4.6.4.1 Questionnaire, scoring and coding

To measure participants practices around COVID-19 prevention and management measures, 11 questions were asked, and participants were given "Strongly disagree", "Somewhat disagree", "Neutral", "Somewhat agree" and "Strongly agree" answer options to each question. These answer options were recoded into YES and No, with "Strongly disagree",

"Somewhat disagree" and "Neutral" given a "No" and "Somewhat agree" and "Strongly agree" given a "YES". The Yes answer choices were marked with 1 score while a No answer option was marked with a 0 score. The internal consistency of the questions was assessed using Cronbach's alpha. A coefficient with a total reliability of 0.707 was obtained when items 10 and 11 were excluded due to weak correlation. Therefore, the total practice score was calculated using nine questions with scores ranging from 0 to 9.

4.6.4.2 Practice scores related to the COVID-19

The overall mean practice score of 9 questions was 6.25 (SD ± 1.93), and the correct percentage rate was 69.4%. Majority of the respondents (87.2%) stated they avoid going to public places due to fear of getting sick with COVID-19, while 37 (12.9%) stated they do not. Similarly, 81.9% indicated that they mostly use hand sanitizer/wash their hands frequently with soap and water, while 18.8% said they do not. In regard to avoiding touching things like door handles or stair railings when in a public place, majority of respondents (81.9%) stated they do avoid while 18.1% stated they do not. In terms of wearing a face mask, 84% of respondents reported that they do wear and 16% said they do not. Nearly all respondents said they do not monitor their health and health of others and did not get tested when they suspected exposure.

Moreover, the main differences seen between male and female respondents regarding practices to prevent COVID-19 infection and spread are in regard to avoiding going to public places due to fear of getting sick with COVID-19 and avoiding touching things like door handles or stair railings when in public place. While 85.3% of males stated they avoided going to public places, a higher proportion of females (88.2%) said they avoided public places. Additionally, 88.2% of males indicated they avoided touching things like door handles or stair railings when in a public place, compared to 78.5% of females. Overall, while the mean score for males was 6.41 (SD ± 1.68) with a correct rate of 71%, females had a score of 6.16 (SD ± 2.05) with a correct rate of 68.4% (Table 4.14).

Table 4.14. Practices of respondents towards COVID-19 prevention and management in Uganda

Practice questions	Response	Overall, n (%)	Male, n (%)	Female, n (%)
P1: I avoid going to public places because of fear of getting sick with COVID-19	Yes	251 (87.2)	87(85.3)	164(88.2)
	No	37 (12.9)	15(14.7)	22(11.8)
P2: I avoid touching things like door handles or stair railings when I am in a public place.	Yes	236 (81.9)	90(88.2)	146(78.5)
	No	52 (18.1)	12(11.8)	40(21.5)
P3: I frequently use hand sanitizer/wash my hands with soap and water.	Yes	234 (81.3)	84(82.4)	150(80.7)
	No	54 (18.8)	18(17.7)	36(19.4)
P4: I have changed the way I live my life because of COVID-19	Yes	219 (76.0)	79(77.5)	140(75.3)
	No	69 (24.0)	23(22.6)	46(24.7)
P5: Do you Wash your hands frequently	Yes	253 (87.9)	92(90.2)	161(86.6)
	No	35 (12.2)	10(9.8)	25(13.4)
P6: Do you wear face mask	Yes	242 (84.0)	87(85.3)	155(83.3)
	No	46 (16.0)	15(14.7)	31(16.7)
P7: Do you keep a distance between you and others when in a social gathering	Yes	177 (61.5)	67(65.7)	110(59.1)
	No	111 (38.5)	35(34.3)	76(40.9)
P8: Do you Pray to prevent getting sick with COVID-19	Yes	13 (4.5)	6(5.9)	7(3.8)
	No	275 (95.5)	96(94.1)	176(96.2)
P9: Do you stay home	Yes	174 (60.4)	62(60.8)	112(60.2)
	No	114 (39.6)	40(39.2)	74(39.8)
P10: Do you monitor your health and the health of your family	Yes	11 (3.8)	0	11(5.9)
	No	277 (96.2)	102(100.0)	175(94.1)
P11: Did you get yourself tested when you suspected exposure	Yes	9 (3.1)	2(2.0)	7(3.8)
	No	279 (96.9)	100(98.0)	179(96.2)
Total practice score (Mean ± Std. dev)		6.25 ± 1.93	6.41 ± 1.68	6.16 ± 2.05
Overall practice rate (Mean/9 ×100)		69.4%	71%	68.4%

Note:
1. Cronbach's alpha coefficient was calculated to assess the internal consistency of the scale used in measuring the COVID-19 practice construct. The Cronbach's alpha coefficient was found to be 0.707 indicating good internal consistency.
2. The Cronbach alpha coefficient 0.707 was obtained after when items P10 and P11 were excluded due to weak correlation were excluded due to negative correlation

4.6.5 Correlation between sociodemographic characteristics and Knowledge, attitude, risk perception and practices (KARP) towards COVID-19

Kruskal-Wallis H Test and a Wilcoxon Rank Sum Test were utilised to explore the relationship between various socio-demographic factors, WASH related and COVID-19 related factors (that is the independent variables) and COVID-19 knowledge, attitudes, risk perception, and practices (that is the dependent variables). These tests were applied across three distinct categories: the overall sample, as well as males and females separately. The Kruskal-Wallis H Test was used for independent variables with more than two categories, whereas the Wilcoxon Rank Sum Test was used for independent variables with two categories. Since the Kruskal-Wallis H Test cannot explain the observed differences between categories, a Dunn's test with Bonferroni correction was used to conduct pairwise comparisons as a post hoc test where significant associations were detected. The results of the analysis showed that knowledge of COVID-19 was significantly associated with only the frequency of hearing COVID-19 information (p-value<0.05) for the overall sample. Results of Dunn's test with Bonferroni correction indicated that those who heard COVID-19 information only once or twice a week (8, 0-9) had significantly lower knowledge compared to those who heard it daily (8, 5-9) or several times a week (8, 3-9). No significant associations were found between gender, occupation, marital status, or wealth and the knowledge of respondents. Knowledge was significantly associated with educational status but for only the female sub-sample, with those with primary education (7, 0-9) having a significantly lower knowledge than those with above primary education (8, 5-9) or no education (8, 0-9) (Table 4.15).

In terms of attitudes, there were several significant associations between attitudes towards COVID-19 and various factors. Specifically, there were significant associations between attitudes towards COVID-19 and food insecurity (p-value<0.05). Food insecure households (4, 1-5) had significantly higher positive attitudes towards COVID-19 than food

secure households (3, 1-5)). The availability of extra room to isolate COVID-19 infected patients also had a significant association with attitudes towards COVID-19 (p-value<0.05). Households with no extra room (4, 1-5) had significantly higher positive attitudes towards COVID-19 than households with an extra room (3, 1-5). Based on these findings, it seems that households facing disadvantages, such as a lack of an extra room for self-isolation or food insecurity, held more positive attitudes than those who did not face such challenges.

Satisfaction with the Ugandan government response to COVID-19 also had a significant association with attitudes towards COVID-19 (p-value<0.05). Those satisfied with the Ugandan government response (4, 1-5) had significantly higher positive attitudes towards COVID-19 than those who were not satisfied (3, 1-4). Similarly, trust in the information from the Ugandan government about COVID-19 had a significant association with attitudes towards COVID-19 (p-value<0.05). Those who trust the information from the Ugandan government about COVID-19 (4, 1-5) had significantly higher positive attitudes towards COVID-19 than those who do not (3, 1-5), for all the sample categories (Table 4.16). These findings suggest that having positive perceptions about the government is critical in shaping their positive COVID-19 attitudes.

Furthermore, there was a significant association between attitudes towards COVID-19 and the frequency of hearing COVID-19 information (p-value<0.05) for the overall sample. Those who heard COVID-19 information once/twice a week (4, 1-5) or daily (4, 2-5) had significantly higher positive attitudes towards COVID-19 than those who heard it several times a week (3, 1-5).

In addition, there was a significant association between attitudes towards COVID-19 and the level of handwashing facility, but only for the male sub-sample (p-value<0.05). Those who had limited handwashing facility (4, 3-5) had significantly higher positive attitudes towards COVID-19 than those with basic (3, 1-5) or no facility (3, 1-5).

Furthermore, the bivariate correlates of risk perception in Table 4.17 show that, for the overall sample, risk perception towards COVID-19 is significantly associated with food insecurity (p-value<0.05). Food insecure households had significantly higher (2, 0-4) risk perception than food secure households (1, 0-4). The presence of an extra room for isolating COVID-19 infected individuals was found to be significantly associated with risk perception towards the virus (p-value<0.05). Participants without an extra room (2, 0-4) had a significantly higher risk perception than those with an extra room (1, 0-4). The findings indicate that households facing disadvantages, such as a lack of an extra room for self-isolation or food insecurity, had a greater perception of risk compared to those who did not face such challenges.

Satisfaction with UG response to COVID-19 and trust in the information from UG about COVID-19 were significantly associated with risk perception (p-value<0.05). Those who expressed satisfaction with the UG response had significantly higher perception of risk (2, 0-4) than those who did not (1, 0-4). Similarly, those who trusted in information from the UG about COVID-19 had significantly higher perception of risk (2, 0-4) than those who did not (1, 0-4). The findings indicate that positive perceptions of the government and its information play a critical role in shaping how the public receives and perceives public health messaging.

The results are similar for the male and female categories with slight differences. Specifically, among males, risk perception toward COVID-19 is associated with food insecurity (p-value<0.05) and health insurance (p-value<0.05). For females, risk perception towards COVID-19 is associated with educational status (p-value<0.05), occupation (p-value<0.05), and availability of extra room to isolate COVID-19 infected patients (p-value<0.05).

Finally, Table 4.18 indicates that, for the overall sample, practice towards COVID-19 is significantly associated with satisfaction with the UG response to COVID-19 and trust in the

information from the UG about COVID-19 (p-value<0.05). Those who expressed satisfaction with the UG response to COVID-19 (7, 1-9) had significantly higher positive COVID-19 practices than those that did not (6, 0-9). Similarly, those who trusted in information from the UG about COVID-19 (7, 1-9) had significantly higher positive COVID-19 practices than those that did not (6, 0-9). These findings suggest that positive perceptions of the government are associated with a higher likelihood of individuals implementing COVID-19 prevention practices.

Additionally, the results demonstrate that the availability of an extra room for COVID-19 isolation, household size, and the presence of children were all significantly associated with COVID-19 practices. Households without an extra room (7, 0-9) had significantly higher practice scores than those with an extra room (6, 1-9). Moreover, large households or households with more than ten members (7, 3-8) had significantly higher practice scores than small (7, 0-9) or medium (7, 0-9) sized household. Similarly, households with children present (7, 0-9) had significantly higher practice scores than those without (6, 0-9). The findings suggest that households at greater risk of COVID-19 infection due to their large size or presence of children, and who are disadvantaged in terms of resources to cope, are more likely to implement COVID-19 preventive practices.

Regarding gender, the results show a significant association between COVID-19 practices and household size among males (p-value<0.05), but not among females. In contrast, there is a significant association between COVID-19 practices, the presence of children, occupation, and trust in UG information for females, but not for males (see Table 4.18).

In sum, from the bivariate analysis, it appears that COVID-19 related factors such as trust in and satisfaction with the UG response to COVID-19 consistently influences attitudes, risk perceptions, and practices of respondents. Older adults who trusted in and expressed satisfaction with the UG response to COVID-19 had positive attitudes, higher risk perceptions,

and implemented COVID-19 preventive practices than those that did not. This is particularly notable with regard to females, where the trust in the government was found to have an effect across all three dependent variables. Knowledge of COVID-19 appears to be less affected by socio-demographic characteristics, with frequency of COVID-19 information being the only factor associated with knowledge. Those who heard COVID-19 information more frequently had higher knowledge than those who did not. Basic necessities, such as food security, availability of room to isolate suspected COVID-19 patients, and the presence of children in the household, all shaped the attitude, risk perception, and practice of the respondents. The presence of children, in particular, had an effect on the practices of the female sub-sample, which may be related to the fact that many female older adults in Uganda perform child caregiving responsibilities.

In addition to the effect of socio-demographic characteristics and other related factors on KARP, the literature also suggests that there is a relationship between the KARP variables themselves, particularly between knowledge, attitudes, risk perception and COVID-19 practices. To further investigate these relationships, a spearman's correlation analysis was conducted (See section 4.6.6 and Table 4.19).

Table 4.15 Relationships between sociodemographic characteristics and Knowledge of COVID-19 in Uganda.

Variables		Overall		Male		Female	
		Median (Range)	P-value	Median (Range)	P-value	Median (Range)	P-value
Gender	Male	8 (2-9)	0.9454	-	-	-	-
	Female	8 (0-9)		-	-	-	-
	No education	8 (0-9)	0.0903	8(2-9)	0.9283	8(0-9)A	*0.0402*

101

Variables		Overall		Male		Female	
		Median (Range)	P-value	Median (Range)	P-value	Median (Range)	P-value
Educational status	Primary	7 (0-9)		7(5-9)		7(0-9)B	
	Above primary	8 (5-9)		8(5-9)		8(5-9)A	
Occupation	Subsistence farming	8 (3-9)	0.7791	7(3-9)	0.9087	8(3-9)	0.4271
	Self-employed	8 (0-9)		7.5(4-9)		8(0-9)	
	Not working	8 (0-9)		8(2-9)		8(0-9)	
	Other	7.5 (4-9)		8(6-9)		7(4-8)	
Marital status	Partnered	8 (3-9)	0.6663	8(3-9)	0.6984	8(5-9)	0.8237
	Unpartnered	8 (0-9)		7(2-9)		8(0-9)	
Wealth	Poor	8 (0-9)	0.7175	7(5-9)	0.5084	8(0-9)	0.9561
	Less poor	8 (0-9)		8(2-9)		8(0-9)	
Frequency of hearing COVID-19 information	Daily	8 (5-9) A	*0.0290*	8(7-9)	0.2017	8(5-9)	0.1136
	Once/twice a week	8 (0-9) B		8(2-9)		8(0-9)	
	Several time a week	8 (3-9) A		7(5-9)		8(3-9)	

Notes:

      $p < .05$

1. When the sample characteristic variable was a dichotomous, the Wilcoxon rank sum test was used.

2. When the sample characteristic variable was polychotomous, the Kruskal Wallis test was used.

Table 4.16 Relationships between sociodemographic characteristics and attitudes towards COVID-19 in Uganda.

Variables		Overall		Male		Female	
		Median (Range)	P-value	Median (Range)	P-value	Median (Range)	P-value
Gender	Male	3 (1-5)	0.9903	-	-	-	-
	Female	3 (1-5)		-	-	-	-
Educational status	No education	3 (1-5)	0.2154	3(1-5)	08264	3(1-5)	0.1539
	Primary	3 (1-5)		3(1-5)		3(1-5)	
	Above primary	3 (1-5)		3(1-5)		3(1-5)	
Occupation	Subsistence farming	3 (1-5)	0.6886	3(1-5)	0.6998	3(1-5)	0.3776
	Self-employed	3 (1-5)		3.5(3-4)		3(1-5)	
	Not working	3 (1-5)		3(2-5)		3(1-5)	
	Other	3 (1-4)		3.5(3-4)		3(1-4)	
Marital status	Partnered	3 (1-5)	0.7986	3(1-5)	0.8247	3(2-5)	0.5785
	Unpartnered	3 (1-5)		3(1-5)		3(1-5)	
Wealth	Poor	3 (1-5)	0.2855	3(1-5)	0.6109	3(1-5)	0.3385
	Less poor	3 (1-5)		3(1-5)		3(1-5)	
Household size	Small (1-5)	3 (1-5)	0.5599	3(1-5)	0.3075	3(1-5)	0.9102
	Medium (6-10)	3 (1-5)		3(1-5)		3(1-5)	
	Large (>10)	3 (2-5)		4(2-5)		3(2-4)	
Children present	Yes	3 (1-5)	0.0944	3(1-5)	0.1075	3(1-5)	0.3978
	No	3 (1-5)		3(1-5)		3(1-5)	
Presence of handwashing facility	Yes	3 (1-5)	0.1884	4(1-5)	0.0504	3(1-5)	0.8271
	No	3 (1-5)		3(1-5)		3(1-5)	
Level of drinking water services	Basic	3 (1-5)	0.3107	3(1-5)	0.7815	3(1-5)	0.2047
	Limited	3 (1-5)		3(1-5)		3(1-5)	
	Unimproved	3 (1-5)		3(3-4)		3(1-5)	
	Surface water	3 (2-4)		3(2-4)		3(3-3)	
Level of toilet facility	Basic	3 (1-5)	0.3420	3(1-5)	0.9947	3(1-5)	0.2030
	Limited	3 (1-5)		3(3-4)		3(1-4)	
	Unimproved	3 (1-5)		3(1-5)		3(1-5)	
	No facility	3 (2-5)		3(3-4)		3(2-5)	
Level of hand washing facility	Basic	3 (1-5)	0.2465	3(1-5) A	*0.0202*	3(1-5)	0.9364
	Limited	4 (1-5)		4(3-5) B		3(1-4)	
	No facility	3 (1-5)		3(1-5) A		3(1-5)	
Location of toilet facility	Off-premises	3 (2-5)	0.7640	3.5(3-4)	0.3680	3(2-5)	0.2317
	On-premises	3 (1-5)		3(1-5)		3(1-5)	

Variables		Overall		Male		Female	
		Median (Range)	**P-value**	**Median (Range)**	**P-value**	**Median (Range)**	**P-value**
Location of drinking water	Off-premises	3 (1-5)	0.1057	3(1-5)	0.5338	3(1-5)	0.1236
	On-premises	3 (1-5)		3(1-5)		3(2-5)	
Water in (security)	Water secure	3 (1-5)	0.9292	3(1-5)	0.8837	3(1-5)	0.9961
	Water insecure	3 (1-5)		3(1-5)		3(1-5)	
Food in (security)	Food secure	3 (1-5)	***<0.001***	3(1-4)	***0.0001***	3(1-5)	***<0.0001***
	Food insecure	4 (1-5)		4(1-5)		4(1-5)	
Health insurance coverage	Yes	3 (3-4)	0.2633	3(3-3)	0.2948	3(3-4)	0.5470
	No	3 (1-5)		3(1-5)		3(1-5)	
Availability of extra room to isolate COVID-19 infected patience	Yes	3 (1-5)	***0.0001***	3(1-5)	***0.0069***	3(1-5)	***0.0001***
	No	4 (1-5)		3.5(1-5)		4(1-5)	
Frequency of hearing COVID-19 information	Daily	4 (2-5) A	***0.0148***	3(2-4)	0.0899	4(2-5)	0.0666
	Once/twice a week	4 (1-5) A		4(1-5)		3(1-5)	
	Several time a week	3 (1-5) B		3(1-5)		3(1-5)	
Satisfied with UG response to COVID-19	Yes	4 (1-5)	***<0.001***	4(1-5)	***0.0003***	4(1-5)	***<0.0001***
	No	3 (1-4)		3(1-4)		3(1-4)	
Trust the information from UG about COVID-19	Yes	4 (1-5)	***0.0002***	3(1-5)	0.0674	4(1-5)	***0.0010***
	No	3 (1-5)		3(1-5)		3(1-5)	

Notes:

p< .05

1. When the sample characteristic variable was dichotomous, the Wilcoxon rank sum test was used.
2. When the sample characteristic variable was polychotomous, the Kruskal Wallis test was used.

Table 4.17. Relationships between sociodemographic characteristics and risk perception towards COVID-19 in Uganda

Variables		Overall		Male		Female	
		Median (Range)	P-value	Median (Range)	P-value	Median (Range)	P-value
Gender	Male	2 (0-4)	0.5529	-	-	-	-
	Female	2 (0-4)	-	-	-	-	-
Educational status	No education	2 (0-4)	0.0575	2(0-4)	0.7410	2(0-4) A	*0.0102*
	Primary	1 (0-4)		2(-4)		1(0-4) B	
	Above primary	2 (0-4)		1(0-4)		2(0-4) A	
Occupation	Subsistence farming	2 (0-4)	0.0580	2(0-4)	0.7438	2(0-4)	*0.0079*
	Self-employed	1 (0-4)		2.5(0-3)		0.5(0-4)	
	Not working	1 (0-4)		1(0-4)		1(0-4)	
	Other	0 (0-4)		2.5(0-4)		0(0-4)	
Marital status	Partnered	1 (0-4)	0.9120	2(0-4)	0.7475	1(0-4)	0.5016
	Unpartnered	2 (0-4)		2(0-4)		2(0-4)	
Wealth	Poor	2 (0-4)	0.6275	2(0-4)	0.5104	2(0-4)	0.2879
	Less poor	1 (0-4)		2(0-4)		1(0-4)	
Household size	Small (0-5)	2 (0-4)	0.9068	2(0-4)	0.3360	2(0-4)	0.7423
	Medium (6-10)	1 (0-4)		2(0-4)		1(0-4)	
	Large (>10)	2 (0-4)		2(0-4)		2(0-4)	
Children present	Yes	2 (0-4)	0.1055	2(0-4)	0.1073	2(0-4)	0.3310
	No	1.5 (0-4)		1.5(0-4)		1.5(0-4)	
Presence of handwashing facility	Yes	1.5 (0-4)	0.6125	2(0-4)	0.6155	1(0-4)	0.3368
	No	2 (0-4)		2(0-4)		2(0-4)	
	Off-premises	2 (0-4)	0.4771	2(0-4)	0.6059	1(0-4)	0.2411

Variables		Overall		Male		Female	
		Median (Range)	P-value	Median (Range)	P-value	Median (Range)	P-value
Location of drinking water	On-premises	2 (0-4)		1(0-4)		2(0-4)	
Level of drinking water services	Basic	1 (0-4)	0.5840	1.5(0-4)	0.6813	1(0-4)	0.8328
	Limited	2 (0-4)		2(0-4)		2(0-4)	
	Unimproved	1 (0-4)		1.5(0-4)		1(0-4)	
	Surface water	1.5 (0-4)		2(0-4)		1(0-4)	
Level of toilet facility	Basic	1 (0-4)	0.2833	1(0-4)	0.1538	1(0-4)	0.8428
	Limited	2 (0-4)		3(0-4)		2(0-4)	
	Unimproved	2 (0-4)		2(0-4)		2(0-4)	
	No facility	2 (0-4)		3(0-3)		1(0-4)	
Level of hand washing facility	Basic	2 (0-4)	0.8026	2(0-4)	0.4851	1(0-4)	0.6244
	Limited	1 (0-4)		1(0-4)		1(0-4)	
	No facility	2 (0-4)		2(0-4)		2(0-4)	
Location of toilet facility	Off-premises	2 (0-4)	0.5190	3(0-4	0.1465	1(0-4)	0.7495
	On-premises	2 (0-4)		2(0-4)		2(0-4)	
Water in (security)	Water secure	2 (0-4)	0.4689	2(0-4)	0.8220	1(0-4)	0.4475
	Water insecure	2 (0-4)		2(0-4)		2(0-4)	
Food in (security)	Food secure	1 (0-4)	*0.0139*	1(0-4)	*0.0293*	1(0-4)	0.1368
	Food insecure	2 (0-4)		2(0-4)		2(0-4)	
Health insurance coverage	Yes	4 (0-4)	0.0769	4(4-4)	*0.0107*	2(0-4)	0.7348
	No	2 (0-4)		2(0-4)		2(0-4)	
Availability of extra room to isolate COVID-19 infected patience	Yes	1 (0-4)	*0.0001*	1(0-4)	0.0631	1(0-4)	*0.0008*
	No	2 (0-4)		2(0-4)		2(0-4)	
Frequency of hearing	Daily	2 (0-4)	0.0951	2(0-4)	0.2198	2(0-4)	0.1804

Variables		Overall		Male		Female	
		Median (Range)	P-value	Median (Range)	P-value	Median (Range)	P-value
COVID-19 information	Once/twice a week	2 (0-4)		2(0-4)		2(0-4)	
	Several times a week	1 (0-4)		1(0-4)		1(0-4)	
Satisfied with UG response to COVID-19	Yes	2 (0-4)	*0.0125*	2(0-4)	0.0572	2(0-4)	0.0952
	No	1 (0-4)		1(0-4)		1(0-4)	
Trust the information from UG about COVID-19	Yes	2 (0-4)	*0.0393*	2(0-4)	0.4457	2(0-4)	0.0554
	No	1 (0-4)		1.5(0-4)		1(0-4)	

Notes:

   p<   .05

1. When the sample characteristic variable was dichotomous, the Wilcoxon rank sum test was used.
2. When the sample characteristic variable was polychotomous, the Kruskal Wallis test was used.

Table 4.18. Relationships between sociodemographic characteristics and practice towards COVID-19 in Uganda

Variables		Overall		Male		Female	
		Median (Range)	P-value	Median (Range)	P-value	Median (Range)	P-value
Gender	Male	7 (0-9)	0.6400	-	-	-	-
	Female	7 (0-9)		-	-	-	-
Educational status	No education	7 (0-9)	0.2028	7(0-9)	0.8343	7(0-8)	0.1078
	Primary	7 (0-9)		7(2-8)		6(0-9)	
	Above primary	7 (3-8)		7(3-8)		7(3-8)	
Occupation	Subsistence farming	7 (0-9)	0.1384	7(0-9)	0.5663	7(1-9) A	*0.0452*

Variables		Overall		Male		Female	
		Median (Range)	P-value	Median (Range)	P-value	Median (Range)	P-value
	Self-employed	7 (0-9)		7.5(5-9)		7(0-8) A	
	Not working	7 (0-8)		7(3-8)		6(0-8) B	
	Other	7 (4-8)		7(4-8)		5.5(4-7) B	
Marital status	Partnered	7 (0-9)	0.4169	7(0-9)	0.2865	7(1-8)	0.9747
	Unpartnered	7 (0-9)		7(2-9)		7(0-9)	
Wealth	Poor	7 (1-9)	0.9473	7(3-8)	0.6331	7(1-9)	0.6053
	Less poor	7 (0-9)		7(0-9)		7(0-8)	
Household size	Small (0-5)	7 (0-9)	*0.0183*	7(1-9)	*0.0434*	6.5(0-8)	0.2153
	Medium (6-10)	7 (0-9)		7(0-9)		7(1-9)	
	Large (>10)	7 (3-8)		8(5-8)		7(3-8)	
Children present	Yes	7 (0-9)	*0.0127*	7(0-9)	0.0823	7(1-8)	*0.0441*
	No	6 (0-9)		6.5(2-9)		6(0-9)	
Presence of handwashing facility	Yes	7 (1-9)	0.8461	7(3-8)	0.0844	7(1-9)	0.3158
	No	7 (0-9)		7(0-9)		7(0-8)	
Location of drinking water	Off-premises	7 (0-9)	0.7009	7(0-9)	0.8275	7(0-9)	0.7765
	On-premises	7 (1-8)		7(2-8)		7(1-8)	
Location of toilet facility	Off-premises	7 (0-8)	0.8798	7(4-8)	0.7798	7(0-8)	0.6275
	On-premises	7 (0-9)		7(0-9)		7(0-9)	
Level of drinking water services	Basic	7 (0-8)	0.4398	7(1-8)	0.5278	7(0-8)	0.4882
	Limited	7 (0-9)		7(0-9)		7(0-9)	
	Unimproved	7 (3-8)		6.5(4-8)		7(3-8)	
	Surface water	6 (4-8)		6(5-8)		6(4-7)	
Level of toilet facility	Basic	7 (0-9)	0.2600	7(3-9)	0.9659	7(0-9)	0.1876
	Limited	6 (2-8)		7(5-8)		5(2-8)	
	Unimproved	7 (0-9)		7(0-9)		7(0-8)	
	No facility	7 (0-8)		7(4-8)		7(0-8)	
Level of hand washing facility	Basic	7 (1-9)	0.8762	7(3-8)	0.1966	7(1-9)	0.6019
	Limited	7 (3-8)		8(4-8)		6.5(3-8)	
	No facility	7 (0-9)		7(0-9)		7(0-8)	
Water in (security)	Water secure	7 (0-9)	0.2348	7(1-9)	0.6628	7(0-8)	0.2325
	Water insecure	7 (0-9)		7(0-9)		7(0-9)	
Health insurance coverage	Yes	6.5 (4-7)	0.3522	6(4-7)	0.2857	7(5-7)	0.6876
	No	7 (0-9)		7(0-9)		7(0-9)	
Availability of extra room to isolate COVID-19 infected patience	Yes	6 (1-9)	*0.0001*	6(1-9)	*0.0040*	6(1-9)	*0.0001*
	No	7 (0-9)		7(0-9)		7(1-8)	

Variables		Overall		Male		Female	
		Median (Range)	P-value	Median (Range)	P-value	Median (Range)	P-value
Satisfied with UG response to COVID-19	Yes	7 (1-9)	*<0.001*	7(1-9)	*0.0082*	7(1-9)	*<0.0001*
	No	6 (0-9)		6(0-9)		6(0-8)	
Trust the information from UG about COVID-19	Yes	7 (1-9)	*<0.001*	7(1-9)	0.4612	7(1-9)	*<0.0001*
	No	6 (0-9)		7(0-9)		6(0-8)	

Notes:

  p< .05

1. When the sample characteristic variable was dichotomous, the Wilcoxon rank sum test was used.
2. When the sample characteristic variable was polychotomous, the Kruskal Wallis test was used.

4.6.6 Correlation between knowledge, attitudes, risk perception, WASH insecurity and practice towards COVID-19

The results of the Spearman's correlation indicate a strong positive correlation between knowledge, attitude, risk perception, and practice towards COVID-19 among participants in Uganda. This is true regardless of gender, with knowledge of COVID-19 having the strongest positive association with practice at $r = 0.7034$, attitudes having the second strongest association at $r = 0.5543$, and risk perception having the weakest association at $r = 0.2512$. These suggest as knowledge, attitudes, and risk perception increase, it is likely that practices toward COVID-19 will improve. WASH insecurity also had a small, statistically significant positive correlation with practice, suggesting WASH insecurity is a potential barrier to positive COVID-19 prevention and control practices among Ugandan older adults. However, WASH insecurity did not appear to affect COVID-19 practice differently for males and females.

Table 4.19 Relationships between knowledge, attitude, risk perception, and WASH insecurity and practice towards COVID-19 in Uganda.

Variables	Practice towards COVID-19					
	Overall		Male		Female	
	Spearman's rho	P-value	Spearman's rho	P-value	Spearman's rho	P-value
Knowledge of COVID-19	0.7034	*<0.001*	0.7382	*<0.0001*	0.6864	*<0.0001*
Attitude	0.5543	*<0.001*	0.6393	*<0.0001*	0.5092	*<0.0001*
Risk perception	0.2512	*<0.001*	0.2411	*0.0147*	0.2575	*0.0004*
WASH in (security)	0.1365	*0.0205*	0.157	0.1144	0.1266	0.0850
Notes: p< .05 1. Spearman correlation was used given that both the dependent and independent variable were continuous variables.						

4.6.7 Summary of objective two results

Objective two aimed to investigate Ugandan older adults' knowledge, attitudes, risk perceptions, and practices (KARP) toward COVID-19. Using Bloom's cut-off point (Olaimat et al., 2020), scores between 80% and 100% were interpreted as good, scores between 60 and 70% were interpreted as moderate, and scores less than 60% were interpreted as poor. The respondents in this study attained good knowledge (81.3%), moderate attitudes (66.4%), moderate practice (69.4%), and poor risk perception (43.8%). There are no differences in the scores between males and females.

These scores are associated with several socio-demographic, COVID-19-related, and WASH-related factors. For example, trust in the Ugandan government and satisfaction with the government's response to COVID-19 have a strong influence on attitudes, risk perception, and practices. Additionally, COVID-19 knowledge was found to be less affected by socio-demographic characteristics, with the frequency of COVID-19 information being the only

factor associated with knowledge. Furthermore, basic necessities such as food security, availability of room to isolate suspected COVID-19 patients, and the presence of children in the household, were also found to be associated with attitudes, risk perception, and practice of the respondents. Crucially, WASH security has a positive correlation with practice, indicating that higher WASH security means a likely increase in COVID-19 practice.

4.7 Links between experiences of COVID-19 and emotional distress and wellbeing

This section reports the results of the analysis of objective three of the research, which explores the links between older adults' experiences of COVID-19 in the context of WASH and their overall health and wellbeing. The results include a descriptive analysis (number/percent) of the respondent's experiences of emotional distress and general wellbeing. Additionally, bivariate and multivariate analyses is used to illustrate the relationship between the independent variables (sample characteristics, COVID-19 related variables, and WASH variables) and the outcome variable (emotional distress and wellbeing scores).

4.7.1 The wellbeing of older adults in Uganda during the COVID-19 pandemic (n=288)
Questionnaire, scoring and coding

The respondents' wellbeing was measured using seven questions related to their economic and financial situation, including their ability to meet basic needs such as food, shelter, and healthcare during the COVID-19 pandemic (Table 4.20). To create a wellbeing index, the responses for each question (i.e., Never, Rarely, Sometimes, Often and Very often) were recoded into "Yes" and "No" options where "Often" and "Very often" are categorised as "Yes" and "Never, Rarely and Sometimes, are categorised as "No" — a "Yes" response was coded as "1" and a "No" response was assigned a "0". These responses were summed up and observations with a score of less than 4 were regarded as indicative of high wellbeing and scores of 4+ were indicative of poor wellbeing.

The results indicate that 67% of respondents reported high wellbeing, while 33.0% reported experiencing low wellbeing. There were gender differences in the prevalence of wellbeing among the respondents. A higher proportion of females reported having good wellbeing than males (70.4% vs. 60.8%) and were less likely to have low wellbeing compared to men (29.6% vs. 39.2%).

Table 4.20 General wellbeing of the respondents during the COVID-19 pandemic in Uganda (n=288)

Scores of wellbeing index	Response	Overall, n (%)	Male, n (%)	Female, n (%)
W1: could not pay my bills on time (e.g., water, electricity, loan payments)	Yes	118 (41.0)	46(45.1)	72(38.7)
	No	170 (59.0)	56(54.9)	114(61.3)
W2: I could not pay health insurance premiums for myself or my dependents	Yes	88 (30.6)	36(35.3)	52(28.0)
	No	200 (69.4)	66(64.7)	134(72.0)
W3: I could not pay my rent on time	Yes	27 (9.4)	12(11.8)	15(8.1)
	No	261 (90.6)	90(88.2)	171(91.9)
W4: I could not fix my house	Yes	101 (35.1)	41(40.2)	60(32.3)
	No	187 (64.9)	61(59.8)	126(67.7)
W5: I ate less because there was not enough food or money to buy food	Yes	126 (43.8)	52(51.0)	74(39.8)
	No	162 (56.3)	50(49.0)	112(60.2)
W6: I did not have enough money to buy the things I needed	Yes	124 (43.1)	49(48.0)	75(40.3)
	No	164 (56.9)	53(52.0)	111(59.7)
W7: I did not have enough money to buy the things I wanted	Yes	120 (41.7)	47(46.0)	73(39.2)
	No	168 (58.3)	55(54.0)	113(60.8)
General Wellbeing index	- Yes	193 (67.0)	62(60.8)	131(70.4)
	No	95 (33.0)	40(39.2)	55(29.6)

4.7.2 Bivariate analysis of general wellbeing

The results of the bivariate analysis revealed that general wellbeing was significantly associated with five of the twenty explanatory variables (Table 4.21). Two of these variables related to respondents' trust in information from the Ugandan government regarding COVID-

19 and satisfaction with the Ugandan government's response to COVID-19; those who did not trust information from the Ugandan government were more likely to report being generally well (78.3%) compared to those who trusted information from the Ugandan government (59.5%), and those who were not satisfied with the Ugandan government's response to COVID-19 were more likely to report being generally well (94.1%) compared to those who were satisfied (52.4%). Additionally, respondents in formal sector employment (71%), those who were in the "poor" wealth bracket (71.8%), and those who reported being food secure (89.5%) were more likely to report being generally well. Educational status was also significant for the female sub-sample, with 81.8% of those with above primary education and 79.1% of those with primary education being more likely to report being generally well compared to those with no education (61.9%).

The results of a binary logistic regression analysis (Table 4.22) revealed that both WASH security and COVID-19-related factors (knowledge, attitude, risk perception, practice, and WASH (in)security) were significantly associated with general wellbeing (overall and by gender). For knowledge, the OR of 0.46 implies that for every unit increase in knowledge of COVID-19, the odds of general wellbeing decreased by 54% (OR 0.46; 95% CI 0.35, 0.60). Although there is also a significant association between knowledge and general wellbeing for both male and female respondents, the OR is lower for females (0.42) than for males (0.52) and the overall sample (0.46), indicating that a unit increase in knowledge of COVID-19 among female respondents results in a higher percentage decrease (58%) in odds of general wellbeing (OR 0.42; 95% CI 0.29, 0.60). This suggests that female participants who had more knowledge of COVID-19 had a greater reduction in the likelihood of experiencing general wellbeing compared to the overall sample and male respondents.

For attitudes, the OR of 0.16 implies that for every unit increase in positive attitudes towards COVID-19, the odds of general wellbeing decreased by 84% (OR 0.16; 95% CI 0.09,

0.26). Although there is also a significant association between attitudes and general wellbeing for both male and female respondents, the OR is lower for females (0.11) than for males (0.23) and the overall sample (0.16), indicating that a unit increase in positive attitudes towards COVID-19 among female respondents results in a higher percentage decrease (89%) in odds of general wellbeing (OR 0.11; 95% CI 06, 0.22). This suggests that female participants who had more positive attitudes towards COVID-19 had a greater reduction in the likelihood of experiencing general wellbeing compared to the overall sample and male respondents.

Also, for risk perception, the OR of 0.75 implies that for every unit increase in risk perception of COVID-19, the odds of general wellbeing decreased by 25% (OR 0.75; 95% CI 0.64, 0.89). Although there is also a significant association between risk perception and general wellbeing for both male and female respondents, the OR is lower for males (0.67) than for females (0.80) and the overall sample (0.75), indicating that a unit increase in risk perception of COVID-19 among male respondents results in a higher percentage decrease (33%) in odds of general well-being (OR 0.67; 95% CI 0.50, 0.89). This suggests that male participants who had higher risk perception of COVID-19 had a greater reduction in the likelihood of experiencing general wellbeing compared to the overall sample and female respondents.

Furthermore, the OR of 0.53 for practice implies that for every unit increase in practice of preventive measures against COVID-19, the odds of general wellbeing decreased by 47% (OR 0.53; 95% CI 0.43, 0.67). While there is also a significant association between practice and general wellbeing for both male and female respondents, the OR is lower for females (0.47) than for males (0.61) and the overall sample (0.53), indicating that a unit increase in practice of preventive measures against COVID-19 among female respondents results in a higher percentage decrease (53%) in odds of general wellbeing (OR 0.47; 95% CI 34, 0.66). This suggests that female participants who had higher practice of preventive measures against

COVID-19 had a greater reduction in the likelihood of experiencing general wellbeing compared to the overall sample and male respondents.

Finally, WASH insecurity had an OR of 0.96 implying that for every unit increase in WASH insecurity due to COVID-19, the odds of general wellbeing decreased by 4% (OR 0.96; 95% CI 0.93, 0.98). There is also a significant association between WASH insecurity and general wellbeing for both male and female respondents, but the ORs are similar to the overall sample (0.94 for males and 0.96 for females). This suggests that WASH insecurity due to COVID-19 had a similar effect on the likelihood of experiencing general wellbeing for all participants.

Table 4.21 Factors associated with wellbeing of older adults in Uganda

Scores of wellbeing index							
Variables		Overall		Male		Female	
		Frequency (n/%)	P-value	Frequency (n/%)	P-value	Frequency (n/%)	P-value
Gender	Male	62 (60.8)	0.096				
	Female	131 (70.4)					
Educational status	No education	78 (61.4)	0.198	18 (60.0)	0.985	60(61.9)	*0.027*
	Primary	79 (71.8)		26 (60.5)		53(79.1)	
	Above primary	36 (70.6)		18 (62.1)		18(81.8)	
Occupation	Subsistence farming	94 (66.7)	*0.022*	37 (64.9)	0.361	57(67.9)	*0.038*
	Self-employed	11 (42.3)		4 (40.0)		7(43.8)	
	Not working	75 (71.4)		15 (55.6)		60 (76.9)	
	Formal sector employment	13 (81.3)		6 (75.0)		7 (87.5)	
Marital status	Partnered	64 (67.4)	0.928	34 (64.2)	0.469	30 (71.3)	0.872
	Unpartnered	129 (66.8)		28 (57.1)		101 (70.0)	

Scores of wellbeing index							
Variables		Overall		Male		Female	
		Frequency (n/%)	P-value	Frequency (n/%)	P-value	Frequency (n/%)	P-value
Household size	Small (1-5)	99 (69.7)	0.629	34 (60.7)	0.829	65 (75.6)	0.294
	Medium (6-10)	74 (64.4)		21 (63.6)		53 (64.6)	
	Large (>10)	20 (64.5)		7 (53.9)		13 (72.2)	
Children present	Yes	141 (66.5)	0.761	39 (60.9)	0.967	102 (68.9)	0.373
	No	52 (68.4)		23 (60.5)		29 (76.3)	
Wealth	Poor	125 (71.8)	*0.031*	39 (68.4)	0.075	86 (73.5)	0.232
	Less poor	68 (59.7)		23 (51.1)		45 (65.2)	
Presence of handwashing facility	Facility present	62 (64.6)	0.535	15 (48.4)	0.090	47 (72.3)	0.681
	No facility	131 (68.2)		47 (66.2)		84 (69.4)	
Location of drinking	Off-premises	50 (68.5)	0.756	17 (73.9)	0.143	98 (72.1)	0.422
	On-premises	143 (66.5)		45 (57.0)		33 (66.0)	
Level of drinking water services	Basic	111 (71.6)	0.122	36 (69.2)	0.258	75 (72.8)	0.056
	Limited	57 (58.2)		19 (54.3)		38 (60.3)	
	Unimproved	14 (66.7)		3 (37.5)		11(84.6)	
	Surface water	11 (78.6)		4 (57.1)		7 (100.0)	
Level of toilet facility	Basic	108 (71.1)	0.174	31 (66.0)	0.492	77 (73.3)	0.146
	Limited	19 (76.0)		2 (40.0)		17 (85.0)	
	Unimproved	61 (59.8)		28 (59.6)		33 (60.0)	
	No facility	5 (55.6)		1 (33.3)		4 (66.7)	
Level of hand washing facility	Basic	54 (67.5)	0.328	13 (52.0)	0.167	41 (74.6)	0.598
	Limited	8 (50.0)		2 (33.3)		6 (60.0)	
	No facility	131 (68.2)		47 (66.2)		84 (69.4)	
Source of drinking water	Improved	168 (66.4)	0.641	55 (63.2)	0.354	113 (68.1)	0.098
	Unimproved	14 (66.7)		3 (37.5)		11 (84.6)	

Scores of wellbeing index							
Variables		Overall		Male		Female	
		Frequency (n/%)	P-value	Frequency (n/%)	P-value	Frequency (n/%)	P-value
Source of toilet facility	Improved	127 (71.8)	0.094	33 (63.5)	0.567	94 (75.2)	0.118
	Unimproved	61 (59.8)		28 (59.6)		33 (60.0)	
	No facility	5 (55.6)		1 (33.3)		4 (66.7)	
Location of toilet facility	Off-premises	170 (66.2)	0.368	9 (64.3)		14 (82.4)	0.258
	On-premises	23 (74.2)		53 (60.2)		117 (69.2)	
Food (in)security	Food secure	119 (89.5)	*<0.0001*	38 (90.5)	*<0.0001*	81 (89.0)	*<0.0001*
	Food insecure	74 (47.7)		24 (40.0)		50 (52.6)	
Health insurance coverage	Yes	7 (87.5)	0.211	2 (66.7)	0.832	5 (100.0)	0.142
	No	186 (66.4)		60(60.6)		126 (69.6)	
Satisfied with UG response to COVID-19	Yes	98 (52.4)	*<0.0001*	37 (50.0)	*<0.0001*	61 (54.0)	*<0.0001*
	No	95 (94.1)		25 (89.3)		70 (95.9)	
Trust information from UG about COVID-19	Yes	103 (59.5)	*0.001*	37 (56.1)	0.186	66 (61.7)	*0.002*
	No	90 (78.3)		25 (69.4)		65 (82.3)	
	Notes: **Scores of less than 4 indicate high wellbeing** p< .05 Chi-squared test was used given that both the dependent and independent variable were categorical variables.						

Table 4.22. Factors associated with wellbeing of older adults in Uganda

	Scores of wellbeing index					
	Overall sample		**Male**		**Female**	
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Knowledge of COVID-19	0.46 (0.35-0.60)	*<0.001*	0.52 (0.34-0.77)	*0.001*	0.42(0.29-0.60)	*<0.0001*
Attitude	0.16 (0.09-0.26)	*<0.001*	0.23(0.11-0.47)	*<0.0001*	0.11(0.06-0.22)	*<0.0001*
Risk perception	0.75 (0.64-0.89)	*0.001*	0.67(0.50-0.89)	*0.006*	0.80(0.65-0.98)	*0.034*
Practice	0.53 (0.43-0.67)	*<0.001*	0.61(0.44-0.84)	*0.002*	0.47(0.34-0.66)	*<0.0001*
WASH (in)security	0.96 (0.93-0.98)	*0.002*	0.94(0.89-0.99)	*0.018*	0.96(0.93-0.99)	*0.029*
Notes: p< .05 Logistic regression was used given that the dependent variable was dichotomous and the independent variable was and independent variables were continuous variables.						

4.7.3 Emotional distress

Emotional distress was measured using the General Health Questionnaire (GHQ-12) (Goldberg et al., 1997). To create emotional distress scale, the responses for each question (i.e., better than usual, same as usual, worse than usual, much worse than usual) were recoded into binary variables (0,1). The sum for each participant was then determined, and the cut-off point was set at 4. Individuals with a sum of 4+ indicate a probable case of emotional distress (Goldberg et al., 1997). The percentage of respondents with a score of 4+ is 87.2%, 85.3%, and 88.2% for the overall sample, males and females, respectively, indicating a high incidence of emotional distress among the study population. Additionally, more females reported likely cases of emotional distress compared to men (2.7% more than men).

4.7.4 Bivariate analysis of emotional distress

The results of a bivariate analysis of emotional distress of the respondents and twenty explanatory variables are presented in Table 4.23. The explanatory variables were based on

their plausibility in explaining emotional distress and were chosen from the literature. The results are presented for the overall sample, as well as for male and female sub-samples, and odds ratios (OR) with 956% confidence intervals and p-values are reported for each variable. For the overall sample, emotional distress was significantly associated with three of the twenty plausible explanatory variables: marital status, satisfaction with UG response to COVID-19, and trust in information from the UG about COVID-19. Interestingly, these three variables were also significantly associated with emotional distress for the female sub-sample, and none of them were significant for the male sub-sample (Table 4.23). Those who were partnered were found to be more likely to report being emotionally distressed (93.7%) in comparison to those who were unpartnered (83.9%). Similarly, nearly all respondents who were not satisfied with the UG response to COVID-19 (99.0%) were more likely to be emotionally distressed compared to those who were satisfied with the response (80.8%). Lastly, those who did not trust information from the UG about COVID-19 were more likely to be emotionally distressed (94.8%) than those who trusted the information from the UG (82.1%).

The presence of children and wealth are significantly associated with emotional distress for the male sub-sample only. Male respondents with children present were more likely to be emotionally distressed (90.6%), suggesting that the presence of children may be linked to greater levels of stress during the pandemic for males in particular. Respondents in the "poor" wealth bracket were also more likely to be emotionally distressed (93.0%) compared to those in the "less poor" wealth bracket (75.6%), suggesting that males with fewer resources may be feeling increased levels of distress during the pandemic.

Table 4.23. Factors associated with distress of older adults in Uganda

		Emotional distress					
Variables		**Overall**		**Male**		**Female**	
		Frequency (n/%)	P-value	Frequency (n/%)	P-value	Frequency (n/%)	P-value
Gender	Male	87 (85.3)	0.485				
	Female	164 (88.2)					
Educational status	No education	107 (84.3)	0.406	25(83.3)	0.937	82(84.5)	0.271
	Primary	99 (90.0)		37(86.1)		62(92.5)	
	Above primary	45 (88.2)		25(86.2)		20(90.9)	
Occupation	Subsistence farming	119 (84.4)	0.073	47(82.5)	0.500	72(85.7)	*0.023*
	Self-employed	20 (76.9)		9(90.0)		11(68.8)	
	Not working	98 (93.3)		25(92.6)		73(93.6)	
	Formal sector employment	14 (87.5)		6(75.0)		8(100.0)	
Marital status	Partnered	89 (93.7)	*0.020*	48(90.6)	0.118	41(97.6)	*0.031*
	Unpartnered	162 (83.9)		39(79.6)		123(85.4)	
Household size	Small (0-5)	120 (84.5)	0.322	46(82.1)	0.261	74(86.1)	0.698
	Medium (6-10)	102 (88.7)		28(84.9)		74(90.2)	
	Large (>10)	29 (93.6)		13(100.0)		16(88.9)	
Children present	Yes	186 (87.7)	0.621	58(90.6)	*0.049*	128(86.5)	0.160
	No	65 (85.5)		29(76.3)		36(94.7)	
Wealth	Poor	155 (89.1)	0.227	53(93.0)	*0.014*	102(87.2)	0.585
	Less poor	96 (84.2)		34(75.6)		62(89.9)	
Level of drinking water services	Basic	134 (86.5)	0.098	46(88.5)	0.291	88(85.4)	0.167
	Limited	89 (90.8)		30(85.7)		59(93.7)	
	Unimproved	15 (71.4)		5(62.5)		10(76.9)	
	Surface water	13 (92.9)		6(85.7)		7(100.0)	
Level of toilet facility	Basic	135 (88.8)	0.245	42(89.4)	0.384	93(88.6)	0.698
	Limited	24 (96.0)		5(100.0)		19(95.0)	
	Unimproved	85 (83.3)		38(80.9)		47(85.5)	
	No facility	7 (77.8)		2(66.7)		5(83.3)	
Level of hand washing facility	Basic	66 (82.5)	0.287	18(72.0)	0.073	48(87.3)	0.960
	Limited	15 (93.8)		6(100.0)		9(90.0)	
	No facility	170 (88.5)		63(88.7)		107(88.4)	

Emotional distress							
Variables		**Overall**		**Male**		**Female**	
		Frequency (n/%)	**P-value**	**Frequency (n/%)**	**P-value**	**Frequency (n/%)**	**P-value**
Presence of handwashing facility	Facility present	81 (84.4)	0.319	24(77.4)	0.138	57(87.7)	0.882
	No facility	170 (88.5)		63(88.7)		107(88.4)	
Location of drinking	Off-premises	63 (86.3)	0.801	67(84.8)	0.798	121(89.0)	0.578
	On-premises	188 (87.4)		20(87.0)		43(86.0)	
Source of drinking water	Improved	223 (88.1)	0.072	76(86.4)	0.164	147(88.6)	0.281
	Unimproved	15 (71.4)		5(62.5)		10(76.9)	
Source of toilet facility	Improved	159 (89.8)	0.205	47(90.4)	0.267	112(89.6)	0.681
	Unimproved	85 (83.3)		38(80.9)		47(85.5)	
	No facility	7 (77.8)		2(66.7)		5(83.3)	
Location of toilet facility	Off-premises	225 (87.6)	0.563	11(78.6)	0.444	15(88.2)	0.993
	On-premises	26 (83.9)		76(86.4)		149(88.2)	
Food (in)security	Food secure	115 (86.5)	0.747	33(78.6)	0.109	82(90.1)	0.423
	Food insecure	136 (87.7)		54(90.0)		82(86.3)	
Health insurance coverage	Yes	7 (87.5)	0.976	2(66.7)	0.355	5(100.0)	0.406
	No	244 (87.1)		85(85.9)		159(87.9)	
Satisfied with UG response to COVID-19	Yes	151 (80.8)	*<0.001*	60(81.1)	0.051	91(80.5)	*<0.0001*
	No	100 (99.0)		27(96.4)		73(100.0)	
Trust information from UG about COVID-19	Yes	142 (82.1)	*0.002*	54(81.8)	0.180	88(82.2)	*0.004*
	No	109 (94.8)		33(.7)		76(96.2)	
	Notes: p< .05 Chi-squared test was used given that both the dependent and independent variable were categorical variables.						

The results of the binary logistic regression analysis of the association between knowledge of

COVID-19, attitude, risk perception, practices or WASH insecurity and emotional distress is

shown in Table 4.24. For knowledge of COVID-19, the odds ratio (OR) was 0.62, which means that for every unit increase in knowledge of COVID-19, the odds of emotional distress decreased by 38% (OR 0.62; 95% CI 0.45, 0.86). A similar relationship is observed for the female respondents (OR 0.61; 95% CI 0.40, 0.93) and not for the male respondents. This means that higher knowledge levels are protective against emotional distress for the whole population and for women, but not for men.

For attitudes, the OR of 0.46 implies that for every unit increase in positive attitudes towards COVID-19, the odds of emotional distress decreased by 54% (OR 0.46; 95% CI 0.28, 0.76). Although there is also a significant association between attitudes and emotional distress for the female respondents, the OR is lower (0.24) than for the overall sample, indicating that a unit increase in positive attitude towards COVID-19 among female respondents results in a higher percentage decrease (76%) in odds of emotional distress (OR 0.24; 95% CI 0.12, 0.50). This suggests that female participants who had more positive attitudes towards COVID-19 had a greater reduction in the likelihood of experiencing emotional distress compared to the overall sample and male respondents.

Regarding risk perception, the OR of 0.75 implies that for every unit increase in risk perception of COVID-19, the odds of emotional distress decreased by 25% (OR 0.75; 95% CI 0.59, 0.95). There is also a significant association between risk perception and emotional distress for the female respondents, but not for the male respondents. The OR for females is slightly lower than the overall sample (0.72), indicating that a unit increase in risk perception of COVID-19 among female respondents results in a 28% decrease in odds of emotional distress (OR 0.72; 95% CI 0.54, 0.97). This suggests that female participants who had higher risk perception of COVID-19 had a greater reduction in the likelihood of experiencing emotional distress compared to the overall sample, while male participants did not show a significant effect of risk perception on emotional distress.

Finally, the OR of 0.78 for practice implies that for every unit increase in COVID-19 practice score, the odds of emotional distress decreased by 22% (OR 0.78; 95% CI 0.62, 0.99). There is no significant association between practice and emotional distress for both the male and female sub-samples, indicating that the relationship between COVID-19 practice and emotional distress is not influenced by the gender of respondents. WASH insecurity was found to not have an effect on emotional distress regardless of the gender of the respondents.

Table 4.24 Factors associated with distress of older adults in Uganda

| Variables | Emotional distress | | | | | |
| | Overall sample | | Male | | Female | |
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Knowledge of COVID-19	0.62 (0.45-0.86)	*0.004*	0.63(0.37-1.06)	0.084	0.61(0.40-0.93)	*0.023*
Attitude	0.46 (0.28-0.76)	*0.002*	0.98(0.50-1.94)	0.959	0.24(0.12-0.50)	*<0.0001*
Risk perception	0.75 (0.59-0.95)	*0.015*	0.80(0.55-1.17)	0.254	0.72(0.54-0.97)	*0.030*
Practice	0.78 (0.62-0.99)	*0.040*	0.86(0.60-1.24)	0.423	0.74(0.54-1.01)	0.060
WASH (in)security	1.01 (0.97-1.05)	0.340	0.99(0.93-1.06)	0.822	1.01(0.97-1.07)	0.568
Notes: $p < .05$ Bivariate logistic regression was used given that the dependent variable was dichotomous and independent variables were continuous variables.						

4.7.5 Multivariate analysis of emotional distress

The overall prevalence of emotional distress in the sample was 87.2%, which is considered very high. To identify the factors that were associated with emotional distress, a multivariable binary logistic regression was performed using selected independent variables that had

significant bivariate associations with emotional distress. The multivariate analysis adjusted for potential confounding factors and provided a more accurate estimate of the effect of each independent variable on emotional distress. The independent variables that were included in the multivariable analysis were marital status, state of health relative to age mates, worry about COVID-19, perception of COVID-19 severity and satisfaction with the government's response to COVID-19.

The results as shown in Table 4.25 revealed that being partnered (Adj. OR=3.4, 95% C.I=(1.2-9.3), p<0.05), having poor state of health relative to age mates (Adj. OR=0.4, 95% C.I=(0.2-0.9), p<0.05), and being worried about COVID-19 (Adj. OR=2.5, 95% C.I=(1.1-5.8), p<0.05) were positively associated with emotional distress among older adults in Uganda, indicating that these factors increased the likelihood of experiencing emotional distress. On the other hand, thinking that COVID-19 can be serious (Adj. OR=0.2, 95% C.I=(0.1-0.6), p<0.01) and being satisfied with the Ugandan government's response to COVID-19 (Adj. OR=0.1, 95% C.I=(0.01-0.61), p<0.05) were negatively associated with emotional distress among older adults in Uganda, indicating that these factors decreased the likelihood of experiencing emotional distress. The observation that "worried about COVID-19" was positively associated with emotional distress, while "think COVID-19 can be serious" was negatively associated with emotional distress, appears contradictory at first. However, it may suggest that respondents were concerned about the broader impacts of the pandemic, such as socio-economic effects, in addition to the risk of getting infected by the virus. These findings suggest that the emotional distress of older adults in Uganda may be influenced by various factors related to the COVID-19 pandemic, such as their level of worry, perception of seriousness, and satisfaction with the government's response. However, other factors such as marital status and self-assessed health status can also affect emotional distress.

Table 4.25: Factors associated with Emotional distress among older adults in Uganda (N=288)

Variable	Overall, n (%)	Emotional distress, n (%)	Adj. OR (95% C.I)	p-value
Marital Status				
Partnered	95 (33.0)	89 (93.7)	3.4(1.2-9.3)	0.017
Unpartnered	193 (67.0)	162 (83.9)	Ref	
State of health relative to age mates				
Good	117 (40.6)	97 (82.9)	0.4 (0.2-0.9)	0.024
Poor	171 (59.4)	154 (90.1)	Ref	
Worried about COVID-19				
Yes	174 (60.4)	164 (94.3)	2.5 (1.1-5.8)	0.032
No	114 (39.6)	87 (76.3)	Ref	
Think COVID-19 can be serious				
Yes	154 (53.5)	123 (79.9)	0.2 (0.1-0.6)	0.003
No	134 (46.5)	128 (95.5)	Ref	
Satisfied with the Ugandan government's response to COVID-19				
Yes	187 (64.9)	151 (80.8)	0.1 (0.01-0.61)	0.015
No	101 (35.1)	100 (99.0)	Ref	
Notes: p< .05 The final model accurately classified 87.2% of emotional distress cases, with 96.4% sensitivity and 24.3% specificity. The Hosmer-Lemeshow goodness of fit test confirmed a good model fit (p=0.4532), and the model effectively discriminated between those with and without emotional distress (c-statistic=0.8465).				

4.7.6 Summary of objective three results

Objective three aimed to explore the links between older adults' experiences of COVID-19 in the context of WASH and their overall health and wellbeing. The results indicate that the majority of older adults experienced emotional distress (87.2%), whiles a significant proportion reported having low wellbeing (33%). Females were more likely to report being emotionally distressed compared to men. On the other hand, more men reported lower wellbeing compared to women. The high prevalence of emotional distress was linked to socio-demographic features such as living with marital partners, not working or working in subsistence agriculture, living with children, and

being poor, as well as COVID-19-related factors such as not trusting in COVID-19 information from the UG and not being satisfied with the UG response towards COVID-19. Emotional distress was not linked to WASH insecurity. Low wellbeing was linked to socio-demographic factors such as low educational attainment, being self-employed or working in subsistence agriculture, and being food insecure. In contrast to emotional distress, not trusting in the information from UG about COVID-19 and not being satisfied with the UG response to COVID-19 was linked to high wellbeing. Also, being WASH insecure was linked to the likelihood of reporting lower wellbeing.

CHAPTER FIVE
DISCUSSION AND CONCLUSION

5.1 Introduction

This thesis examined access to WASH services among older adults living in marginalized communities in Uganda during the COVID-19 pandemic, with particular emphasis on how social, economic, and demographic factors, as well as pandemic knowledge, attitudes and practices, influenced their psychosocial health and wellbeing. In doing so, the research addressed the following objectives:

1) To examine the barriers to WASH access among older adults in SSA, using Uganda as a case study;

2) To assess the knowledge, attitudes, risk perceptions and practices (KARP) of older adults regarding the prevention and management of COVID-19 in Uganda;

3) To investigate how WASH barriers and the impact of the COVID-19 pandemic contributed to the psychosocial health and wellbeing of older adults in Uganda.

Following a brief history of the geographies of pandemic impacts and responses, which set the context for examining WASH issues, the literature review revealed several recurring themes. Firstly, although the problem of inadequate access to WASH services in SSA has been discussed by several authors, little is known about the barriers affecting older adults. This gap becomes more apparent during disruptions, such as the COVID-19 Pandemic, where the need for WASH services is critical, and older adults are extremely vulnerable (Amuakwa-Mensah et al., 2021; Cavill et al., 2022). Secondly, while scholars have studied the impact of WASH insecurity on attitudes and practices toward COVID-19 preventive measures (Ekumah et al., 2020; Stoler et al., 2021; Zvobgo & Do, 2020), few have focused on older adults. Thirdly, there appear to be no studies investigating the influence of WASH insecurity and COVID-19 attitudes and practices on the psychosocial health and wellbeing of older adults in SSA. To

address these research objectives, cross-sectional survey data were gathered from a sample of Ugandan older adults living in social isolation. The rest of this chapter presents a discussion of the key findings under the three research objectives before concluding. The chapter finishes with a discussion of the contributions of this thesis as well as policy implications and directions for future research.

5.2 Barriers to adequate WASH access among older adults during the COVID-19 Pandemic

The findings show that a substantial proportion (nearly half) of Ugandan older adults had limited access to safe WASH services to effectively undertake COVID-19 preventive practices such as handwashing. To illustrate, about 37% of the sample spent nearly one hour per round trip accessing improved water sources, which is higher than the proportion of Ugandans (30%) spending over 30 minutes per round trip to access improved water sources (Uganda National Malaria Control Division (NMCD) et al., 2020). Similarly, more than half of the respondents did not have a handwashing facility at home for maintaining hand hygiene, which is also higher than the proportion of Ugandans lacking access to handwashing facilities (45%) (WHO/UNICEF, 2021). The poorer access to WASH services among the sample compared to the Ugandan national averages may be explained by the predominantly rural nature of the study area. Rural Uganda is known to have significantly lower access to various WASH services compared to urban areas (Uganda Bureau of Statistics (UBOS), 2021; Uganda National Malaria Control Division (NMCD) et al., 2020).

This poor access to WASH services among the study sample resulted in older adults adopting WASH practices that increased their risk of COVID-19 infections. For instance, many respondents acquired water from distant sources, formed long queues at community water collection points, borrowed water from neighbours or purchased water from private vendors.

These practices increase contact with people outside their households, putting them at risk of COVID-19 infections (Kumpel et al., 2022; Stoler et al., 2021). These results support previous findings that many households in SSA still lack access to adequate and safe WASH services, which may hinder COVID-19 preventive practices (Ekumah et al., 2020; Stoler et al., 2021; WHO & UNICEF, 2021). They also align with findings by Zvobgo & Do (2020) that the lack of adequate access to WASH services in SSA can lead to risky behaviours, such as violating lookdowns and physical distancing regulations, during health emergencies.

Access to safe WASH services is subject to several barriers, including socioeconomic and demographic factors, which, in turn, influence the health behaviours and outcomes of populations. This thesis explained this relationship using the feminist political ecology of health (Section 2.6) to help understand the barriers to WASH access for older adults. Bivariate analysis revealed significant associations between WASH insecurity and wealth, location of sources of WASH services, and quality/levels of sanitation services. Although these associations have been reported in previous studies, this thesis found contrary evidence for the direction of the relationship between wealth and WASH insecurity. Regarding wealth and WASH insecurity, it emerged that less poor (i.e., rich) older adults reported higher WASH insecurity than poorer older adults, which is surprising and contradicts what has been consistently reported in the literature that poverty is a major predictor or risk factor for inadequate access to WASH services (Amoak et al., 2023; WHO/UNICEF, 2021). Two reasons could explain this somewhat surprising finding. First, wealthier households often rely on piped water systems that are more likely to experience disruptions and intermittent water flow due to an increase in demand, as happened during the pandemic (Kumpel et al., 2022). These disruptions are less likely to affect poorer households that rely on communally shared water sources such as boreholes. Second, during the pandemic, several governments, including the government of Uganda, rolled out pro-poor policies aimed at improving access to water for

low-income and other disadvantaged households (Bedru, 2020). These pro-poor measures may have tilted the scales in favour of poorer households, who likely perceived the increased water supply in a more positive sense compared to rich households, who may not have benefitted from the pro-poor policies.

The research also revealed that access to safe WASH services is gendered. However, unlike many previous studies (e.g., Tsai et al., 2016), this thesis found that older men were more likely to be WASH-insecure than older women. This inconsistent finding may be explained by the fact that a large proportion of the sample in this research was unpartnered and, as such, the WASH-related household dynamics in SSA may not apply. For example, previous population-based studies often look at the differences in WASH insecurity experiences between men and women within the same households (Wutich, 2009). Because of the gender roles in SSA that demand women and girls assume the responsibility of water collection and toilet maintenance, they are more likely to experience severe outcomes when there is inadequate WASH compared to men. However, in situations where men live alone or are unpartnered, as is the case in this research, these gender roles may become less applicable, leading to men reporting higher levels of WASH insecurity. For example, as found by Angoua et al. (2018) in Ivory Coast, the presence of women (the household head's wife) at home was associated with better access to clean water than when the men were alone. This implies that in the absence of women, men are more likely to experience water shortages.

5.3 COVID-19 Knowledge, attitude, risk perception and Practice (KARP) of older adults

Drawing on feminist political ecology of health, this thesis posits that the effects of WASH access on the health and wellbeing of older adults are collectively mediated by their knowledge, attitudes, risk perceptions, and practices (KARP) in the context of the COVID-19 pandemic. It further posits that KARP is shaped by the socioeconomic conditions and power

dynamics of populations. The results show that older adults in Uganda have good knowledge, moderate attitudes, moderate practices, and low perceptions of risk towards COVID-19. These results are similar to and, in some cases, indicate better scores than several previous general population-based studies in SSA. For example, Matovu et al. (2022) reviewed 12 studies that investigated COVID-19 knowledge, risk perception, and practices in SSA and found that nearly all of the studies reported moderate to good knowledge, low to moderate risk levels, and low to moderate practices. Similarly, Kebede et al. (2022) revealed through an empirical study in Ethiopia that the majority of their respondents had good knowledge, positive attitudes, and low perceptions of risk. The high knowledge among participants in this research may be explained by the frequency of hearing COVID-19 information enhanced by the persistent media campaigns in Uganda during the country's very strict lockdowns. The low-risk perception among the sample respondents was unexpected, given that the perceived vulnerability of older adults within the study context was expected to be a catalyst for higher risk perceptions (Jones & Storer, 2022). Additionally, Kebede et al. (2022) argued that increased knowledge is associated with increased risk, especially if respondents lack the means to cope effectively. Yet the high levels of knowledge reported in this thesis appears not to increase risk perceptions. This finding could be explained by the strict lockdowns implemented in Uganda, which may have made older adults already living in social isolation feel relatively safer (Development Initiatives, 2020). For instance, an online survey conducted in Kenya discovered that the majority of the participants reported low or no risk perception towards COVID-19 and attributed it to their compliance with lockdown measures, which had already kept them indoors (Austrian et al., 2020). The timing of the data collection could also explain the low-risk perception. For example, Nshakira-Rukundo & Whitehead (2021) found that Ugandan people's fear of COVID-19 reduced in July 2020 compared to March 2020 levels, implying that as people get used to living with the virus, their risk perceptions may reduce. Because the data for

this thesis were collected in the latter part of 2020, the respondents' risk perceptions may have already started to decline.

Regarding the effects of socioeconomic conditions and power dynamics of populations on KARP, it emerged that frequency of information, level of education, gender, trust in the Ugandan government and satisfaction with the government's response to COVID-19, food security, availability of room to isolate COVID-19 patients, and the presence of children in the household influenced KARP. Most of these relationships confirm existing studies on factors influencing COVID-19 KARP in SSA (Austrian et al., 2020). An interesting finding worth highlighting is that men reported slightly higher levels of COVID-19 knowledge than women in the study sample, a finding supported by Kebede et al. (2022). This disparity may be explained by the fact that women in the sample had lower levels of education and lower levels of wealth compared to men. Yet higher levels of education and higher levels of wealth are associated with higher COVID-19 knowledge in previous studies (Austrian et al., 2020; Baye, 2020; Kebede et al., 2022). Additionally, in Kenya, Austrian et al. (2020) found that men, especially those who were educated, were more likely to have access to a wide range of information channels such as government SMS, social media, and the internet than women; as such, their level of knowledge was found to be higher compared to women.

Consistent with several previous studies, this thesis found that COVID-19 knowledge, attitudes, and risk perceptions influence COVID-19 practices and that as knowledge, attitudes, and risk perceptions increase, it is likely that practices toward COVID-19 will improve. In contrast, as respondents' WASH insecurity level increases, their COVID-19 practices reduce, implying that WASH insecurity is a barrier to positive COVID-19 practices among Ugandan older adults. This supports the findings by Amuakwa-Mensah et al. (2021) that the lack of adequate access to relevant resources, such as WASH services in SSA, hinders the uptake of COVID-19 practices.

5.4 Effect of WASH barriers and the COVID-19 pandemic on emotional distress and wellbeing of older adults

Results from the examination of the emotional distress of older adults were alarming. Nearly 90% of the respondents reported being emotionally distressed. No relevant studies investigated the COVID-19-related psychosocial health of older adults in SSA. However, compared with emotional distress studies pre-COVID-19 in the region, as well as COVID-19-related studies in other regions, these levels of emotional distress are significantly higher. For example, Kangmennaang et al. (2020) investigated water-related emotional distress in Accra, Ghana and found that probable cases of emotional distress occurred among only 27% of the respondents. Additionally, they found that water-insecure households were more likely to report being emotionally distressed. García-Portilla et al. (2021) examined COVID-19-related emotional distress of older adults in Spain. They discovered probable cases of emotional distress were reported among 52.5% of women and 34.3% of men. They attributed these relatively high levels (by developed country standards) of emotional distress to the effects of the COVID-19 pandemic. These suggest that the higher levels of emotional distress in the current research may be attributed to the effects of the COVID-19 Pandemic, including worry about the effects of COVID-19, such as their inability to go about their normal activities and access basic resources for everyday living among the study sample, as revealed by the multivariate logistic regression model in this thesis.

Both emotional distress and wellbeing are gendered. Overall, females reported higher levels of emotional distress compared to males, which is consistent with the results of García-Portilla et al. (2021). Two reasons may explain this disparity. First, Pinchoff et al. (2021) suggest that women were more likely to report household tension and violence and skip meals during the COVID-19 pandemic compared to men. This is particularly common with women living with marital partners. Similarly, Lemuel et al. (2021) found through a cross-sectional

study in Uganda that people living with marital partners were more likely to report being angry, although the study participants included both younger and older people. This research appears to confirm these previous findings, as women who were partnered were more likely to report being emotionally distressed. Second, this research found that emotional distress is linked with feelings of distrust towards the government's COVID-19 information and dissatisfaction with the government's actions toward addressing the pandemic. This is because trust in the government can directly reduce people's worries (Xu, 2021) and moderate other variables such as coping with financial challenges and lack of basic services such as WASH resulting from the Pandemic (Barrafrem et al., 2021; Jones & Storer, 2022) to reduce people's worries about the Pandemic. Interestingly, distrust in COVID-19 information and dissatisfaction with the government's actions were both associated with high emotional distress among female respondents, and none had a significant association among male respondents. Consequently, females were more likely not to trust the government's COVID-19 information and be unsatisfied with the government's actions, leading to high emotional distress.

Poor wellbeing was linked with food insecurity (present for both men and women), unemployment or employment in the subsistence sector, and lower educational attainment (present for only women); these relationships are established in the existing literature (e.g., Rishworth & Elliott, 2022). Surprisingly, however, higher wellbeing was linked with distrust in government's COVID-19 information and dissatisfaction with government's actions toward addressing the pandemic. While no existing studies were found that explored this relationship, it could be explained by the fact that individuals who are more critical and distrusting of government's actions may feel empowered to take control of their own lives. In the context of the COVID-19 pandemic, this could mean violating stay-at-home orders to access lifesaving resources such as food, water, and income in the absence of strong governmental welfare measures (Jones & Storer, 2022). These resources can make these individuals better off than

those not engaging in such actions, hence leading to higher wellbeing. Nonetheless, further research is needed to understand the complex relationship between trust in government COVID-19 information, satisfaction with government's actions, and wellbeing during the COVID-19.

Additionally, COVID-19 knowledge, attitude, risk perception, and practice (KARP) were used to assess the impact of COVID-19 on emotional distress and wellbeing. The findings suggest that even though increases in KARP factors could reduce the chances of experiencing emotional distress, it had an adverse effect on wellbeing. This could be because as people become more knowledgeable about COVID-19, have positive attitudes, have high-risk perceptions, and are able to practice COVID-19 preventive measures; they will be less worried about getting infected with the virus and hence contribute to lower emotional distress. However, these factors will not increase their chances of being able to meet their basic needs relating to income, food, and paying various bills, which are deemed critical drivers of people's wellbeing during the COVID-19 Pandemic (Giebel, Ivan, Burger, et al., 2022; Giebel, Ivan, & Ddumba, 2022). In fact, the socioeconomic demands of COVID-19 practices may reduce people's ability to meet their basic needs due to loss of income and competition for older adults' already limited resources to acquire sanitizers and face masks (Giebel, Ivan, Burger, et al., 2022; Jones & Storer, 2022).

Finally, WASH insecurity was used to assess the impact of WASH barriers on the psychosocial health and wellbeing of older adults. The results indicate that WASH insecurity had no significant association with emotional distress, which was unexpected given that, in theory, WASH insecurity means people would likely worry about being unable to practice COVID-19 preventive measures and vice versa. The reason for this finding is not entirely apparent and requires further research. However, WASH insecurity was significantly associated with wellbeing, with respondents who were WASH insecure less likely to report

high wellbeing. This finding confirms previous conceptions of the relationship between WASH insecurity and wellbeing in LMICs (Kangmennaang et al., 2019; Kangmennaang & Elliott, 2023).

5.5 Conclusions and contributions to knowledge

The COVID-19 Pandemic may trigger a decline in the psychosocial health and wellbeing of older adults in SSA. The lack of the requisite resources for managing the pandemic, including WASH services and other resources for everyday living, such as food, income, and housing, as well as the strict lockdowns, can aggravate feelings of emotional distress and reduce wellbeing. This has been the case in Uganda due to the unprecedented restrictions and disruptions in daily life experienced in the country (Development Initiatives, 2020), as well as the lack of access to basic resources, including WASH (Jones & Storer, 2022). This thesis has investigated access to WASH services among marginalized older adults in Uganda during the COVID-19 pandemic. It has also explored how barriers to WASH access impacts older adults' COVID-19 practices and psychosocial health and wellbeing.

The results show that older adults in Uganda face barriers to accessing WASH services, which not only inhibits their COVID-19 prevention and management practices but also negatively impacts their psychosocial health and wellbeing. Indeed, access to WASH services is critical, but so are other resources for everyday living, such as food, income, and housing. This thesis has shown that the inadequacy of these resources, which may have been worsened by the COVID-19 pandemic, affects older adults' ability to practice COVID-19 preventive measures, increase their worry about COVID-19, and hinder their ability to meet their basic needs, leading to emotional distress and low wellbeing.

The role of governments in shaping people's psychosocial health and wellbeing during health emergencies has also been highlighted in this research. In particular, trust in

government's information and coping mechanisms can alleviate people's worry over suffering severe health and socioeconomic consequences resulting from the pandemic and hence improve their psychosocial health. However, in the absence of effective welfare mechanisms as part of government's coping mechanisms, trust in government information and adherence to its coping measures may result in low wellbeing among vulnerable populations such as older adults.

This thesis makes several contributions to health geography scholarship. Firstly, by uncovering the role of trust in governments in shaping vulnerable people's psychosocial health and wellbeing during the COVID-19 pandemic, this research advances the proposition that trust in political authority is a critical determinant of population health, especially during health emergencies. Previous research has already shown that trust in government is critical for improving vaccination rates and adherence to COVID-19 preventive practices (Blair et al., 2022; Pak et al., 2021). This thesis adds that beyond preventive practices, trust or distrust in government may also impact people's psychosocial health and wellbeing, especially in low- and middle-income countries.

Secondly, this research has shed light on how emerging infectious diseases converge with a lack of resources in low- and middle-income countries to affect the health and wellbeing of vulnerable groups, as called for by Elliott (2022). It has revealed that in resource-poor contexts, adhering to COVID-19 practices places an extra burden of worry on vulnerable populations and denies them access to critical lifesaving resources. These can exacerbate existing health and wellbeing concerns among vulnerable groups. Although previous research has examined the impact of the lack of resources on KARP and health and wellbeing in LMICs, this thesis extends these findings by examining the full *resources – KARP – health and wellbeing* pathway.

Finally, this research makes a timely contribution to policy by revealing the unique WASH vulnerabilities confronting older adults in LMICs during health emergencies. Specifically, the findings of this research can inform targeted interventions and policies that prioritize access to WASH services and other welfare services for older adults and improve public trust in governments during health emergencies. This knowledge is crucial for addressing the ongoing effects of the COVID-19 Pandemic but is also useful for improving future pandemic preparedness in LMICs.

5.6 Directions for future research

This research has made several significant contributions to knowledge but has also revealed the need for research in several key areas. First, the relevant literature (including this thesis) has revealed an important relationship between trust in government, COVID-19 KARP, and psychosocial health and wellbeing. However, to help inform policy, further research is needed that focuses on understanding the drivers of trust in governments and how governments can engender and sustain public trust during health emergencies.

Relatedly, the thesis uncovered that better wellbeing was linked with distrust in government's COVID-19 information and dissatisfaction with government's actions toward addressing the Pandemic. Although this thesis suggests that the relationship may be because individuals who are more critical and distrusting of government's actions may violate COVID-19 restrictions in pursuit of resources that improves their wellbeing, more research is still needed to understand this link.

Furthermore, several other relationships have been identified in the current research that have not been adequately explained in the existing literature, including this thesis. Notably, wealthier households reported higher WASH insecurity than poorer households during the Pandemic and more male older adults reported higher WASH insecurity

than older adult females. Additionally, the inherent limitations of the quantitative approach utilized in this research made it difficult to comprehensively capture the complex power dynamics and the ecological aspects that are central to the feminist political ecology of health. Consequently, future research would benefit from incorporating alternative epistemologies including qualitative methods, allowing for a more in-depth exploration of these dynamics and relationships.

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Appendix A: Survey instrument

Good morning/afternoon; my name is _. I am here to invite you to answer some questions about your health and the health of your family. This should only take about 20 minutes or so. Before we begin, I will read you some information about the study and about how your information will be kept strictly confidential: <Pending privacy statement> Would it be ok if I started asking you a few questions now?

Interviewer to introduce themselves with the provided script

○ Participant is ready to begin

○ Participant is not ready to begin. Is there be another day or time more convenient for the participant?

Are you able to reschedule a visit?

Record the location of this household

Ensure the device's GPS is enabled.

latitude (x.y °)

....

longitude (x.y °)

....

altitude (m)

....

accuracy (m)

....

Gender of participant *

○ Male

○ Female

Age of participant, in years. *

....

Marital status of the participant   *

○   Single or never married

○   Currently married or living with someone

○   Separated, divorced or widowed

○   Participant refused to answer

Participant's relationship to the household head?   *

○   Is household head

○   Spouse of household head

○   They are another family member

How many other male adults (18+) live in this household?   *

0

How many other female adults (18+) live in this household?   *

0

How many other male children live in this household?   *

0

How many other female children live in this household?   *

0

Religion of participant   *

○   Christian

○   Muslim

○   Other

Please specify religion

Does the participant own or rent this house?   *

○   Own

○   Rent

○   Owned by another family member

○   Other

Please specify who owns this house

....

How long has the participant lived in this community? (Years)

....

Has the participant ever attended school *

○ Yes

○ No

What is the highest level of education completed? *

○ Primary

○ Junior Secondary

○ Senior Secondary/Vocational/Technical

○ Teaching/Nursing College

○ Some University

○ Completed University

○ Graduate School

○ Professional degree (medicine, law, dentistry)

What kind of work does the participant mainly do? *

○ Does not work

○ Subsistence farming

○ Employed for pay full time

○ Employed for pay part time

○ Unemployed and looking for work

○ Temporary or seasonal work for pay

○ In school

○ Self-employed

Please specify type of self employment

....

What was the total household income for last year (2019) (UGX): *

....

"Now we have a few questions about household items"

◯ OK

Select household items that are present   *

☐ Cupboard

☐ Cassette, CD or DVD player

☐ Television

☐ Mobile phone

☐ Sofa set

☐ Electricity

☐ Household member with a bank account, mobile account, or account with an agent

---

What is the main material of the floor of this household?   *

◯ Earth or sand

◯ Cement screed (cement, aggregates, and water)

What is the main material of the exterior walls of this household?   *

◯ Cement

◯ Other

What is the main material of the roof of this household?

◯ Thatch or palm leaf

◯ Iron, zinc, or aluminum sheets

What type of fuel does this household mainly use for cooking?

◯ Wood

◯ Other

"Now we'd like to know more about what kind of water source and toilet this household uses"

◯ OK

What is the main source of drinking water for this household? *

- ○ Piped water
- ○ Dug well
- ○ Water from spring
- ○ Rainwater collection
- ○ Delivered water
- ○ Water kiosk
- ○ Packaged water
- ○ Surface water
- ○ Other

Please specify source of drinking water

Please select the specific type based on the source

What is the main source of water used by members of this household for other purposes, such as cooking and hand washing? *

- ○ Piped water
- ○ Dug well
- ○ Water from spring
- ○ Rainwater collection
- ○ Delivered water
- ○ Water kiosk
- ○ Packaged water
- ○ Surface water
- ○ Other

Please specify source of water used for other purposes

Please select the specific type based on the source

Does this household spend money on water? *

- ○ Yes
- ○ No

How much does the household spend on water per day?

Record in local currency

....

Where is the location of the source of drinking water? *

○ In dewlling

○ In yard or plot

○ Elsewhere

How long does it take to travel to the location of the source of water and come back? *

○ Participant does not know

○ Household members do no collect water from outside the residence

○ Record duration to travel for water

Record the total time taken for a single round trip including queuing.

Record in minutes

....

Who is primarily responsible for obtaining water each day?

Select the individual primarily responsible for water collection

○ Adult male

○ Adult female

○ Girl (< 15 years old)

○ Boy (< 15 years old)

How many trips did that person make in the last week?

○ Participant does not know

○ Record number of trips

Record the number of trips

....

We would like to learn about the places that household members of this households uses to wash their hands. Ask the participant to please show you where members most often wash their hands? *

○ Observed fixed place

○ Observed mobile place (bucket, jug, or kettle)

○ No observed place, no handwashing place in the household, yard or plot

○ No observed place, permission to observe was not granted

Is there presence of water?

Observe

○ Water is available

○ Water is not available

Is there presence of soap, detergent or other cleansing agent?

Observe

○ Soap or detergent is available

○ Ash, sand, mud is available

○ None

What kind of toilet facility do members of this household usually use? If 'Flush' or 'Pour flush', probe: Where does it flush to? (observe if necessary)

*

Note: If not possible to determine, ask permission to observe the facility

○ Flush or pour flush

○ Dry pit latrines

○ Composting toilts

○ Bucket

○ Container based sanitation

○ Hanging toilet or haning latrine

○ No facility or bush

○ Other

Please specify the type of toilet

....

Please select the specific type of toilet

Is this facility shared with others who are not members of this household?

○ Yes

○ No

Where is this toilet located?

○ In household

○ In own yard or plot

○ Elsewhere

Is there a senior in this household? Are they able to go to the toilet room, use the toilet, arrange their clothes, and return without any assistance (may use cane or walker for support and may use bedpan/urinal at night.

Ask only if relevant: If there is a senior in the household being cared for by another

○ Yes

○ No

○ Participant does not know

○ Participant refused to answer

○ Not applicable

When a member of this household is menstruating, are they able to wash and change in privacy while at home?

Ask only of relevant

○ Yes

○ No

○ Participant does not know

○ Participant refused to answer

○ Not applicable

Has the access to water changed in anyway in the past year? (to capture implementation of any NGO or government programs to enhance water access to stem the spread of the virus)   *

○ Yes - how?

○ No

○ Participant does not know

○ Participant refused to answer

Record an open ended answer as to how change in access to water has occured in the past year.

Ask participant to think about their day yesterday. How many times did they wash your hands with soap and water and / or use hand sanitizer?   *

"Now we'd like to discuss how you make decisions about water or sanitation issues within your household, and within your community. Please answer the questions, thinking about how the situation has been in the last 12 months."

Proceed by asking the participant how decisions within the household are made about the following issues

○ OK

When decisions are made regarding collection of water in the household, who is it that normally takes the decision?

Ask participant to select all where applicable

☐ Participant (Self)

☐ Spouse

☐ Other household member

☐ Other non-household member

☐ Not applicable (e.g water on premises)

How much input do you have in making decisions about collection of water in the household?

Ask participant to select one

○ No input or input in few decisions

○ Input Into some decisions

○ Input into most or all decisions

When decisions are made regarding managing and maintenance of household toilet or hygiene facilities, who is it that normally takes the decision?   *

Ask participant to select all where applicable

☐ Participant (Self)

☐ Spouse

☐ Other household member

☐ Other non-household member

How much input do you have in making decisions about managing and maintenance of household toilet or hygiene facilities?

Ask participant to select one

○ No input or input in few decisions

○ Input Into some decisions

○ Input into most or all decisions

Within your household when decisions are made about attending community water, sanitation and hygiene meetings (e.g. planning of water facilities or resolution of problems), who is it that normally takes the decision?   *

Ask participant to select all where applicable

☐ Participant (Self)

☐ Spouse

☐ Other household member

☐ Other non-household member

☐ Not applicable (no community meetings)

Within your household, when decisions are made about attending community water, sanitation and hygiene meetings how much input do you have?

Ask participant to select one

◯ No input or input in few decisions

◯ Input Into some decisions

◯ Input into most or all decisions

When decisions are made regarding household expenditure related to water (buying water, paying fees, containers, etc), who is it that normally takes the decision? *

Ask participant to select all where applicable

☐ Participant (Self)

☐ Spouse

☐ Other household member

☐ Other non-household member

☐ Not applicable (no payments for water in last 12 months)

How much input did you have in making decisions about household expenditure related to water (buying water, paying fees, containers, etc)?

Ask participant to select one

◯ No input or input in few decisions

◯ Input Into some decisions

◯ Input into most or all decisions

When decisions are made regarding expenditure related to sanitation and hygiene (buying soap, building handwashing or sanitation facilities, emptying pits, maintaining, facilities, etc) , who is it that normally takes the decision? *

Ask participant to select all where applicable

☐ Participant (Self)

☐ Spouse

☐ Other household member

☐ Other non-household member

☐ Not applicable (no payments for water in last 12 months)

How much input did you have in making decisions about expenditure related to sanitation (buying soap, building handwashing or sanitation facilities, emptying pits, maintaining, facilities, etc)?

Ask participant to select one

◯ No input or input in few decisions

◯ Input Into some decisions

◯ Input into most or all decisions

"Now I have a few questions about how comfortable you feel speaking up in public when the community needs to make important decisions on water, sanitation and hygiene"

Proceed by asking the participant how they feel about about the following issues

○ OK

Do you feel comfortable speaking up in public to help decide on water, sanitation or hygiene implementation (like wells, hygiene promotion programs) in your community? (eg in a meeting about planning activities, or resolving break-downs)

Ask participant

○ No, not at all comfortable

○ Yes, but with difficulty

○ Yes, comfortably

○ Not applicable

Do you feel comfortable making a complaint to community leaders or local authority about water, sanitation and hygiene services (like break-downs, poor quality) in your community?

Ask participant

○ No, not at all comfortable

○ Yes, but with difficulty

○ Yes, comfortably

○ Not applicable

Have you complained about any challenges to your community leaders or local authority

Ask participant

○ Not at all

○ rarely

○ Very often

○ Not applicable

How effective do you think your complaints are to resolve this issue?

Ask participant

○ Very effective

○ Fairly effective

○ A little bit effective

○ Not active in complaints

"Now I'd like to ask you a few questions about some of the challenges facing you, your family and your nation"

Proceed by asking the participant about how they feel about about the following issues. Encourage the participant to choose one response but do not read out lists

○ OK

What would you say the greatest challenge facing you or your family is right now? *

Ask participant

○ Water

○ Sanitation

○ Food

○ Family disputes

○ Money

○ Housing

○ Land

○ Sickness

○ Other

Please specify the sickness

....

Please specify the challenge your family faces right now

....

What would you say the greatest challenge facing your community right now? *

Ask participant

○ Water

○ Sanitation

○ Food

○ Family disputes

○ Money

○ Housing

○ Land

○ Sickness

○ Other

Please specify the sickness

....

Please specify the challenge your community faces right now

What would you say the greatest challenge facing Uganda right now? *

Ask participant

○ Water

○ Sanitation

○ Food

○ Economy

○ Corruption

○ Housing

○ Land

○ Healthcare

○ Sickness

○ Other

Please specify the sickness

participant

Please specify the challenge your community faces right now

participant

"We know that sometimes in Uganda, women are the subject of beatings by their husbands. What do you think about this? Can you tell me, is a husband justified in hitting or beating his wife if:"

Proceed by asking the participant to respond to the following statements with the provided responses

○ OK

Select which response the participant agrees with the most		No	Yes, some of the time	Yes, most of the time
She goes out without telling him	*	○	○	○
She neglects the children	*	○	○	○
She argues with him	*	○	○	○
She refuses to have relations with him	*	○	○	○

She burns the food	*	◯	◯	◯
She argues with her mother or father in law	*	◯	◯	◯
She does not provide (enough) water for the household	*	◯	◯	◯

"We know too that sometimes in UGANDA, seniors are the subject of abuse and neglect by their children or other close relations. I'd like to know what you think about this. When I read each of the following statements, tell me how much you agree or disagree with the statement read:"

Proceed by asking the participant to respond to the following statements with the provided responses

◯ OK

Read out the following statements and indicate how much the participant agrees or disagrees with the statement		Strongly agree	Slightly agree	Neutral	Slightly disagree	Strongly disagree
Manhandling of older people, parents or parents-in-law is not considered violence or abuse.	*	◯	◯	◯	◯	◯
Physically touching older people without their consent is not sexual abuse.	*	◯	◯	◯	◯	◯
If an older person's hygiene, safety and nutrition needs are not met, that is considered neglect.	*	◯	◯	◯	◯	◯
If an older person is housed in unsuitable living conditions, that is considered neglect.	*	◯	◯	◯	◯	◯
If an older person is subject to beating, slapping, kicking, biting and/or having things thrown at them, that is considered abuse.	*	◯	◯	◯	◯	◯

| If an older person is subject to shouting, insults, name calling or ridicule, that is considered abuse. | * | ◯ | ◯ | ◯ | ◯ | ◯ |

| If an older person's goods or money are stolen, whether by force or by deceptions, that is considered abuse. | * | ◯ | ◯ | ◯ | ◯ | ◯ |

"Now I'd like to ask you a few questions about your experience with getting water or using the latrine"

◯ OK

Have you ever been bothered by anyone when going to the latrine or into the bush to relieve yourself or fetch water?   *

Ask participant

◯ Yes

◯ No

◯ Participant does not know

◯ Participant refused to answer

Can you tell me about this? *Ask participant*	Yes	No
Was it water related?	◯	◯
Was it sanitation related?	◯	◯

How was it sanitation related?

Ask participant

☐ Physical violence

☐ Sexual violence

☐ Intimidation with no violence

☐ Other

Please specify in which way it was sanitation related

Ask participant

....

Has anyone else in your household ever been bothered by anyone when going to the latrine or into the bush to relieve yourself or fetch water?   *

Ask participant

○ Yes

○ No

○ Participant does not know

○ Participant refused to answer

Can you tell me about this? *(Anyone else within the household)*	Yes	No
Other household member: Was it water related	○	○
Other household member: was it sanitation related	○	○

How was it sanitation related?

(Anyone else within the household)

☐ Physical violence

☐ Sexual violence

☐ Intimidation with no violence

☐ Other

Please specify in which way it was sanitation related

(Anyone else within the household)

Has anyone else you know ever been bothered by anyone when going to the latrine or into the bush to relieve yourself or fetch water?   *

Ask participant

○ Yes

○ No

○ Participant does not know

○ Participant refused to answer

Can you tell me about this? *(Anyone else the participant knows)*	Yes	No
Was it water related	○	○
Was it sanitation related	○	○

How was it sanitation related?
(Anyone else the participant knows)

☐   Physical violence

☐   Sexual violence

☐   Intimidation with no violence

☐   Other

Please specify in which way it was sanitation related
(Anyone else the participant knows)

"Now we'd just like to chat about how you've been doing over the past year"
"indicate how often each experience occurred for you in the past year"

◯   OK

"Over the past year..." *Repeat these statements to the participant and record their response*		Never	Rarely (maybe once per year)	Sometimes (2-3 times over the year)	Often (almost every other month)	Very often (more than once per month)
I could not pay my bills on time (eg, water, electricity, loan payments)	*	◯	◯	◯	◯	◯
I could not pay health insurance premiums for myself or my dependents	*	◯	◯	◯	◯	◯
I could not pay my rent on time	*	◯	◯	◯	◯	◯
I could not fix my house	*	◯	◯	◯	◯	◯
I ate less because there was not enough food or money to buy food	*	◯	◯	◯	◯	◯
I did not have enough money to buy the things I needed	*	◯	◯	◯	◯	◯
I did not have enough money to buy the things I wanted	*	◯	◯	◯	◯	◯

Household water insecurity access scale over the past 30 days (a) *Ask participant*		Very often	Often	Sometimes	Rarely	Never
Have you been worried that your household would not have enough water?	*	◯	◯	◯	◯	◯
Has a household member drank water from an undesirable source?	*	◯	◯	◯	◯	◯
Has a household member drank unsafe water?	*	◯	◯	◯	◯	◯
Has a household member drank less water than needed because there was not enough?	*	◯	◯	◯	◯	◯
Has a household member used less water than needed because there was not enough?	*	◯	◯	◯	◯	◯
Has a household member go to bed thirsty because there was not enough water?	*	◯	◯	◯	◯	◯
Have never had any water at all in your household?	*	◯	◯	◯	◯	◯
Has a household member felt angry or frustrated because there was not enough water?	*	◯	◯	◯	◯	◯
Household water insecurity access scale over the past 30 days (b) *Ask participant*		Very often	Often	Sometimes	Rarely	Never
Have you had safety concerns accessing a sanitation facility or going to the bush?	*	◯	◯	◯	◯	◯
Have you defecated in the open or used an undesirable placed to relieve yourself?	*	◯	◯	◯	◯	◯

Have you been unable able to wash or practice adequate hygiene because there was not enough water?	*	○	○	○	○	○
Have you been without a place with water and soap to wash your hands when you needed to?	*	○	○	○	○	○

Household water insecurity access coping measures Ask only if the participant experienced any of the issues from the previous question		Yes	No	Don't Know	Refused to answer
Have you taken extra measures to store water	*	○	○	○	○
Borrowed water from a neighbour	*	○	○	○	○
Harvested rain water in order to cope	*	○	○	○	○
Bought water from a private vendor	*	○	○	○	○
Taken extra measures to conserve water	*	○	○	○	○
Recycle or reused water in order to cope	*	○	○	○	○
Acquire water from a distant source	*	○	○	○	○
Purify unsafe water	*	○	○	○	○
Make illegal connection to a public water pipeline	*	○	○	○	○
Other	*	○	○	○	○

Please describe other measures that were taken to cope with issues

Household food insecurity index over the past 4 weeks *Ask participant*		Never	Rarely	Sometimes	Often	Very often
How often did you worry that your household would not have enough food?	*	○	○	○	○	○
How often were you or any household member unable to eat the kinds of foods you preferred because of a lack of resources?	*	○	○	○	○	○
How often did you or any household member have to eat a limited variety of foods due to a lack of resources?	*	○	○	○	○	○
How often did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	*	○	○	○	○	○
How often did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	*	○	○	○	○	○
How often did you or any household member have to eat fewer meals in a day because there was not enough food?	*	○	○	○	○	○
How often was there ever no food to eat of any kind in your household because of lack of resources to get food?	*	○	○	○	○	○
How often did you or any household member go to sleep at night hungry because there was not enough food?	*	○	○	○	○	○
How often did you or any household member go a whole day and night without eating anything because there was not enough food?	*	○	○	○	○	○

"Now we'd like to ask you a few questions about how you are feeling"

○ OK

In general, relative to others your own age, would you say your health is: *

Ask participant

○ Excelent

○ Very good

○ Good

○ Fair

○ Poor

Do you currently have health insurance for yourself and/or for other members of your household? *

Ask participant

○ Yes, self

○ Yes, all in household

○ Yes, self and children in household

○ Only children

○ No

○ Other

Please specify who has health insurance within this household

Ask participant

In general, how would you rate the accessibility of health care services in your community? *

Ask participant

○ Excelent

○ Very good

○ Good

○ Fair

○ Poor

In general, how would you rate the quality of health care services in your community?   *

Ask participant

○ Excelent

○ Very good

○ Good

○ Fair

○ Poor

If you or someone in your household gets sick, who do you trust to provide care?

Ask participant

○ Self

○ Relative

○ Friend

○ God / Allah

○ Traditional healer

○ Doctor

○ Nurse

○ Other

Please specify who you would trust to provide your household with care during sickness

Ask participant

"Now, I would like to ask you about how you have been feeling recently about your general health"   *

○ OK

Been able to concentrate on what you're doing?   *

Ask participant

○ Better than usual

○ Same as usual

○ Less than usual

○ Much less than usual

○ Do not know

○ Refused to answer

Lost much sleep over worry?   *

Ask participant

○ Not at all

○ No more than usual

○ Rather more than usual

○ Much more than usual

○ Does not know

○ Refused to answer

Felt you were playing a useful part in things?   *

Ask participant

○ More so than usual

○ Same as usual

○ Less useful than usual

○ Much less useful than usual

○ Do not know

○ Refused to answer

Felt capable of making decisions about things?   *

Ask participant

○ More so than usual

○ Same as usual

○ Less so than usual

○ Much less than usual

○ Do not know

○ Refused to answer

Felt constantly under strain?   *

Ask participant

○ Not at all

○ No more than usual

○ Rather more than usual

○ Much more than usual

○ Does not know

○ Refused to answer

Felt you couldn't overcome your difficulties? *

Ask participant

○ Not at all

○ No more than usual

○ Rather more than usual

○ Much more than usual

○ Does not know

○ Refused to answer

Been able to enjoy your normal daily activities? *

Ask participant

○ More so than usual

○ Same as usual

○ Less so than usual

○ Much less than usual

○ Do not know

○ Refused to answer

Been able to face up to your problems? *

Ask participant

○ More so than usual

○ Same as usual

○ Less so than usual

○ Much less than usual

○ Do not know

○ Refused to answer

Been feeling unhappy and depressed? *

Ask participant

○ Not at all

○ No more than usual

○ Rather more than usual

○ Much more than usual

Been losing confidence in yourself? *

Ask participant

○ Not at all

○ No more than usual

○ Rather more than usual

○ Much more than usual

○ Does not know

○ Refused to answer

Been thinking of yourself as a worthless person? *

Ask participant

○ Not at all

○ No more than usual

○ Rather more than usual

○ Much more than usual

○ Does not know

○ Refused to answer

Been feeling reasonably happy, all things considered? *

Ask participant

○ More so than usual

○ Same as usual

○ Less so than usual

○ Much less than usual

○ Do not know

○ Refused to answer

"Now we'd like to talk about recent challenges in Uganda"

○ OK

Have you heard about this new virus, COVID-19 (Coronavirus)? *

Ask participant

○ Yes

○ No

Do you remember how you first heard about it? *

Ask participant

○ Yes

○ No

Where did you first hear about COVID-19 (Coronavirus)? *

○ A friend, family member or neighbour

○ A health care professional

○ Radio

○ The television

○ Other

Please specify where you first heard about COVID-19 (Coronavirus)

How often this year have you heard about it? *

○ Never

○ Once or twice a week

○ Several times a week

○ Daily

From what source do you frequently get information about COVID-19 (Coronavirus) from? *

○ Radio

○ TV

○ Newspaper

○ Community forum

○ Community Health Worker

○ Family or Friend

○ Social media

○ Other

Please specify the source you most frequently get information about COVID-19 (Coronavirus) from

Did you share the information about COVID-19 (Coronavirus) you learned with others? *

○ Yes

○ No

Do you feel you have enough information about the COVID-19 (Coronavirus) virus information? *

○ Yes

○ No

○ Participant does not know

○ Participant refused to answer

What type of information would you like to have about the COVID-19 (Coronavirus) situation? *

☐ How to cure COVID-19

☐ How to protect yourself and family

☐ How it spreads or how you can catch it

☐ Other

Please specify what other information you would like to have about the COVID-19 (Coronavirus) situation

What have you been told about how to prevent you or your family from getting sick? *

☐ Wash hands frequently

☐ Wear a mask

☐ Socially distance

☐ Pray

☐ Stay home

☐ Monitor the health of you and family members

☐ Get tested if you suspect you have been exposed

☐ Other

Please specify what other measures you have been told about how to prevent you or your family from getting sick

Have you been doing these things? *

○ Yes

○ No

Which of the measures have you taken to prevent you or your family from getting sick? *

☐ Wash hands frequently

☐ Wear a mask

☐ Socially distance

☐ Pray

☐ Stay home

☐ Monitor the health of you and family members

☐ Get tested if you suspect you have been exposed

☐ Other

How worried are you personally about COVID-19 (Coronavirus)? *

○ Not at all worried

○ Slightly worried

○ Somewhat worried

○ Moderately worried

○ Extremely worried

"How likely do you think that..." *Repeat the answer options to the participant in order of left to right*	Extremely unlikely	Moderately unlikely	Somewhat unlikely	Neutral	Somewhat likely	Moderately likely	Extremely likely
You will be directly and personally affected by catching COVID-19 (Coronavirus) over the next 6 months? *	○	○	○	○	○	○	○
Your friends and family will be directly affected by catching COVID-19 (Coronavirus) in the next 6 months? *	○	○	○	○	○	○	○

How much do you agree or disagree with the following statements:	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
COVID-19 (Coronavirus) will not affect many people in Uganda *	○	○	○	○	○
I will probably get sick with the COVID-19 (Coronavirus) virus *	○	○	○	○	○

| Getting sick with COVID-19 (Coronavirus) can be serious | * | ○ | ○ | ○ | ○ | ○ |

| If I get sick with COVID-19 (Coronavirus), I wouldn't want anyone to know because then they would treat me differently | * | ○ | ○ | ○ | ○ | ○ |

		Definitely true	Probably true	Probably false	Definitely false
"I'm going to read things people have said about the COVID-19 (Coronavirus) virus. Please tell me if you think each is definitely true, probably true, probably false or definitely false?"					
The virus can spread when an infected person touches someone's hand or face, kisses them, or sneezes or coughs near them	*	○	○	○	○
Washing hands frequently helps prevent the spread of COVID-19	*	○	○	○	○
Infected people may not show symptoms for 5 – 14 days	*	○	○	○	○
If you show symptoms, or think you have it, you should get tested	*	○	○	○	○
People who have recovered from COVID-19 should be avoided to prevent getting the disease	*	○	○	○	○

Have you had, the COVID-19 (Coronavirus) infection?   *

- ( ) Yes, I had it
- ( ) No
- ( ) Don't know
- ( ) Participant refused to answer

How was COVID-19 diagnosed?

- ( ) I diagnosed myself based on symptoms
- ( ) I was diagnosed by a doctor based only on symptoms
- ( ) I was diagnosed based on a positive test
- ( ) I do not know
- ( ) Other

Please specify how you were diagnosed with COVID-19 (Coronavirus)

....

If you were infected by COVID-19, how seriously do you think it would affect your health?

- ( ) Not very much
- ( ) A lot
- ( ) Very much
- ( ) Extremely impacted

What about anyone else in your household – have they had COVID-19?   *

- ( ) Yes
- ( ) No

How were they (household member) diagnosed with COVID-19?

- [ ] Diagnosed themselves based on symptoms
- [ ] Diagnosed by doctor based on symptoms
- [ ] Based on a positive test
- [ ] I don't know
- [ ] Other

Are they (household member) well now?

○ Yes

○ No

○ Deceased

○ Don't know

Do you know anyone (else) who has been diagnosed with the virus?

○ Yes

○ No

How are you related to this person?

....

How were they (non-household member) diagnosed with COVID-19?

☐ Diagnosed themselves based on symptoms

☐ Diagnosed by doctor based on symptoms

☐ Based on a positive test

☐ I don't know

☐ Other

Are they (non-household member) well now?

○ Yes

○ No

○ Deceased

○ Don't know

Do you know anyone who has passed from the virus? *

○ Yes

○ No

Please specify your relationship

○ Friend

○ Family

○ Neighbour

○ Other

How has your daily life changed since the virus has come to Uganda?   *

Select all that apply

- [ ] Social distancing
- [ ] Kids not in school
- [ ] Wearing a mask
- [ ] Challenges getting food
- [ ] Challenges getting water
- [ ] Washing hands more often
- [ ] Other

Please specify in what other way your life has changed since the virus has come to Uganda

What do you think the biggest change to your daily life has been?   *

Insert open ended response

"Now I'd like to read some statements to you and you can tell me how much you agree or disagree with the statement"	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
It really bothers me when people cough or sneeze without covering their mouth. *	○	○	○	○	○
I prefer to use hand sanitizer or wash my hands after shaking another's hand *	○	○	○	○	○
I avoid going to public places because of fear of getting sick with COVID-19 *	○	○	○	○	○
I avoid touching things like door handles or stair railings when I am in a public place *	○	○	○	○	○
I dislike wearing a facemask *	○	○	○	○	○
A person's temperature should be taken before they enter any public place *	○	○	○	○	○
I am fine with going to very crowded public places *	○	○	○	○	○

I frequently use hand sanitizer/wash my hands with soap and water	*	◯	◯	◯	◯	◯
I would isolate at home for 14 days if I were symptomatic or had a positive COVID-19 test	*	◯	◯	◯	◯	◯
I have changed the way I live my life because of COVID-19	*	◯	◯	◯	◯	◯

How satisfied are you with the Ugandan Government's response to COVID-19?   *

◯ Very satisfied

◯ Satisfied

◯ Somewhat satisfied

◯ Not very satisfied

◯ Not at all satisfied

How much do you trust the information for the Ugandan Government about COVID-19?   *

◯ Completely trusting

◯ Mostly trusting

◯ A little trusting

◯ Not at all trusting

"Now I'm going to read you some measures the government of Uganda may have taken to help prevent the spread of COVID-19 I'd like to know whether or not you support the Government's decision to take these measures"		A lot	A little	Neutral	Not at all
Stopping greeting another with handshakes or kisses	*	◯	◯	◯	◯
Those have contact with infected individuals staying home for 14 days	*	◯	◯	◯	◯
Requiring people with COVID-19 to stay home until they are well	*	◯	◯	◯	◯
Stopping sporting matches	*	◯	◯	◯	◯

Stopping cultural events (eg, music concerts)	*	○	○	○	○
Stopping prayer gatherings	*	○	○	○	○
Closing schools	*	○	○	○	○
Closing restaurants and social clubs	*	○	○	○	○
Closing churches and mosques	*	○	○	○	○
Shutting down transportation between cities	*	○	○	○	○
Closing off a city for 2 weeks	*	○	○	○	○
Closing transportation in and around cities	*	○	○	○	○
Closing workplaces	*	○	○	○	○
Shutting down markets	*	○	○	○	○

What would be the biggest problems for you if you had to stay in the house for 14 days?　*

○ Food and water

○ Running our of money

○ Losing your job

○ None

○ Other

Please specify how you would be affected if you had to stay in the house of 14 days

If someone in your household was sick, would you have a separate room in your house to keep them isolated for 14 days? *

○ Yes

○ No

○ Participant does not know

○ Participant refused to answer

Is there anything else you'd like to share with me today that we haven't already talked about?

Record open ended if related to WASH and/or COVID only. If you have any concerns about the quality of the data collected in this survey please list them here. Try to give important details but be concise.