

# Knowledge, Attitudes, and Practices in River Sanitation: Perspectives from Riverside-Dwelling Communities in Zamboanga Sibugay, Philippines

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## ABSTRACT

**Background:** Rivers are crucial to ecosystems, providing water for drinking, agriculture, and recreation, but urbanization and industrial activities have severely degraded their quality. This study aims to examine the knowledge, attitudes, and practices (KAP) of riverside-dwelling residents regarding river sanitation, with the goal of identifying key factors influencing their understanding and behaviors related to water quality and environmental health.

**Subjects and Method:** Employing a descriptive-correlational research design, the study involved 120 randomly selected samples from households within 200 meters of the riverbanks situated in Barangay Basalem, Buug, Zamboanga Sibugay. Data were collected over the period from June 2022 to April 2023 using validity- and reliability-tested questionnaires and analyzed through Pearson correlation coefficients. The dependent variable in the study was the sociodemographic characteristics of the respondents, while the independent variables were the respondents' knowledge, attitudes, and practices related to water sanitation.

**Results:** Results showed high levels of knowledge but varied attitudes and practices. Respondents understood the risks of contaminated water but held contradictory beliefs about sanitation practices. Statistical analysis demonstrated a significant correlation between age and both attitudes ( $p= 0.049$ ) and practices ( $p= 0.049$ ) related to river sanitation, highlighting generational differences in river sanitation behaviors.

**Conclusion:** The findings underscore the need for targeted interventions and improved educational programs to address knowledge gaps and promote effective sanitation practices, ultimately aiming to protect both public health and river ecosystems.

**Keywords:** River sanitation, knowledge, attitudes, practices, Philippines

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## BACKGROUND

Rivers are integral components of our ecosystem, serving as vital sources of drinking water, irrigation, transportation, and recreation. Naturally formed clean and uncontaminated, rivers have historically supported human civilization. However, rapid urbanization, industrialization, and human development have introduced numerous pollutants into these water bodies, significantly degrading water quality (Hassan-Rashid et al, 2018). The degradation of river ecosystems is now a pressing global issue, as rivers face multiple threats from human activities, including pollution, deforestation, and climate change.

Recent studies underscore the prevalence of unhygienic practices among communities residing near rivers, where activities such as bathing, washing clothes, and household chores contribute significantly to water contamination (Devgade and Patil, 2023). Furthermore, in many cases, these rivers also serve as informal waste disposal sites, where both organic and inorganic waste materials are discarded, further compounding the pollution problem (Ferronato and Torretta, 2019). Such practices are not isolated incidents but are widespread across various regions, reflecting a broader pattern of neglect and insufficient awareness regarding river sanitation. The lack of proper sanitation facilities, coupled with limited environmental education, perpetuates these behaviors, leading to a continuous cycle of pollution that not only threatens the health of the river ecosystem but also the well-being of the communities dependent on these water sources (Cosgrove and Loucks, 2015).

Global initiatives, such as the Millennium Development Goals (MDGs) and the current Sustainable Development Goals (SDGs), have long emphasized the critical importance of sanitation within the

broader development agenda (Kumar et al., 2016). Although significant progress has been made in improving access to sanitation worldwide, substantial gaps remain, particularly in achieving comprehensive sanitation targets. The SDGs specifically focus on eradicating open defecation, ensuring equitable access to sanitation facilities, and addressing the unique sanitation needs of vulnerable populations, including women and children (Parikh et al., 2021).

In rural settings, rivers often play a central role in daily life. However, without sustainable management, these water bodies become susceptible to pollution (Deletic and Wang, 2019). This issue is particularly acute in rural areas where inadequate sanitation practices contribute to the contamination of rivers. Barangay Basalem, a rural community in Buug, Zamboanga Sibugay, exemplifies this challenge. The barangay, home to a diverse and multicultural population, is situated near the Sibuguey River, which, along with the Balangasan River, has been increasingly polluted. According to a regional report released by the Environmental Management Bureau (2020), both the Sibuguey River and the nearby Balangasan River have exceeded water quality guidelines for fecal coliform, highlighting the presence of contamination and posing serious health risks to the surrounding communities. Additionally, the improper disposal of solid waste has led to the accumulation of refuse in the rivers, exacerbating the pollution and heightening the health risks faced by the local population. The continuous build-up of solid waste creates breeding grounds for harmful pathogens and exacerbates the spread of waterborne diseases, further endangering the health and safety of residents who rely on these rivers for various aspects of daily life (Omang et al., 2021).

Addressing the issue of river sanitation in Barangay Basalem is therefore crucial, not

only for protecting the environment but also for safeguarding the health and well-being of the community. Hence, this study sought to assess the knowledge, attitudes, and practices (KAP) regarding river sanitation among riverside-dwelling residents in Buug, Zamboanga Sibugay, Philippines. The findings from this research aim to provide critical insights for policymakers and health-care providers, enabling them to develop targeted interventions that address existing knowledge gaps and counteract negative attitudes, thereby promoting more effective health outcomes and enhancing environmental stewardship.

## SUBJECTS AND METHOD

### 1. Study Design

This study utilized a descriptive-correlational research design and was conducted in Barangay Basalem, Buug, Zamboanga Sibugay, Philippines, over the period from June 2022 to April 2023.

### 2. Population and Sample

In this study, 120 households from Barangay Basalem, Buug, and Zamboanga Sibugay were selected as participants. To ensure the relevance and accuracy of the data, the selection process adhered to specific inclusion criteria. Respondents were required to meet the following criteria: (1) be located within a 200-meter radius of the riverbanks, (2) be permanent residents for at least the past five years, and (3) engage in direct or indirect activities associated with the river. These criteria were established to focus on residents who are most impacted by the river's environmental conditions and sanitation issues.

### 3. Study Variables

The dependent variable in the study was the sociodemographic characteristics of the respondents, while the independent variables were the respondents' knowledge, attitudes, and practices related to water sanitation.

### 4. Operational Definition of Variables

**Water Sanitation:** Refers to the measures and practices aimed at ensuring that water is clean, safe, and free from contaminants. This includes the treatment, handling, and management of water sources to prevent pollution and maintain public health.

**Knowledge:** Refers to the understanding and awareness that respondents have regarding water sanitation, including the identification of potential contaminants, the importance of maintaining clean water, and the methods for ensuring water quality.

**Attitude:** Refers to the respondents' beliefs, feelings, and dispositions towards water sanitation. This encompasses their perceptions of the importance of proper sanitation practices, their support for community and governmental interventions, and their general approach to maintaining water cleanliness.

**Practices:** Refers to the actual behaviors and actions taken by respondents about water sanitation. This includes specific activities such as proper waste disposal, avoiding contamination of water sources, and adherence to recommended sanitation practices.

### 5. Study Instrument

To collect primary data, a researcher-developed questionnaire was created, with items derived from a comprehensive literature review and input from experts. This questionnaire underwent a thorough review and validation by a panel of specialists who evaluated its relevance and alignment with the research objectives. Based on their detailed feedback, necessary revisions were made to ensure the tool's effectiveness. Following this validation process, the Content Validity Ratio (CVR) analysis was performed. Items were categorized according to their CVR scores: those scoring between 0.7 and 0.9 were retained, scores from 0.6 to 0.5 were revised, and items with scores from 0.4

to 0.1 were excluded. To further ensure the reliability of the instrument, a pilot test was conducted, resulting in a Cronbach's Alpha coefficient of 0.90. This high value indicates strong internal consistency among responses to the Likert-type questions, affirming the questionnaire's reliability as a research tool.

## 6. Data Analysis

The data were analyzed using statistical methods, with descriptive statistics applied to summarize the findings. Frequencies and percentages were calculated for socio-demographic variables, while means and standard deviations were computed for quantitative variables. To explore relationships among quantitative variables, Pearson correlation analysis was performed. Statistical significance was considered at  $p \leq 0.05$ , and a critical value of 2.000 was applied to assess the significance of correlations. The responses were systematically organized and analyzed using Statistical Package for Social Sciences (SPSS) version 20.

## 7. Research Ethics

Approval for the study was obtained from the MSU Buug Nursing Department Ethics Committee, with ethical clearance granted under reference number NDEC-2022-21 on November 15, 2022. Following ethical standards, informed consent was secured from all participants during recruitment. The study adhered to strict principles of

confidentiality and anonymity; all documents and transcripts were coded and restricted to access by the research investigators only.

## RESULTS

This section presents the data in tabular form, organized as follows: first, the frequency and percentage distribution of the respondents' demographic profiles; second, the descriptive statistics detailing the respondents' levels of knowledge, attitudes, and practices; and third, the correlation analysis between demographic profiles and the respondents' knowledge, attitudes, and practices regarding river sanitation.

Table 1 presents the sociodemographic profile of the respondents revealing that the largest age group is 41 years old and above, comprising 42.50% of the sample. Regarding sex, females make up the majority at 64.17%, compared to 35.83% males. Regarding educational attainment, the highest percentage of respondents are elementary level (23.33%) and high school graduates (25.83%). The majority of respondents are unemployed, representing 67.50% of the sample, while self-employed individuals constitute 21.67% and employed individuals make up 10.83%.

**Table 1. Frequency distribution of the studied sample according to their socio-demographic characteristics (n = 120)**

Variables	Category	Frequency (n)	Percentage (%)
<b>Age Group (years old)</b>	18 to 23	27	22.50
	24 to 29	12	10.00
	30 to 35	11	9.17
	36 to 40	19	15.83
	<41	51	42.50
<b>Sex</b>	Male	43	35.83
	Female	77	64.167
<b>Highest Educational Attainment</b>	Elementary Level	28	23.33
	Elementary Graduate	5	4.17
	High School Level	25	20.83

Variables	Category	Frequency (n)	Percentage (%)
<b>Employment Status</b>	High School Graduate	31	25.83
	College Level	2	1.67
	College Graduate	23	19.17
	Post Graduate	5	4.17
	Vocational Degree	1	0.83
	Employed	13	10.83
	Self-employed	26	21.67
	Unemployed	81	67.50

Table 2 illustrates that the respondents demonstrated a high level of knowledge across most of the ten questions, with correct response rates ranging from 90.83% to 96.67%. However, there was a notable exception with item No. 6, which stated that "Water from the river can be used for household chores" Only 49.17% of respon-

dents answered this question correctly. This indicates a significant gap in understanding, as using river water for household chores is generally considered appropriate under certain conditions. Additionally, item No. 10 had a notably low correct response rate of 25.00%, suggesting a widespread misconception or lack of awareness.

**Table 2. Descriptive statistics of the respondent's level of knowledge about river sanitation (n = 120)**

Knowledge of River Sanitation	No. of Respondents Getting the Right Answer	Number of Respondents Getting the Wrong Answer	% of Respondents Getting the Right Answer
Diarrheal diseases from unsafe water	116	4	96.67
Potential for river water contamination	109	11	90.83
Disease transmission via animal dung	111	9	92.50
Health impact of waste disposal	114	6	95.00
Health risks from poor sanitation	115	5	95.83
Household use of river water	59	61	49.17
Illnesses from drinking river water	114	6	95.00
Pollutants in river water	113	7	94.16
Health risks from swimming in polluted water	112	8	93.33
Safety concerns of consuming river fish and vegetables	36	84	25.00

Table 3 summarizes the respondents' attitudes toward river sanitation. The data highlights that respondents consistently hold positive attitudes regarding several aspects of river sanitation. Specifically, they strongly agree that it is important to use river water safely for household purposes (Mean= 3.91) and recognize the impact of participating in clean-up drives (Mean= 3.48), enforcing effective governance (Mean= 3.64), implementing low-cost sanitation systems

(Mean= 3.73), and developing government programs (Mean= 3.73). These attitudes are interpreted as "always" according to the scale. Conversely, attitudes toward disposing of waste in the river and using river water for bathing or washing clothes are less favorable, with means of 1.83 and 1.38, respectively, indicating "oftentimes" and "never" acceptance. Overall, the grand mean of 2.61 reflects that respondents generally hold an "oftentimes" positive attitude



toward river sanitation, suggesting areas of improvement in their practices and beliefs.

**Table 3. Descriptive statistics of the respondents’ attitude toward river sanitation (n=120)**

Attitudes toward River Sanitation	Mean	SD	Interpretation
Waste disposal behavior	1.83	0.71	Oftentimes
Defecation practices	3.75	0.58	Always
Bathing and washing habits	1.38	0.65	Always
Household water use	3.91	0.39	Always
Participation in clean-up drives	3.48	0.68	Always
Community education on river care	1.37	0.62	Never
Compliance with Local Government Unit (LGU) guidelines	1.82	0.74	Oftentimes
Governance of river sanitation	3.64	0.59	Always
Implementation of sanitation systems	3.72	0.53	Always
Government support for sanitation systems	3.72	0.57	Always
<b>Grand Mean</b>	<b>2.61</b>	<b>0.61</b>	<b>Oftentimes</b>

Scale: 2.31 – 3.00- “Always”; 1.61 – 2.30- “Oftentimes”; 1.00 – 1.60- “Never”

Table 4 provides a summary of respondents' practices related to river sanitation. The data reveals that the majority of respondents "never" engage in activities that include drinking river water (mean = 1.10), using it for farming and livestock (mean = 1.53), and bathing daily (mean = 1.24). These practices indicate a general avoidance of potentially harmful activities. However, some respondents reported regularly throwing garbage

into the river (mean = 1.83) and occasionally restricting children from using the river as a playground (mean = 1.82). The grand mean of 1.41 signifies that overall, respondents predominantly engage in practices deemed as "never," reflecting a cautious approach towards river use but highlighting areas where improved sanitation practices are needed.

**Table 4. Descriptive statistics of the respondents’ practices on river sanitation (n= 120)**

Practices toward River Sanitation	Mean	Std. Deviation	Interpretation
Garbage disposal in river	1.83	0.71	Oftentimes
Defecation in river	1.25	0.58	Never
Usage of river water for cleaning	1.38	0.65	Never
Usage of river water for drinking	1.10	0.39	Never
River water for farming/livestock	1.53	0.68	Never
Consumption of river-grown vegetables	1.37	0.62	Never
Limiting children's use of river	1.81	0.74	Oftentimes
Consumption of river fish	1.32	0.59	Never
Bathing in river	1.24	0.53	Never
Laundry in river	1.25	0.57	Never
<b>Grand Mean</b>	<b>1.41</b>	<b>0.61</b>	<b>Never</b>

Scale: 2.31 – 3.00- “Always” 1.61 – 2.30- “Oftentimes” 1.00 – 1.60- “Never”

Table 5 highlights the relationships between sociodemographic factors and respondents knowledge, attitudes, and practices related to river sanitation. The analysis indicates that age showed a significant negative correlation with both

attitudes (Spearman's rho= -0.18, p= 0.049) and practices (Spearman's rho= -0.18, p= 0.049), suggesting that age plays a significant role in shaping attitudes and practices related to river sanitation.

**Table 5. Relationship between sociodemographic profiles to the Knowledge, Attitudes, and Practices of the respondents on river sanitation**

Variables	Age	Sex	Educational Attainment	Employment
<b>Knowledge</b>	-0.09	0.16	0.03	-0.08
	0.303	0.075	0.741	0.360
<b>Attitude</b>	-0.18	0.15	0.02	0.01
	0.049	0.083	0.812	0.868
<b>Practice</b>	-0.18	0.15	0.02	0.01
	0.049	0.083	0.812	0.868

**DISCUSSION**

**1. Socio-demographic Characteristics**

The data reveals that the majority of respondents are females aged 41 years and above indicating a mature population with potentially long-standing interactions with local river systems. The older age group likely has well-established attitudes and practices concerning river sanitation, shaped by their extensive experience with the river. Over time, anthropogenic activities like waste disposal, bathing, and laundry have increasingly been seen to contribute to the degradation of river water quality (Sanchez et al., 2022). Additionally, given that women are typically more involved in daily water-related chores, their perspectives on water quality and sanitation practices are especially influential. In the Filipino context, women often take on domestic responsibilities and are usually home-based (Gallego and Abdullah, 2021), which further amplifies their role in shaping these practices.

Consequently, the majority of respondents are either at the elementary level or high school graduates, and are unemployed. The educational profile indicates a generally lower level of formal education among respondents. This could influence their

knowledge about sanitation and affect their ability to engage with or implement more advanced sanitation practices (Ahmed et al., 2020; Chowdhury et al., 2020). Low education has been found to correlate with less awareness of the health impacts of poor river sanitation (Ukata and Bisong, 2015). On the other hand, high unemployment rates suggest economic challenges within the community, which could impact their resources and ability to engage in proper sanitation practices (Oskam et al., 2021). Unemployed individuals might have less access to resources or support systems necessary for maintaining river sanitation, potentially affecting their practices and attitudes toward river cleanliness.

**2. Knowledge about River Sanitation**

Table 2 reveals that respondents generally demonstrated a high level of knowledge about river sanitation, with correct response rates for most of the ten knowledge questions. These results suggest that the respondents are well-informed about river sanitation, likely due to effective community education efforts or personal experience with the adverse effects of poor sanitation. Understanding the relationship between people and their environment is essential, as

it directly informs and enhances mitigation efforts by gauging public support for environmental programs (Arif et al., 2022). This knowledge is particularly vital for maintaining clean water sources, which are crucial for public health and environmental sustainability.

In essence, environmental knowledge and awareness have a significant relationship with sanitation (Ukata and Bisong, 2015). It plays a crucial role in shaping people's attitudes and behaviors toward sanitation. When individuals are aware of the importance of a clean environment and understand the consequences of poor sanitation, they are more likely to engage in practices that promote hygiene and protect natural resources. This awareness fosters a sense of responsibility and urgency, motivating communities to take proactive steps in maintaining their surroundings (Erhabor and Don, 2016). For instance, when people understand how improper waste disposal can lead to water pollution, they are more likely to adopt proper waste management practices. Similarly, awareness of the health risks associated with unsanitary conditions can drive individuals to prioritize cleanliness in their households and communities (Debrah et al., 2021). This connection between awareness and action highlights the importance of education and information dissemination in environmental programs.

### **3. Attitudes towards River Sanitation**

The respondents generally exhibit positive attitudes toward maintaining river cleanliness, as indicated by high mean scores on statements like “I believe participating in river clean-up drives significantly improves water quality” (Mean = 3.483) and “I believe the government should develop programs to support sustainable river sanitation” (Mean = 3.725). These responses underscore the critical need for reinforcing the right attitude towards community involvement and

government intervention in river sanitation. Scholars in environmental education emphasize the importance of shifting attitudes to cultivate a lasting environmental ethic and discipline among citizens (Ukata and Bisong, 2015). For sustainable environmental progress, it is crucial that individuals modify their perceptions, attitudes, habits, values, and beliefs to embrace a more environmentally conscious lifestyle.

Despite the positive attitudes towards some sanitation practices, there are contradictory perceptions among the respondents. For example, the statement “I feel that defecating in the water won't harm the river” received a high mean score of 3.750, indicating a significant number of respondents may underestimate the negative impact of such behavior on river health. To date, the practice of dumping human waste into rivers persists in the Philippines due to the absence of toilets with septic tanks and insufficient sewage systems (Domingo and Manejar, 2021). This context may explain why respondents believe that dumping waste into rivers will not cause harm, as they lack alternative sanitation options and may not fully understand the environmental impact of their actions. Without adequate sanitation infrastructure, respondents might resort to using river water out of necessity, overlooking the associated risks (Shayamunda, 2024). This highlights the need for enhanced community education on the importance of proper sanitation practices to safeguard public health.

### **4. Practices on River Sanitation**

The results from Table 4 indicate a generally cautious approach among respondents regarding river practices, with most respondents avoiding high-risk behaviors such as drinking untreated river water, defecating in the river, and using it for cooking or cleaning. This behavior could reflect an awareness of the potential health risks or a



lack of resources that make such practices untenable. As river waters are increasingly compromised by growing human populations, urban development, and economic activities—factors that contribute to consequent water quality degradation—people are becoming more aware of the risks associated with consuming contaminated water (Mustapha et al., 2013; Sanchez et al., 2022). This heightened awareness underscores the need for improved water management and sanitation infrastructure to address both the practical and perceptual barriers to safe river use.

### **5. Correlation between Age and Attitude-Practice on River Sanitation**

The significant correlation between age and both attitudes and practices highlights a generational difference in perceptions and behaviors related to river sanitation. Older respondents may have more entrenched practices or less awareness of the current environmental and health risks associated with river sanitation, possibly due to longstanding habits or limited exposure to newer sanitation practices and information. For example, Kalumbi et al. (2020) documented a cultural belief in a community, where a young girl, upon finding a frog in a well bucket, returned it to the well, believing it would increase the water supply. This reflects traditional water-handling practices that persist despite health risks. Similarly, the researchers also noted that another community believed that lake water farther from the shore was safe, even though fishermen defecate in the lake at night, which could contaminate it. These misconceptions, passed down through generations, continue to shape water use practices despite the known risks.

### **AUTHOR CONTRIBUTION**

The study was conceptualized and the data were collected by Hassan I. Esmael, Kreslie Mae A. Duldulao, Rosalino O. Delosa, and Jopeter B. Dela Paz. Randy Ian F. Gallego provided oversight as the study's supervisor, playing a key role in data analysis, interpretation, and drafting of the manuscript.

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### **CONFLICT OF INTEREST**

The authors declare that they have no conflicts of interest associated with this study.

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