Age-Stratified Socio-demographic Determinants of Water Insecurity in Urban Ghana

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Abstract

This study examines how age-stratified socio-demographic factors influence water insecurity in urban Ghana, where age-based access differences remain poorly understood. Using survey data from 627 households in three neighborhoods in Accra, we used stratified multivariate logistic regression to analyze water insecurity among three age groups: young adults (18–29 years; 59.2%), middle-aged adults (30–59 years; 27.4%), and older adults (60+ years; 13.4%). The results indicate that unemployment significantly influence the odds of water security across all groups: young (OR = 0.29, 95% CI: 0.04–0.92), middle-aged (OR = 0.40, 95% CI: 0.12–0.99), and older adults (OR = 0.39, 95% CI: 0.02–0.92). Households relying on unimproved water sources were more likely to be water insecure: young (OR = 2.05, CI: 1.01–6.72), middle-aged (OR = 1.66, CI: 1.07–38.23), older adults (OR = 1.90, CI: 1.11–7.43). For older adults, the distance to water (>30 minutes) was a crucial factor (OR = 4.98, CI: 1.72–14.37), while for younger respondents, marital status and household decision-making power were influential. These findings highlight the importance of age-specific interventions that focus on employment, infrastructure, and autonomy to achieve SDG 6: universal water access in urban Ghana and similar settings.

Keywords: Water Insecurity; Age-Stratified Analysis; Urban Ghana; Socio-demographic Determinants; WASH (Water, Sanitation, and Hygiene)

1. Introduction

Access to clean drinking water services is critical for enhancing human health and well-being. However, water insecurity—defined as inadequate access to clean, safe, and affordable water for drinking, cooking, sanitation, and hygiene—continues to threaten human health and well-being, eroding progress toward achieving the Sustainable Development Goals (SDG), particularly Goal 6, which aims to ensure universal access to clean water by 2030 (United Nations, 2021). Access to safe drinking water contributes to human dignity, improves education and health outcomes, and often prevents violence (Kyessi et al., 2019). Despite its importance, over two billion people, including older individuals, lack access to clean drinking water. While water scarcity is common in developed countries, low- and middle-income nations face even more significant challenges, with many individuals experiencing high or extremely high-water vulnerability due to the inequitable distribution and management of water resources. Water insecurity, particularly in urban areas, is exacerbated by population growth, rural-urban migration, and, in recent years, the impact of climate change (UNICEF, 2021; WHO, 2023). Scholarly discourse on WASH has primarily focused on women and children, especially girls, as vulnerable and water-insecure populations (Ahiabli et al., 2023; Collins et al., 2019). These studies suggest that women and children bear a disproportionate burden of water insecurity, particularly when primary water sources are located a considerable distance away. The time spent fetching water means less time in school and reduced participation in socio-economic activities for girls and women, respectively (UNICEF, 2021). In terms of outcomes, over 700 children die every day from preventable WASH-diarrhea-related diseases (UNICEF, 2020). Furthermore, existing studies indicate that widespread water shortages compel women to walk long distances, resulting in less time for other activities, including work and leisure (Dickin et al., 2021; Pahwaringira et al., 2017), as well as increased risk of injury (Venkatamanan et al., 2020).

Over the years, numerous studies have examined demographic disparities in unimproved drinking water and sanitation (Oppong et al., 2022), the link between water access and empowerment (Dickin et al., 2021; Dery et al., 2020), water access among persons with disabilities in school settings (Dassah & Bisung, 2023), barriers to water access in impoverished urban areas (Leahy et al., 2024), and water service informalities alongside health risks (Dery & Bisung, 2022). However, there is limited scholarly insight focused on age-

specific water insecurity. The public health, epidemiology, and medicine literature have extensively explored stratified age-specific analyses. Applying such analyses to water issues could significantly enhance the understanding of water insecurity. While existing research has considered age as a demographic factor, it provides little insight into age-specific pathways to water security. The absence of this evidence hampers the development of targeted WASH interventions for different age groups. Water-related interventions risk overlooking the diverse access, needs, and insecurity experiences across age groups when efforts broadly aim to improve access conditions in an area without considering age differences.

Given the limited knowledge about the relationship between age and water insecurity, especially in Ghana, this study has two main goals: 1) to explore the connection between age and water insecurity, and 2) to identify factors influencing water insecurity across three age groups using stratified, age-specific analysis. This understanding can support global efforts to achieve SDG 6 - universal water access for everyone – through targeted water-related strategies. The number of older people worldwide is increasing, with about 900 million individuals aged 60 and above. This number is expected to reach 2 billion by 2050 (WHO, 2021). By 2050, the elderly population in Sub-Saharan Africa is projected to grow from 43 million to 163 million (WHO, 2015). Therefore, identifying factors driving water insecurity in this age group is crucial.

2. Methods

2.1 Study context, design, and data collection

The research used extensive data on water insecurity, perceptions of inequality, and experiences related to water insecurity across urban Ghana's demographic groups. Data were collected from three specific neighborhoods in Accra known for ongoing water security issues. These neighborhoods include Chorkor, Jamestown, and Korle Gono (GSS; GHS; ICF International, 2015). The sample size in each neighborhood was determined using a probability-proportional-to-population-size methodology (Dickin et al., 2021).

We employed a stratified, multistage, systematic random sampling method for data collection. A random starting point was determined using the EPI random path approach (Milligan et al., 2004). The sampling units consisted of households, as defined by the Ghana Statistical Services (GSS), which are characterized as individuals or groups of related and unrelated individuals living together in the same dwelling(s), with one adult recognized as the head of the household and sharing the same housekeeping arrangements (GSS, 2019). The target sample included 650 households. A total of 627 households participated, yielding a 98% response rate. The study primarily focused on women due to their dominant role in water collection. Eligibility criteria required participants to be the primary water collectors for their families, reside in the study area, and be at least 18 years old. Data was collected via an interviewer-administered questionnaire by research assistants fluent in English and at least two local languages (e.g., Twi, Ga, and Dagbani). The Queen's University General Research Ethics Board (GREB) approved the study's ethics, and verbal informed consent was obtained from all participants prior to the survey.

Measures

The study includes one outcome variable (water insecurity), one primary independent variable (age), and several additional independent variables, including primary water source, education, employment status, gender, and marital status. These variables were examined across three age groups. Details of these variables are provided below.

Water insecurity: Water insecurity was evaluated using the Household Water Insecurity Experiences (HWISE) Scale (Young et al., 2019). The cross-culturally validated HWISE includes twelve items designed to measure uncertainties related to water access and quality (Young et al., 2019). Participants responded to questions about their concerns regarding water insecurity, the safety and reliability of their water source, and their tendencies to conserve or limit water use due to shortages, using a Likert scale from 1 = Never to 5 = Always.

Age: Participants were asked, “How old are you?” The ages were recorded as a continuous variable and then grouped into categories: young (18-29 years), mid-age (30-59 years), and elderly (60 years and older).

Primary water source: Participants were asked to identify their main source of drinking water, referencing typical water sources commonly used by the DHS and Ghana Statistical Service (GSS; GHS; ICF International, 2015; GSS, 2019). Additionally, participants were asked to specify the distance, defined as the time it takes to walk to and from the water source, including waiting time. The data were then used to categorize the water sources as safely managed, basic, limited, and unimproved, according to the JMP WHO/UNICEF water ladder (WHO/UNICEF, 2015).

Additional variables: We included various household demographic factors, such as gender, employment status, marital status, educational attainment, and household size. These additional demographic variables were incorporated because research has demonstrated that they influence water access (Bisung and Elliott, 2017; Kangmennaang et al., 2020; Mushavi et al., 2019; Wutich, 2009).

3. Data Analysis

The statistical analyses were conducted using Stata software (version 18.0). We began with a descriptive analysis of our study sample. Since our outcome variable is binary, we applied binary logistic regression, starting with a bivariate analysis to examine the relationship between water insecurity and age (Table 2). Next, we used multivariate logistic regression to develop three models—each focused on a specific age group. The first model (Model 1) examined predictors of water insecurity among the young population. Model 2 analyzed predictors for individuals in their mid-age years, while the final model (Model 3) explored predictors among older adults. Odds Ratios (OR) are reported, with 95% Confidence Intervals (CI) used to assess statistical significance. We controlled for several independent variables identified in previous research related to water insecurity. Before conducting the analysis, we evaluated the assumptions of logistic regression: (1) categorical dependent variables, (2) independent observations, and (3) absence of outliers. All potential explanatory variables, including confounders, were assessed with univariable analysis. Variables with significance levels of 0.05 or lower in the univariable analysis were included in the multivariate regression model (Model 3). Additionally, Spearman's correlation

was used to assess pairwise correlations among the independent variables, with $|r| > 0.7$ indicating high correlation. The cumulative distribution function of the chi-square test was applied to identify outliers in continuous variables.

3.1 Ethics Statement

This study obtained ethical approval from General Research Ethics Board (GREB), by means of a delegated board review for the project "GSKHS-391-21 Mobilizing coping resources of households for urban water security in Ghana;" TRAQ # 6033248, from Queens University. Informed consent was verbally sought from the respondents prior to the data collection. Privacy and anonymity of the respondents were assured before the data collection. No photo was taken of the participants interviewed. However, the respondents were at will to respond to questions of interest and at will as to exit the interview at any point in time.

4 Results

Table 1: Descriptive statistics of the study participants

Variables	Descriptions	Frequency (%)
Age	Young	371 (59.17)
	Mid-age	172 (27.43)
	elderly	84 (13.39)
Gender	Males	260(41.47%)
	Females	367(58.53)

Type of household	Traditional house	23 (3.67)
	Compound house	330 (52.63)
	Single room	135(21.53)
	Chamber and hall	77(12.28)
	Detached	27(4.31)
	Semi-detached	5(0.80)
	Self-Contained House	23(3.67)
	Apartments	7(1.12)
Number of people in a household	0-10 people	298 (47.5)
	11-20 people	254 (40.5)
	21-30 people	67 (10.7)
	> 30 people	8 (1.3)
Are you the water-related primary decision-maker	Yes	431 (68.74)
	No	196 (31.26)

Religious Affiliation	Muslim	48 (7.66)
	Christian	560 (89.31)
	Traditionalist	19 (3.03)
Employment status	Unemployed	97 (15.47)
	Employed	530 (84.53)
Education	No school	77 (12.28)
	Up to primary	105(16.75)
	Junior High School	196(31.26)
	Senior high school	193 (30.78)
	College/University	56 (8.93)
Marital status	Married	250 (39.87)
	Widowed	47 (7.50)
	Divorced	16 (2.55)
	Separated	56(8.93)

	Never married	258(41.15)
What is your ethnic group	Akan	1 (0.16)
	Ewe	23(3.67)
	Fante	8(1.28)
	Ga	592 (94.42)
	Krobo	1(0.16)
	Nzema	1(0.16)
Primary drinking water source	Piped water in the building	68(10.85)
	Shared piped water close to the house	60 (9.57)
	Public boreholes	10 (1.59)
	Protected dug well	1 (0.16)
	Water from water vendors (water kiosk, hand cart vendors)	4(0.64)
	Water tanker owned by a private individual	9(1.44)

	Bottled water/sachet water	475 (75.76)
State of primary drinking water source	Shared	174 (31.13)
	Private	385(68.87)
Frequency of primary drinking water	Daily	459 (85.79)
	Once a week	3 (5.05)
	2-3 times a week	46 (8.60)
	4-6 times a week	27(0.56)

Table 1 outlines the study participants. Most of the participants (59.17%) fall within the young **(18-29 years)** age category, followed by the mid-age (27.43%) and elderly groups. Females make up 58.53% of the sample, with the remainder being males. Most participants reside in compound houses (52.63%), while the others are distributed among various types of households (see table above). The majority (89.31%) identified as Christians, with the rest being either Muslim (7.66%) or Traditionalist (3.03%). Additionally, most participants reported their employment status as 'employed' (84.53%) and their marital status as 'never married' (41.15%). Primary drinking water sources vary, but most participants indicated bottled water (75.76%) as their main source. The remaining demographic information is presented in Table 1 above.

Table 2: Bivariate analysis of water insecurity and age

Variables		**OR (95% CI)**

Age	Young	1.00
	Mid-age	.85 (.38-.97)*
	Old-age	1.24 (1.02-3.22)*

Table 2 presents water insecurity across various age groups. The results show that individuals aged 30 to 59 (mid-age) are less likely to experience water insecurity than their younger counterparts. Conversely, older residents (60+) are more prone to water insecurity.

Table 3: A multivariate analysis of the determinants of water insecurity across the three age groups.

		Young (18-29yrs)	**Mid-aged (30-59 yrs)**	**Old-age (60yrs+)**
Variables		**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Marital status	Never married	1.00	1.00	1.00
	widowed	.05 (0.14-18.45)	.19 (.02-1.32)	.17 (.02-1.23)
	Divorced/separated	.82 (.07-9.61)	1.09 (.25-4.78)	1.11 (0.25-4.81)
	Married	.05 (.01-.55)**	.29 (.08-1.07)	.31 (.08- (.08-1.12)
Sex	Male	1.00	1.00	1.00
	Female	4.56 (0.54 - 37.99)	2.03 (.55-7.51)	2.21 (.60-8.15)
Primary decision maker?	Yes	1.00	1.00	1.00
	No	1.75 (1.65-18.5)**	1.03 (0.27-3.97)	.92 (.24-1.00)
Religious affiliation	Islam	1.00	1.00	1.00
	Christianity	.83 (.04-14.39	.37 (.08-1.68)	.39 (.08-1.72)

	Traditionalist	2.37 (0.14-39.93)	1.50 (.06-33.62)	1.42 (0.06-31.85)
Employment status	Employed	1.00	1.00	1.00
	Unemployed	.29 (.04-0.92)**	.40 (.12-0.99)*	.39 (.02-.92)**
Level of education	No education	1.00	1.00	1.00
	Up to Primary	4.74 (0.73-16.48)	5.31(3.8-33.69)*	5.75 (1.01-36.34)*
	Junior High School	3.48 (.12-99.21)	1.74 (1.00 - 9.65)*	1.98 (.36-10.81)
	Senior high school	.83 (.01-0.42)**	.86 (.12-5.96)	.96 (.14-6.49)
	College/University	3.28 (0.02-37.60)	.71 (.03-12.95)	.86 (.04-15.75)
Drinking water source	Safely managed water service	1.00	1.00	1.00
	Basic water services	.13 (.01-1.48)	.15 (.03- .64)**	.26 (.00-15.19)
	protected dug well	.43 (.01-11.37)	2.99 (.45-19.70)	.43 (.09- 1.96)
	Limited water services	22.55 (.15-32.11)	.31 (.00-16.44)	.97 (.13-7.07)
	Unimproved water services	2.05 (1.01-6.72)*	1.66(1.07-38.23)*	1.90 (1.11-7.43)**
Distance to water source	Less than 30 minutes away	1.00	1.00	1.00
	More than 30 minutes away	1.81 (1.04–72.83)*	1.20(1.01-9.43)*	4.98 (1.72 - 14.37)**
State of water source	Public	1.00	1.00	1.00
	Private	.42 (.06-0.27)*	.47 (.17-1.29)	.45 (.16- 1.22)

The primary water source for cooking	Private Piped water	1.00	1.00	1.00
	Shared piped water	22.65 (1.67-36.98)	11.41 (2.56-50.76)	10.64 (2.45-46.15)**
	Public boreholes	1.90 (0.06-57.90)	2.79 (0.34-22.61)	2.86 (.35-23.13)
	Protected dug well	16.02 (.43-59.46)	.47 (.10-2.20)	2.70(.41- 17.54)
	Bottled/sachet water	.79 (.10-6.21)	11.63 (8.25-23.41)	10.80 (.77-15.14)
How long have you been without water in the past month?	0-3 times a week	1.00	1.00	1.00
	2-3 times a week	10.63 (0.32-34.85)	.67 (.10-4.49)	.70(.10-1.00)*
	4-6 times a week	2.42 (.05-19.42)	1.27 (1.02-8.06)*	1.90 (0.33-10.88)
Primary water collector	Adult Woman	1.00	1.00	1.00
	Adult man	1.52(.12- 19.14)	1.31 (1.00-6.77)**	1.43 (0.28 - 7.34)
	Girls below 18 years	.42 (.03-0.55)**	–	–
	Boys below 18 years	.51 (.02-11.70)	–	–
Cons.		.54 (.00-7.09)	1.11 (0.02-49.48)	.58 (.01- 22.93)

*Notes: OR = odds ratio; Ref: = Reference Categories; * $p \leq 0.10$, ** $p \leq 0.05$, and *** $p \leq 0.01$; CI = confidence intervals*

Table 3 presents a multivariate analysis of the determinants of water insecurity across the three age groups. The results show shared determinants of water insecurity among the different age groups. One such determinant is employment status; unemployment exacerbates household water insecurity across all three age groups. The unemployed individuals in the younger age group (OR=.29,

95%=.04-0.92), the middle-age group (OR=.40, 95% CI=.12-0.99), and the older age group (OR=.39, 95% CI=.02-.92) are less likely to be water secure compared to their employed peers. Similarly, water sources and distance to water sources are common indicators of water insecurity across the three age groups (see Table 3). Households with unimproved water sources are more likely to experience water insecurity among the young (OR=2.05, 95% CI=1.01-6.72), middle-age (OR=1.66, 95% CI=1.07-38.23), and older adults (OR=1.90, CI=1.11-7.43) groups. Households that travel more than 30 minutes to fetch water for their families are also more likely to be water insecure, which holds true for the young, middle-age, and older populations. Other common determinants include the level of education and sources of drinking water. However, it is important to note that different subgroups within these categories (level of education and source of drinking water) experience varying degrees of water insecurity. Among the young, those with a high school education are less likely to face water insecurity (OR = 0.83, 95% CI = 0.01-0.42) compared to their peers. In the middle-age group, individuals with up to primary education (OR = 5.31, 95% CI = 3.80-7.69) and those with secondary education (OR = 1.74, 95% CI = 1.00 -9.65) are more likely to be water insecure. For the older age group, those with only primary education (OR=5.75, 95% CI=1.01-36.34) have a higher likelihood of being water insecure.

Some factors are specific to different age groups. **Young**: The results indicate that gender significantly affects water insecurity within this age group. Those who are married are less likely to experience water insecurity (OR=.05, 95% CI=.01-.55) compared to their counterparts. Household decision-making status serves as a significant determinant of water insecurity among this age group. Individuals who are non-primary decision-makers in the household are more likely to be water insecure (OR=1.75, 95% CI=1.65-18.5). Households that report private as the condition of their water sources are less likely to face water insecurity (OR=.42, 95% CI=.06-0.27). Households with girls under 18 as their primary water collectors are less likely to be water secure (OR=42, 95% CI=.03-0.55) compared to adult women.

Mid-age: For this age group, households with basic water sources are less likely to experience water insecurity (OR=.15, 95%CI= .03-.64). Those who have been without water flowing in the pipes 4-6 times a week are more likely to be water insecure (OR = 1.27,

95%CI=1.02-8.06). Additionally, compared to an adult woman, having an adult man as the primary water collector contributes to water insecurity within this age group (OR=1.31, 95%CI=1.00-6.77).

Elderly: Among this age group, those who reported their primary water source for cooking as a shared pipe are more likely to experience water insecurity (OR=10.64, 95% CI=2.45-46.15) compared to those with a private water source as their main source for cooking. Similarly, those who have gone without water flowing in the pipes 2-3 times a week are less likely to be water insecure (OR=.70, 95% CI=.10-1.00).

5. Discussion

This study addresses a crucial empirical gap by presenting detailed evidence on how water insecurity varies across different life stages in Ghana, where most existing research treats age as a background variable rather than a primary analytical category. It consolidates the factors affecting water security and insecurity across various age groups: young adults (18–29 years), middle-aged adults (30–59 years), and older adults (60 years and above). The findings reveal that age plays a significant role in shaping an individual's water security status. These results are consistent with existing literature. For example, Duignan et al. (2022) in their assessment of gendered and age-related experiences of water insecurity among First Nation communities in the United States report that perceptions and awareness of water insecurity differ across age groups, both qualitatively and quantitatively. Similar findings were documented by Wutich (2024) among rural Ecuadorian populations. Additionally, most studies (Young et al., 2022; Mushavi et al., 2020; Shah et al., 2020) analyze age as a sociodemographic factor and find it significantly linked to water insecurity, indicating that age-specific water insecurity is a global issue that requires localized solutions. Across all age groups examined, employment status, water sources, distance to water sources, and education level emerged as common determinants of water insecurity. Beyond these shared factors, some determinants are specific to certain age groups.

In the case of young adults (ages 18-29), water insecurity was significantly influenced by respondents' marital status. Being married notably decreased the odds of experiencing water insecurity. This finding reflects entrenched gender norms in Ghanaian society, where married women are more likely to be embedded in extended household networks that coordinate water collection, reducing individual burden and associated insecurity. Although these households might face higher water demands, the lower likelihood of water insecurity could result from shared responsibilities and financial stability among married individuals. Cultural norms that assign women and girls the task of collecting water for household use may also play a role. Our findings further indicate that having primary decision-making authority over water collection is a key factor in water security among young adults. Data shows that young individuals who lack decision-making power, including control over resource allocation for water collection, are at greater risk of water insecurity. This highlights the link between (in) consistent water access and control over financial resources. In a time of water scarcity, insecurity, and commodification, being resourceful and able to control resource allocation decisions could increase the chances of achieving water security. Additionally, the lack of autonomy in water collection decision-making may be connected to financial power. Household heads and women who fund household water collection often hold ultimate decision-making authority. This group is also more likely to experience water insecurity when unemployed. Like other age groups, reliance on unimproved water sources raises the likelihood of water insecurity among young adults (OR = 05, CI: 01 – 72). The findings also show that young adults with access to shared piped water services (OR = 22.65, CI: 67 – 36.98) and protected dug wells (OR = 16.02) are more prone to high levels of water insecurity.

For middle-aged adults (30–59 years), a combination of economic, infrastructure, and gender-related factors influences water (in)security. Like young adults, unemployed middle-aged individuals are highly likely to experience water insecurity (OR = 0.40, CI: 0.12–0.99). This also highlights the link between economic capacity and access to reliable water services. Additionally, limited financial means may restrict access to improved water sources and storage facilities. This emphasizes the systemic nature of water insecurity, where infrastructural gaps and market-driven water systems disproportionately burden those with limited economic mobility. As observed elsewhere, water resellers tend to charge higher prices for improved water than for unimproved water (Dakyaga et al., 2022). Our results also suggest that middle-aged adults with a basic level of education (primary education) (OR = 5.31, CI: 3.8–33.69) and

Junior High School education (OR = 1.74, CI: 1.00–9.65) are more likely to face water insecurity. The water (in)security of middle-aged groups is further influenced by the sources of water used for domestic purposes. The findings indicate that reliance on basic water services increases the likelihood (OR = 0.15, CI: 0.03–0.64) of being water insecure, while dependence on unimproved water sources presents significant risks for middle-aged cohorts. Like young adults, middle-aged individuals who collect water from sources less than 30 minutes away are at a significant risk of water insecurity (OR = 1.20, CI: 1.01–9.43). Furthermore, middle-aged groups who are served water via shared pipes experience high odds (OR = 11.41, CI: 2.56-50.76) of water insecurity. This aligns with findings for young adults served water from shared pipes. Additionally, intermittent water flow is associated with higher water insecurity among middle-aged groups using such sources.

For older adults (60+ years), access to water, employment, education, drinking water sources, and service quality determine water (in)security. Unemployed older adults (OR = 0.39, CI: 0.02 – 0.92) are more likely to experience water insecurity. Similarly, like middle-aged adults, older adults with only primary education have a higher chance (OR = 5.75, CI: 1.01-36.34) of being water insecure. Additionally, distance is identified as the most significant factor influencing water security for older adults. The findings suggest that greater distance to water negatively impacts older adults' ability to carry water for household use. They have higher odds (OR = 4.98, CI: 1.72 – 14.37) of experiencing water insecurity when relying on shared pipes.

6. Conclusion

This study demonstrates that age is a significant and multifaceted determinant of water (in)security in the Ghanaian context. By disaggregating findings across young adults, middle-aged adults, and older adults, the research reveals not only commonalities such as the influence of employment status, water source type, and education level but also age-specific factors that shape individuals' access to and control over water. For young adults, marital status and autonomy in water-related decision-making emerge as key protective factors, suggesting that social integration and financial empowerment play crucial roles in mitigating water insecurity. Among middle-aged adults, economic vulnerability and reliance on shared or unimproved water sources pose significant risks, underscoring the importance

of affordable and reliable water infrastructure. Older adults, meanwhile, are uniquely burdened by physical access challenges, with distance and mobility constraints significantly limiting their ability to secure safe water. These findings highlight the importance of adopting an age-sensitive and intersectional approach to water governance. Addressing water insecurity requires not only infrastructural investment but also a nuanced understanding of how social roles, decision-making power, and economic status evolve over the life course. Policies and interventions that ignore these dynamics risk leaving vulnerable age groups behind in the pursuit of water security for all.

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