Water Sanitation, Hygiene Practices, and Morbidity Status in a Community-Based Study in Pokhara, Nepal

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Abstract- **Access to clean water, proper sanitation, and hygiene (WASH) are critical for public health, yet many communities in developing countries still face significant challenges. This study examines the status of water sanitation, hygiene practices, and related health outcomes in the semi-urban area of Lamachour, Pokhara, Nepal. Using a mixed-methods approach, data were collected from 100 households through structured surveys, direct observation, and focus group discussions. The findings reveal that 35% of households have access to piped water, while the rest rely on less reliable sources such as wells and rivers, many of which are contaminated. Sanitation facilities are inadequate for 42% of households, with a significant portion still practicing open defecation. Handwashing with soap is not consistently practiced, contributing to the high prevalence of waterborne diseases like diarrhea and typhoid, especially during the monsoon season. Socioeconomic factors such as education and income levels significantly influence WASH practices and health outcomes. The study concludes that improving WASH infrastructure and community awareness is essential for reducing the burden of preventable diseases in Pokhara. Targeted interventions, including community-based health education and enhanced water and sanitation infrastructure, are recommended to improve public health outcomes in the region.**

Keywords: **Water Sanitation, Hygiene, Morbidity, Public Health, WASH, Pokhara, Nepal**

I. INTRODUCTION

Access to clean water, adequate sanitation, and proper hygiene (WASH) are fundamental human rights and essential components of public health. However, despite global efforts to improve these services, millions of people worldwide still lack access to safe drinking water and adequate sanitation. The World Health Organization (WHO) estimates that 2.2 billion people do not have safely managed drinking water, and around 4.2 billion people lack safely managed sanitation services. Inadequate WASH practices are directly linked to the transmission of diseases such as diarrhea, cholera, typhoid, and dysentery, which account for significant morbidity and mortality, particularly in low and middle-income countries.

In Nepal, a country characterized by its diverse geography and socio-economic conditions, WASH challenges remain significant. Despite being water-abundant, Nepal faces obstacles in providing reliable and safe water supply due to infrastructural, financial, and environmental barriers. Rapid urbanization and population growth have further exacerbated these issues, particularly in urban and semi-urban areas such as Pokhara, where access to basic services can be inconsistent. National reports indicate that while strides have been made in eliminating open defecation, disparities in access to clean water and improved sanitation persist, particularly in informal settlements and marginalized communities.

Pokhara, the third-largest city in Nepal and a key tourist destination, experiences significant challenges in managing water supply and sanitation services. The city's semi-urban areas, like Lamachour, face issues related to water quality, inconsistent access to water, inadequate sanitation facilities, and low awareness of hygiene practices. These issues are further complicated by socio-economic factors such as income disparity, education level, and cultural practices that affect community engagement in WASH initiatives.

Previous studies in Nepal have primarily focused on rural WASH challenges or broader national-level assessments. However, there is a critical need for localized research that examines specific community-level practices and health outcomes. Understanding the current state of WASH services in Pokhara, particularly in semi-urban settings, can provide insights into the health risks associated with inadequate water, sanitation, and hygiene practices, guiding future interventions.

This study aims to assess water sanitation, hygiene practices, and their associated health impacts in the semi-urban area of Lamachour, Pokhara. By

employing a mixed-methods approach, this research seeks to provide a comprehensive view of WASH-related issues in the community, identifying key factors influencing health outcomes and offering practical recommendations for policy and program improvements.

II. LITERATURE REVIEW

Global and Regional WASH Challenges

The importance of water, sanitation, and hygiene (WASH) in public health is well-documented, with poor WASH practices being major contributors to the global burden of disease. The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) report that approximately 2.2 billion people worldwide still lack access to safely managed drinking water, and 4.2 billion do not have access to safely managed sanitation. These gaps are particularly acute in low- and middle-income countries, where inadequate infrastructure, rapid urbanization, and socio-economic disparities contribute to a high prevalence of waterborne and sanitation-related diseases, such as diarrhea, cholera, and typhoid.

Diarrheal diseases, for instance, remain one of the leading causes of mortality among children under five, with around 500,000 deaths annually attributed to unsafe water and poor sanitation. Research suggests that improvements in WASH could reduce diarrheal morbidity by up to 60% and child mortality by approximately 25%. Furthermore, hygiene practices, such as regular handwashing with soap, have been shown to reduce the risk of respiratory and gastrointestinal infections significantly. Despite global efforts to achieve Sustainable Development Goal 6, which targets universal access to clean water and sanitation by 2030, many developing regions, including South Asia, continue to struggle with inadequate WASH services.

WASH in Nepal: Progress and Persistent Challenges

Nepal has made considerable progress in WASH over the past two decades, driven by various government initiatives, including the Sanitation and Hygiene Master Plan (2011) and the National Rural Water Supply and Sanitation Policy (2004). The country successfully declared itself open defecation-free in 2019, a significant achievement given the previous prevalence of this practice. However, despite these advancements, disparities in WASH access persist across different regions and communities.

Studies indicate that while 87% of Nepal's population has access to basic water supply, only around 25% of water sources are considered fully functional year-round. In rural and semi-urban areas, where infrastructure is often inadequate, people still rely on rivers, wells, and rainwater, which may be contaminated. Sanitation coverage also varies significantly, with urban areas generally better served than rural ones. The challenges are more pronounced in low-income settlements, where households often share limited sanitation facilities, and water quality is compromised due to poor waste management practices.

The WASH Situation in Pokhara

Pokhara, a rapidly growing city in Nepal, faces unique challenges regarding water supply, sanitation, and hygiene. The city's semi-urban areas, such as Lamachour, are characterized by a mix of traditional and modern lifestyles, creating disparities in access to basic services. Previous studies have noted that while Pokhara's urban center has relatively better WASH infrastructure, the outskirts and semi-urban communities often face unreliable water supply, poor sanitation facilities, and limited awareness of hygiene practices. Seasonal variations, especially during the monsoon, exacerbate these challenges by increasing the risk of water contamination and the spread of waterborne diseases.

Research in similar urban and semi-urban areas of Nepal has shown that socio-economic factors, including income, education, and caste, significantly influence access to and use of WASH services. Households with higher income and education levels are more likely to have access to piped water and improved sanitation, while marginalized communities often face systemic barriers. In Pokhara, rapid urbanization has placed additional pressure on existing water supply systems, leading to frequent shortages and quality issues.

Linking WASH Practices to Health Outcomes

The link between inadequate WASH services and poor health outcomes is well-established, with waterborne diseases being a direct consequence of contaminated water and poor sanitation. A study conducted by Wolf et al. (2020) demonstrated that interventions aimed at improving WASH infrastructure significantly reduce the incidence of diarrheal diseases, respiratory infections, and skin conditions. The risk of infection is particularly high

in settings where multiple households share sanitation facilities or where open defecation is practiced.

In the context of Nepal, the prevalence of diseases such as typhoid, dysentery, and skin infections is closely associated with inadequate WASH practices. The Nepal Demographic and Health Survey (NDHS) has consistently reported higher morbidity rates in communities lacking access to clean water and sanitation. Additionally, socio-cultural practices, including the use of traditional water sources and limited hygiene education, further contribute to the persistence of waterborne diseases.

Gaps in Existing Research

While there is extensive research on WASH in Nepal, most studies focus on rural settings or provide broad national overviews. There is a scarcity of research that specifically examines community-level practices and their direct health impacts in urban and semi-urban contexts like Pokhara. Moreover, the influence of socio-economic factors on WASH behaviors and health outcomes in these settings is not fully understood. This study aims to address these gaps by providing a detailed assessment of WASH practices and related morbidity in a semi-urban community in Pokhara, offering insights that can guide targeted interventions and policy-making.

III. MATERIAL AND METHODS

Study Design

This study employed a mixed-methods approach, combining quantitative and qualitative research methods to comprehensively assess water sanitation, hygiene practices, and associated health outcomes in a semi-urban community. The quantitative component involved structured household surveys, while the qualitative component included focus group discussions and in-depth interviews to explore community perceptions and contextual factors influencing WASH behaviors.

Study Area

The research was conducted in Lamachour, a semi-urban area within Pokhara, Nepal. Lamachour was selected for its diverse population and socio-economic characteristics, which reflect the broader challenges faced in semi-urban settings across the country. The community experiences seasonal variations in water availability and quality, particularly during the monsoon season, which increases the risk of waterborne diseases. Lamachour's demographic profile includes a mix of different castes, income levels, and educational backgrounds, providing a representative sample for studying WASH-related issues.

Sampling Method

A simple random sampling technique was used to select households for the survey. The sample size was calculated using a 95% confidence level and a 5% margin of error, resulting in a target of 100 households. This sample size was chosen to ensure representativeness and statistical validity while considering logistical and resource constraints. Households were randomly selected from a list of residences provided by local authorities, and heads of households were interviewed. If the head of the household was unavailable, another responsible adult aged 18-60 was interviewed.

Data Collection Tools and Techniques

Data collection was carried out from May to July 2024, using multiple tools to ensure a comprehensive understanding of WASH practices and health outcomes: Structured Household Survey: A survey questionnaire was developed, consisting of both closed and open-ended questions. The questionnaire covered topics such as water source and quality, sanitation facilities, hygiene practices (e.g., handwashing), and self-reported health issues within the past six months. Focus Group Discussions (FGDs): FGDs were conducted with community members to gain insights into their perceptions of water and sanitation issues, hygiene behaviors, and cultural beliefs. Each discussion group consisted of 8-10 participants, and separate sessions were held for men and women to encourage open dialogue. In-Depth Interviews:Key informant interviews were conducted with local leaders, health workers, and NGO representatives to gather expert opinions on WASH-related challenges and ongoing initiatives in the community. Direct Observations:Observations were made of the condition of water sources, sanitation facilities, and hygiene behaviors during field visits. This included assessing the cleanliness of toilet facilities and the availability of handwashing materials.

Data Management and Analysis

Data from the household surveys were entered into SPSS software for quantitative analysis. Descriptive

statistics such as frequencies and percentages were used to summarize the data. Cross-tabulations were performed to explore relationships between socio-demographic factors and WASH practices. For qualitative data, thematic analysis was conducted using transcripts from FGDs and interviews. Coding was used to identify recurring themes related to community perceptions, barriers to WASH practices, and suggested improvements.

IV. RESULTS

Socio-Demographic Profile of Respondents

The study included 100 households in Lamachour, Pokhara. The participants comprised 48% males and 52% females, with ages ranging from 18 to 60 years. Approximately 60% of respondents had completed primary education, while 25% had secondary education, and 15% had no formal education. The majority of households (65%) had a monthly income below the local average, indicating economic constraints that could affect access to WASH services.

Table-1: Socio-Demographic Profile of Respondents in the study area

Characteristics	Response	Frequency (N=100)	Percentage (%)
Gender	Male	38	38%
	Female	62	62%
Education	Illiterate	12	12%
	primary school	10	10%
	middle school	34	34%
	under matriculation	14	14%
	matriculation or above	28	28%
Religion	Hindu	88	88%
	Muslim	4	4%
	Christian	4	4%
	others	4	4%
Social identity	scheduled castes	8	8%
	others backward classes	32	32%
	general categories	60	60%
Marital Status	married	68	68%
	unmarried	24	24%
	widowed	6	6%
	others	2	2%
Male member in family	One -three	72	72%
	Four -six	24	24%
	More than six	2	2%
Female member in family	One -three	84	84%
	Three-five	12	12%
	More than six	4	4%

Access of Water Supply Facilities

The availability and quality of water in the community varied significantly: Access to Water Sources: Only 35% of households reported having access to piped water, while 50% relied on wells, and 15% used rivers or streams as their primary water sources. The piped water supply was not consistent, with only 20% of households having access to water on a daily basis. Water Treatment Practices: Approximately 45% of households treated their water before consumption, with boiling being the most common method (70%), followed by filtering (20%) and chlorination (10%). The remaining 55% did not engage in any form of water treatment. Water Contamination: Testing of water samples from wells and rivers indicated contamination with E. coli, suggesting that a significant portion of the water sources were unsafe for drinking.

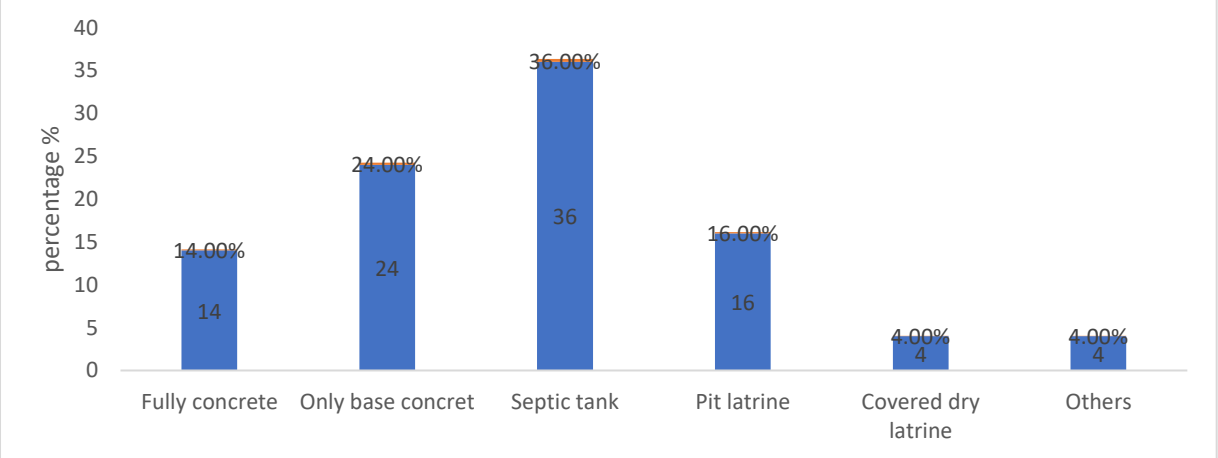
Table-2: Source of water supply, treatment and distance of water supply in the study area

Source of water supply		N	%
	Piped Water	82	82.00
	Dug, well, covered well	11	11.00
	Spring water	1	1.00
	Rainwater collection, surface water river	6	6.00
Water treatment method	Boil	20	20.00
	Add blench, chlorine	44	44.00
	Strain through cloth	8	8.00
	Sollar distillation, filter	24	24.00
Travelling time	Within 15 min	40	40.00
	15 min to 30 min	16	16.00
	30 min to 45 min	16	16.00
	60 min & above	18	18.00
Satisfaction level for water quality	Yes	76	76.00%
	No	24	24.00%

Types of toilet facilities available in the study area

About 58% of households used improved sanitation facilities, such as flush toilets or ventilated pit latrines. The remaining 42% relied on unimproved facilities, with 20% practicing open defecation. Shared Facilities: Nearly 30% of the households with access to toilets shared the facilities with two or more families, leading to hygiene and maintenance challenges.

Figure-1: Types of toilet facilities available in the study area



Hygienic Conditions: Observations revealed that 40% of the toilets were poorly maintained, with evidence of dirt, odors, and lack of water for flushing. Hygiene Practices Hygiene behaviors, particularly handwashing, were found to be suboptimal: Handwashing Frequency: Only 30% of respondents reported always washing their hands with soap after using the toilet, while 45% did so sometimes, and 25% rarely or never practiced it. Availability of Hygiene Products: Access to soap was limited, with 35% of households lacking soap near their sanitation facilities. Hand sanitizers were virtually absent in all surveyed households. Personal Hygiene Practices: Bathing frequency varied, with 60% of respondents bathing daily, while 30% bathed 2-3 times per week, and 10% bathed less frequently. Oral hygiene practices were also inconsistent, with only 50% using toothpaste regularly.

Community Perceptions of WASH Practices

The qualitative data from focus group discussions and in-depth interviews provided insights into the community's understanding of WASH-related issues: Awareness: While most participants were aware of the importance of clean water and proper sanitation, there were misconceptions about water treatment

methods, with some believing that clear water was always safe to drink. Barriers to Improved WASH Practices: The main barriers identified were financial constraints, lack of infrastructure, and inadequate knowledge about effective hygiene practices. The cost of water treatment, such as purchasing filters or disinfectants, was seen as prohibitive for low-income households. Attitudes Toward Hygiene: Cultural practices and beliefs played a role in shaping hygiene behaviors. For instance, handwashing with soap was sometimes seen as unnecessary if hands appeared clean. Moreover, open defecation was more common in areas where toilet facilities were shared or considered unhygienic.

Table-3 Hand washing and Hygiene practices.

Characteristic	response	frequency	Percentage%
Frequency of washing hands	1 to 2 times	20	20.00%
	2 to 3 times	42	42.00%
	4 times and above	38	38.00%
How do you wash hands	Soap	64	64.00%
	Ash	4	4.00%
	Water only	20	20.00%
	soap and water	8	8.00%
Access to soap	Yes	72	72.00%
	No	28	28.00%
Any cultural barriers	Yes	84	84.00%
	No	6	6.00%
	Don’t Know	10	10.00%
Drainage System	Yes	46	46.00%
	No	54	54.00%

Morbidity Patterns Related to Waterborne Diseases
The study revealed a high prevalence of waterborne diseases in the community:Diarrhea: Approximately 60% of households reported at least one case of diarrhea in the past six months, with higher incidence during the monsoon season. Typhoid: 15% of households had experienced cases of typhoid, often requiring medical treatment. Skin Infections: About 25% of respondents reported skin conditions such as rashes, attributed to the use of contaminated water for bathing. Seasonal Variation: The frequency of waterborne illnesses was higher during the monsoon season (June-August), with reported cases of diarrhea increasing by 30% compared to other times of the year.

V. DISCUSSION, CONCLUSION AND POLICY RECOMMENDATIONS

Poor sanitation facilities lead to significant health and economic issues in the community by contaminating water sources and promoting disease spread, particularly gastrointestinal infections. This results in a cycle of illness that affects long-term health and economic stability. Health Impact: Inadequate access to clean water correlates with increased rates of waterborne diseases like diarrhea and cholera. Economic Impact: Time spent securing clean water and medical costs from waterborne diseases contribute to economic hardship. Cultural barriers, such as untouchability and menstruation taboos, prevent marginalized groups, especially women, from practicing good hygiene, increasing their health risks. Discriminatory practices further entrench social inequalities and hinder community efforts to improve water, sanitation, and hygiene (WASH) practices.

The challenges related to water sanitation in the community are deeply interconnected, emphasizing the urgent need for systemic improvements in infrastructure to enhance public health and alleviate the burden on affected households. Key issues include contaminated water sources, inadequate sanitation facilities, poor hygiene practices, and cultural barriers such as untouchability and menstruation taboos. These factors contribute to a high prevalence of waterborne diseases, especially among vulnerable populations like children, leading to severe health impacts and economic instability. Households face significant financial burdens due to illness, with medical expenses ranging from 2,000 to

10,000 rupees, compounded by wage losses and decreased productivity. This cycle of illness and economic hardship disproportionately affects families with unstable incomes, leading to increased vulnerability.

To address these challenges, the following policy recommendations are proposed: Infrastructure Development: Improve local water supply systems to ensure a consistent and safe water source, reducing reliance on unreliable taps or distant sources. Community Education: Implement programs to raise awareness about safe water storage, sanitation practices, and the detrimental effects of caste-based discrimination and menstruation taboos. Alternative Water Sources: Promote community-based solutions like rainwater harvesting to enhance water availability, especially during dry seasons. Local Government Interventions: Establish regular monitoring and responsiveness to community concerns regarding water quality and reliability.

Inclusive Sanitation Facilities: Design shared and accessible sanitation facilities that ensure privacy and dignity, particularly for women during menstruation. Empowerment Initiatives: Strengthen lower-caste communities through education and social programs to reduce the impact of caste-based practices and promote equitable access to hygiene resources. Community Health Education: Focus on safe water storage and sanitation and provide access to affordable water treatment options to mitigate waterborne disease risks. Strengthening Public Healthcare: Enhance the quality and accessibility of public healthcare facilities to reduce reliance on costly private healthcare. Financial Support Programs: Introduce micro-loans or community health insurance schemes to help families manage medical expenses and prevent financial crises.

REFERENCES

[1]. Budhathoki CB. Water supply, sanitation and hygiene situation in Nepal: a review. Journal of Health Promotion. 2019 Sep 8; 7:65-76.

[2]. Bhandari P, Bak J, Lee KS, Chon Y, Bhattachan A, Rimal P, Shrestha BR, Bhandari B, Moon JO, Wu N, Chu WS. Assessment of socio-demographic factors, mother and child health status, water, sanitation, and hygienic conditions existing in a hilly rural village of Nepal. International journal of environmental research and public health. 2019 Oct;16(20):3965.

[3]. Ghimire PR, Agho KE, Ezeh OK, Renzaho AM, Dibley M, Raynes-Greenow C. Under-five mortality and associated factors: evidence from the Nepal demographic and health survey (2001–2016). International journal of environmental research and public health. 2019 Apr;16(7):1241.

[4]. Dhital SR, Chojenta C, Evans TJ, Acharya TD, Loxton D. Prevalence and correlates of Water, Sanitation, and Hygiene (WASH) and spatial distribution of unimproved WASH in Nepal. International journal of environmental research and public health. 2022 Mar 16;19(6):3507.

[5]. Gautam MS, Georgeou N, Phillips M, Pyakurel U, Wali N. Women and WASH in Nepal: Key issues and challenges.

[6]. Budhathoki SS, Bhattachan M, Yadav AK, Upadhyaya P, Pokharel PK. Eco-social and behavioural determinants of diarrhoea in under-five children of Nepal: a framework analysis of the existing literature. Tropical medicine and health. 2016 Dec;44:1-7.

[7]. Li R, Lai Y, Feng C, Dev R, Wang Y, Hao Y. Diarrhea in under five-year-old children in Nepal: a spatiotemporal analysis based on demographic and health survey data. International journal of environmental research and public health. 2020 Mar;17(6):2140.

[8]. Dhital SR. *Household Water, Sanitation and Hygiene and Their Effects on Child Health in Nepal* (Doctoral dissertation, The University of Newcastle).

[9]. Shrestha A, Bhattarai TN, Acharya G, Timalsina H, Marks SJ, Uprety S, Paudel SR. Water, sanitation, and hygiene of Nepal: Status, challe.nges, and opportunities. ACS ES&T Water. 2023 Jan 30;3(6):1429-53.

[10]. Shrestha A, Sharma S, Gerold J, Erismann S, Sagar S, Koju R, Schindler C, Odermatt P, Utzinger J, Cissé G. Water quality, sanitation, and hygiene conditions in schools and households in Dolakha and Ramechhap districts, Nepal: results from a cross-sectional survey. International journal of environmental research and public health. 2017 Jan;14(1):89.