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**| RESEARCH ARTICLE**

## **Application of Health Belief Model in Understanding Wash Behaviour Practices among Mothers of U-5 Children in Lagos Urban Slums**

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**| ABSTRACT**

The poor practice of Water, Sanitation, and Hygiene (WASH) supports the spread of disease burdens causing high U-5 children mortality rates in developing countries like Nigeria. Knowledge, perception, attitude and other influencing factors become important in determining WASH practices. This study, guided by the Health Belief Model, assessed the knowledge, perception, and attitude of mothers of U-5 children in Lagos urban slums to WASH behaviour messages in order to understand their WASH practices. The cross-sectional study involved 361 mothers of U-5 children in selected Lagos urban slums. Applying cluster sampling and purposive sampling techniques, the study used a pre-tested structured questionnaire through interviews to collect data on knowledge, perception, attitude, and practice of WASH. IBM SPSS Version (26) was used to analyse the data collected, and the presentation was in percentages, tables and charts. The main objective was analysed using path analysis of the structural equation model (SEM) and logistic regression model. Only 15.2% used improved water sources, 44.3% stored drinking water safely, and 10.3% did not treat home drinking water. Open defecation was high (61.8%); Only 22.4% washed their hands with water and soap at critical times; 36.6% disposed of waste into the river and canal; open dumpsites (33.8%), and 29.6% used waste to fill marshy areas in the environment. The majority (90%) favourably perceived the susceptibility of children to the dangers of unsafe drinking water. The mothers positively perceived the benefits of good WASH practice for children's health, but (31.1%) had low knowledge of the severity of the risk resulting from poor WASH. The mothers' positive perceptions did not necessarily reflect in their WASH practices. Age, level of education, marital status, and occupation significantly influenced the respondents' WASH practice. Economic reasons and limited WASH facilities were barriers, while contributions of community leaders were supportive. Study recommendations include; the provision of WASH facilities and more WASH behaviour education for mothers through participatory communication approaches. The WASH behaviour sensitisation model should be reviewed to have a distinct identity from routine immunization programmes; to enable mothers to understand WASH messages better.

**| KEYWORDS**

Water, Sanitation, and Hygiene, Lagos Urban Slums, Under-five Mortality, Mothers of U-5, Health Belief Model

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### **1. Introduction**

#### **1.1 Background to the Study**

Safe Water, Sanitation, and Hygiene practices (WASH) are essential determinants of health and well-being (WHO, 2022) and are considered a human right. Yet, poor WASH is responsible for devastating disease burdens causing over 13,800 under-five deaths daily globally, while over 70,000 under-five children die annually in Nigeria (UNICEF, 2020).

Urgent actions are required to address the problem because despite global achievements in dealing with childhood illnesses, children in poor communities, particularly in Sub-Saharan Africa, Nigeria inclusive, are disproportionately affected by poor WASH (UNICEF, 2021).

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The current U-5 mortality is despite WHO earlier report of an impressive decline in child mortality from 12.6 million deaths in 1990 to 5.2 million in 2019, with data showing that globally, the under-five mortality rate dropped from 93 deaths per 1000 live births in 1990 to 38 in 2019. That means 1 in every 11 children died before age 5 in 1990, as against 1 in 27 children in 2019 (WHO, 2020).

Since UNICEF(2021) established that the problem is rooted in poor WASH, it becomes imperative to understand and relate with its recent Factsheet, which reveals the huge populations of the world that still lack access to safe water, sanitation, and still engage in risky health behaviours such as open defecation, which exposes people to direct contact with faeces.

Therefore, it is important to investigate what could be happening to under-five children in Lagos urban slum communities like Abete in Ijora-Badia, Maracana in Ajegunle, and Ago-Egun in Somolu, which have been identified as informal dwellings characterised by limited access to safe water, sanitation and hygiene facilities, thus leaving the people exposed to environmentally-induced epidemics (Elias, 2018 pg.3,28).

More worrying is the World Bank (2022) report that despite 50% of the global population living in urban areas, over 4.4 billion people, the size would grow to about 6 billion people who would be living in urban centres by 2045. Of course, this would mean increased pressure on the already limited WASH facilities in urban areas, especially in informal settlements.

Sadly, Nigeria tops the list of five countries where half of all under-five deaths occurred in 2019; the other countries, according to the death figures, are India, Pakistan, the Democratic Republic of Congo and Ethiopia, with Nigeria and India accounting for almost a third of all deaths. (WHO, 2020).

Of course, there is the need to investigate what happened, seeing that in 2016, data presented by UNICEF show that India was top on the list of countries with high rates of under-five mortality, while Nigeria was second on the list with 11%, behind India's 24 %, of the five deaths leading countries globally with the highest figures of under-five deaths. The other countries were Afghanistan, Pakistan and Ethiopia. "India and Nigeria both account for more than a third of all under-five deaths." (UNICEF, 2016).

Meanwhile, Nigeria had made modest efforts to improve access to clean water and sanitation, but in spite of the increased urban population with access to water and improved sanitation, available data show there was a significant decline in the proportion of urban households with access to piped water to their premises; only three per cent of households got piped water into their homes in 2015 as against the 32 per cent households recorded in 1990 (Global water (2020)).

The continued call by the USAID and the United Nations' chiefs for strengthening the governance of and adequate financing for urban water and sanitation in Nigeria shows a persistent gap in access to WASH; in their 19 November 2021 World Toilet Day remarks, the UN Secretary-General Antonio Guterres, UN Deputy Secretary-General, Nigeria's Amina Mohammed, and the President of the UN General Assembly (UNGA), Abdulla Shahid, sought increased progress for improved sanitation through governance, financing, capacity development, data and innovation (SDG Knowledge Hub, 2021).

Central to their remarks were the needs to enable more people to have access to adequate WASH facilities, with considerations to adopt a human-rights based approach that would make funds available to include people without access to toilets in the planning and decision-making processes.

Key in the UN report from that event was that there were serious concerns about meeting Sustainable Development Goal 6, which calls for clean water and sanitation for all by 2030, considering that over 700 under-five children die daily as a result of unsafe water and poor sanitation facilities and behaviours.

Lack of access to WASH facilities is further highlighted in recently published data from a 2019 Water, Sanitation and Hygiene National Outcome Routine Mapping (WASH NORM) survey; only 16% of households in Lagos State have access to basic hygiene services, where handwashing facility is available on-premises and with soap and water; and only 3.5% of household members are likely to practice proper handwashing, with water and soap, at critical times such as after using the toilet, after changing child's diaper, before eating and before preparing food. In addition, only 61.5% of households in the state have access to safely managed water supply services free of faecal coliform; only 28% of households have access to safely managed sanitation services; and only 12% of healthcare facilities have access to combined water, sanitation and hygiene services (WaterAid, 2022).

For Rijsberman and Zwane's study (2012) 'Water and Sanitation,' the focus is on how to develop technology that would make sanitation facilities very affordable and easily adoptable. They believe that social capital investments in improved sanitation technology and institutional innovations would significantly reduce costs and support millions of people in developing countries to address the problem of open defecation, which they understand as more delicate in causing disease burdens affecting the health of U-5 children in urban areas. If the technology is successful, it will lead to very attractive benefit cost ratios as roll-out costs that need to be borne by the public would be sufficiently small.

The 'Snapshot of global and regional urban water, sanitation and hygiene inequalities' highlights concerns about the increasing urban population and how it will widen existing inequalities in access to WASH services in urban centres by 2030 (UNICEF, 2022). The greatest concern actually is about the devastating effects on people living in slums and other informal settlements, where under-five children would face risk exposures to disease burdens associated with poor WASH behaviours.

Besides the issues of access to facilities, several studies (Ordinoha and Owhondah, 2008; (CASSAD, 2010; Brannlund, Hammarstrom and Strandh, 2013) posit that the likelihood of poor WASH behaviour would be greatly reduced when mothers of Under-five children are adequately educated on good WASH practice. It is, however, contrary to other scholars ( McLennan, 2000; Mkonnen and Mekonnen, 2003; Massie and Webster, 2013, and Akpabio (2012) who say it is really beyond the knowledge of WASH behaviour and provision of facilities for mothers. They maintain that it is important to address factors that could be barriers to good WASH practice among the mothers of U-5 children. While Mekonnen and Mekonnen observed that demographic and sociocultural factors were the most important factors that influenced their study respondents' practices in Ethiopia, McLennan's study recommends that more attention be given to dealing with erroneous beliefs that prevented mothers and caregivers from good WASH practices. And Laverack (2017) supports workable behaviour change approaches, the development of a strong policy framework to enable a supportive environment, and empowering the people to have control over healthy lifestyle decisions that they would make.

An important point is a consideration of how the Health Belief Model (HBM) would help to establish the mothers' perceptions of health risks that could be associated with poor WASH practice. The explanation is that the Model would establish how susceptible the mothers think their children are to the dangers of poor WASH, what they consider as barriers and benefits from good WASH practice, how knowledgeable they are from their exposure to information on WASH, what they think the consequences (Severity) would be if their children became ill as a result of poor WASH, and their self-efficacy; ability to take certain health-promotion actions. However, there are criticisms that the Model fails to address other factors (like habitual behaviours and the need for social acceptance) that may be responsible for people's choice of health behaviours (Boskey, 2022).

This focus is particularly on the impact that poor Water, Sanitation and Hygiene (WASH) behaviour has on the health of children under the age of five years; the persistent high under-five mortality rate due to diarrhoea is linked to poor WASH ( Oloruntoba, Folarin and Ayede, 2004; Joshi and Amadi, 2013).

Meanwhile, studies assessing knowledge, perception, attitude and practice across some countries of the world and in Nigeria (Cronin and Kelly, 2018; Jega's study in Birnin Kebbi, (2018); Adeyemi and Ajibade in Lagos (2018); Solagbe and Titiloye in Ibadan ( 2019; Ogwezzy-Ndisika and Tommy in Lagos (2019), have focussed on rural areas as well as urban areas. However, some of such studies carried out in urban slums have only been done outside of Nigeria (Pathak G, Chalise M, Parajuli S, et al. (2015); Tripathy RM, Acharya GC, Karmee N. (2017); Winter, S. C., Dreibelbis, R., Dzombo, M. N., & Barchi, F. (2019 ). There is no evidential documentation to show that studies assessing knowledge, perceptions, attitudes and practice of WASH among mothers of U-5 children in Lagos urban slums have been done, particularly in this study locations; Abete, Ago-Egun, and Maracana.

Carmen Anthonj et al. (2022) concluded in their study that "risk perception studies are vital for WASH governance in terms of policy, raising awareness, education and behaviour change. In order to make risk perception and behaviour studies even more relevant to effective public health planning and health messaging, future research needs to increasingly focus on early culturally sensitive interventions and changes in perceptions and behaviours over time."

Using the Health Belief Model as a theoretical guide, this study was carried out in selected Lagos urban slums of Abete, Ago-Egun, and Maracana. The study assessed the perception of the mothers of U-5 children in the study locations to ascertain their knowledge and understanding of the health risk their children were exposed to in poor WASH practice as well as the severity of the risk outcome. The mothers' perceptions were also assessed on the benefits associated with good WASH practice. The study also identified factors supporting good WASH practice and limiting factors posing barriers to their WASH practice.

To fulfil its objectives, the study answered these questions;

1. What level of exposure to WASH behaviour change messages do mothers of U-5 children in Lagos urban slums have?
2. What communication channel was used in sensitising the mothers of U-5 children in Lagos urban slums?
3. What are the perceptions and attitudes of mothers of U-5 children in Lagos urban slums to WASH behaviour messages?
4. What are the WASH practices of mothers of U-5 children in Lagos urban slums?
5. What factors influence the practice of WASH among the mothers of U-5 in Lagos urban slums?

## **1.2 Theoretical Framework**

Since behavioural factors are crucial in prompting a change in health practices (WHO, 2011), this study, 'Application of Health Belief Model In Understanding WASH Practices Among Mothers of U-5 Children in Lagos Urban Slums, ' considered the Health Belief Model, which has often been used in driving public health programmes to explain why people may be encouraged to adopt a change in health behaviour.

The Health Belief Model proposes that people are most likely to take preventative action if they perceive the threat of a health risk to be serious, if they feel they are personally susceptible and if there are fewer costs than benefits to engaging in it (Laranjo, 2016). The scholar's further position is that behaviour change interventions are more effective if they address an individual's specific perceptions about susceptibility, severity, benefits, barriers, and self-efficacy.

The Boston University School of Public Health (2018) study maintains that "people could be encouraged to make behaviour change when they are aware and understand the benefits of good health behaviours", and in this case, good WASH behaviours at the individual level among the mothers of under-five children.

The Health Belief Model (HBM) of health behaviour attempts to predict health-related behaviour in terms of certain belief patterns. A person's motivation to undertake a health behaviour can be divided into three categories: individual perceptions, modifying factors, and the likelihood of action. Individual perceptions are factors that affect the perception of illness and the importance of health to the individual, perceived susceptibility, and perceived severity (Mckeller and Sillence, 2020).

In this case of WASH practice among the mothers of U-5 children living in Lagos urban slums, it is assumed that the mothers' exposure to WASH behaviour messages and knowledge would inform their perception of the risk exposure of their children (Susceptibility) to unsafe water use, open defecation; they can better understand how worse an illness caused by unsafe water use could degenerate (perceived severity); just as they could have knowledge of benefits of good WASH practice (perceived benefits).

Massie and Webster's' (2013) study titled "Towards understanding the water and sanitation hygiene beliefs and practices of the Twa of South-west Uganda" is quite relevant in explaining how some cultural beliefs could become barriers to the mothers' practice of good WASH (perceived barriers). External factors such as required action demonstrations by community leaders could be a supporting factor for WASH practice among the mothers of U-5 children in Lagos urban slums.

Carmen Anthonj et al. (2022) study gives backing to this assumption by calling for risk perception studies for WASH governance in terms of policy, raising awareness, education and behaviour change. It specifically notes that "In order to make risk perception and behaviour studies even more relevant to effective public health planning and health messaging, future research needs to increasingly focus on early culturally sensitive interventions and changes in perceptions and behaviours over time."

## **2. Materials and Methods**

### **2.1. Study Area**

This cross-sectional descriptive study was carried out in three Lagos urban slums; Abete, Ago-Egun, and Maracana. The current population of Lagos State is approximately 15.4 million, with projections that about 24.4 million people will be living in Lagos by 2035 (Statista, 2022).

As the largest city in Africa, by reason of the population of inhabitants (Statista, 2022), Lagos continues to receive people from other parts of the country in search of jobs and 'greener pastures.' The state has 20 Local Government Areas and 27 Local Council Development Areas.

The slum communities for this study are spread across the three Senatorial Districts of the state; Abete is in Apapa Local Government Area and under Lagos Central Senatorial District; Ago-Egun is in Somolu Local Government Area and under Lagos East Senatorial District; and Maracana is in Ajeromi-Ifelodun Local Government Area under Lagos West Senatorial District.

The study locations are 'hard-to-reach' places; the researcher always needed the assistance of a respected community guide to be able to access the locations.

### **2.2. Study Population**

The study population were mothers of U-5 children who live in the stated communities. The communities were purposively selected from clusters of the documented nine Lagos urban slums (Elias et al. 2018, p. 28).

### 2.3. Sample Size and Survey Procedure

#### 2.3.1 Sample Size

The sample size of this study is 365 respondents. This number was arrived at after the Taro Yamane sample size equation was applied and calculation done based on a total of 4180 population figures given by community leaders across the study locations. Thus;

Equation 1: Taro Yamane sample size calculation:  $n = \frac{N}{1 + Ne^2}$

Where  $n$ =sample size,  $N$ =population size,  $e$ =the error of sampling (0.05), and estimated population size of 4180.

Therefore:  $n = 4180 / (1 + 4180(0.05)^2)$

Therefore:  $n = 4180 / (1 + 4180(0.0025))$

Therefore:  $n = 4180 / (1 + 10.45)$

Therefore:  $n = 4180 / (1 + 10.45) = 4180 / 11.45$

Therefore:  $n = 365$ .

The sample used for the survey in this study is 365 respondents

#### 2.3.2 Sampling Procedure

The study applied Cluster sampling and Purposive sampling technics.

The identified nine critical communities and their Senatorial Districts are Agege (Lagos West), Ajegunle (Lagos West), Amukoko (Lagos West), Badia (Lagos Central), Ijeshatedo/Itire (Lagos Central), Bariga, Ilaje, Iwaya, Makoko (Lagos East).

Since Lagos has three Senatorial districts, the study picked one slum community from each of the three clusters having a total of nine slum communities to arrive at three slum communities.

Thus having  $\frac{1}{3} \times 9 = 3$ .

Odumosu (2020, p.8) explains that "In Cluster sampling, the population is divided into groups, and a simple random sample of groups is chosen, and all items within the selected groups will take part in the study." And from Barbie's contribution (1986, p.163), in Cluster sampling, the population elements (mothers of U-5 in Lagos urban slums) are already grouped into subpopulations (Lagos urban slum communities), and a list of those subpopulations exist or is created, and each of the lists would then be sampled.

Purposive sampling was used to select the actual slum communities based on their common characteristics of being along a coastal location.

The slum communities selected and their senatorial districts are Abete; within Badia (Lagos Central), Maracana; within Ajegunle (Lagos West), and Ago-Egun; within Ilaje (Lagos East).

According to Owuamalam (2012), "the purposive sampling technique is a situation where the judgment of the researcher is the deciding element on who should be selected as a sample; this method takes into cognizance the peculiar characteristics common to the population from which sample is to be drawn."

To get the number of respondents in each of the communities, the researcher relied on community leaders, who helped with identifying mothers in that category based on their knowledge of the people in the respective communities.

#### 2.3.3 Distribution of questionnaires among respondents across the three communities

The 365 questionnaires were distributed according to the proportion of the population of under-five mothers given for each of the communities.

Abete = 2180

Ago-Egun = 1200

Maracana = 800

Total = 4,180

1. Abete =  $\frac{2180}{4180} \times 365 = 190$

2.Ago-Egun =  $1200/4180 \times 365 = 105$

3.Maracana =  $800/4180 \times 365 = 70$

Total = 365

Return 361:  $361/365 \times 100 = 98.9\%$

Due to the nature of the slum communities, where there are no clear-cut streets, the questionnaires were administered to mothers who were found in parts of each community.

Ethical approval for the study was given by the Research and Innovation Unit of the University of Lagos.

**2.4. Inclusion Criteria**

Only women who lived in the select communities were qualified, plus the additional requirement of being mothers of under-five children.

**2.5. Data Collection Instrument**

The study used a 36-item pretested questionnaire in an interview-administered style with the respondents. Questionnaires usually consist of items worthy of investigation and which can be administered to the respondents (Slaterry et al., 2012). The questions were in sections including demographic questions, perception questions as guided by the Health Belief Model, and questions to elicit information regarding the mothers’ awareness and practice of WASH.

The questionnaires were administered by two research assistants who were duly trained and could communicate in both Yoruba and Pidgin English languages because the population in these communities are predominantly Yoruba and other mixed tribes who understand and communicate in Pidgin English. The research assistants worked closely with the researcher.

**2.6. Data Analysis**

In analysing the data, the researcher used both quantitative and qualitative techniques. The data obtained from the questionnaire were analysed using the IBM Scientific Package for Social Sciences (SPSS 26) software, and they were presented in simple tables of frequencies, percentages and bar charts. The test of association of the socio-demographic characteristics with knowledge and practice of WASH among the mothers was done, and binary logistic regression analysis was employed to identify perceived susceptibility and practice of WASH among mothers of U-5s in Lagos urban slums.

**2.6.1 Ethical Consideration**

The researcher obtained ethical approval from the Research and Innovation Unit of the University of Lagos. Additional approval was sought and received from the Lagos State Primary Healthcare Board. The respondents were told the purpose of the data collected; they all willingly accepted to be a part of the study.

**3. Results**

A total of 361 questionnaires were correctly responded to out of the 365 administered, giving a response rate of 98.9%.

**Table 1: Socio-Demographic Characteristics of Respondents**

Variable	Characteristics	Freq.	%	Mean	SD	Total
Age Group (in years)	15-19	13	3.6			
	20-24	31	8.6			
	25-29	136	37.7			
	30-34	138	38.2			
	35-39	27	7.5			
	40-44	7	1.9			
	45-49	3	0.8			
	50 and above	6	1.7	29.7 years	5.774	361
Marital Status	Married	217	60.1			
	Single	81	22.4			
	Divorced	54	15.0			
	Widowed	9	2.5			361
Level of education	Never attended school	72	19.9			
	Primary school	145	40.2			
	JSS	81	22.4			361

	SSS/GCE/TTC	54	15.0	
	NCE/OND	9	2.5	
Occupation	House wife	81	22.4	
	Self employed	100	27.7	
	Paid employment	18	5.0	
	Petty trader	162	44.9	361
Religion	Christianity	108	29.9	
	Islam	217	60.1	
	African traditional religion	36	10.0	361
Ethnicity	Hausa	36	10.0	
	Igbo	90	24.9	
	Yoruba	235	65.1	361

Source: Field Survey 2022. SD (Standard Deviation).

### 3.1. Respondents' Socio-Demographic Characteristics

The majority of the respondents (38.2%) were aged 30-34 years; teenage mothers accounted for 3.6%. The married were 60.1%, while 22.4% were single, divorced (15.0%) and widowed (2.5%). Educational level; No formal education (19.9%); Primary school (40.2%); Secondary school (15.0%) and OND/HND (2.5%). On occupation; most were petty traders (44.9%); self-employed (27.7%); Full-time housewives (22.4%), and Paid employment (5.0%). Ethnicity; Yoruba (65.1%); Hausas (10.0%), and Igbos (24.9%). Religious background; Islam (60.1%), Christianity (29.9%), and African traditional religion (10.0%).

### 3.2. Extent of Mothers' Exposure to WASH behaviour change messages

The participants were very much familiar with and had much exposure to WASH behaviour messages, with mean response ratings of 4.90 and 3.95, respectively. A pooled mean of 4.43 concludes that mothers of U-5s in Lagos urban slums had much exposure to WASH behaviour change messages.

### 3.3. Communication Approach Used in Sensitising Mothers on WASH in Lagos Urban Slums

Data gathered from the study show that the majority of the respondents 72.6% got the messages through an interpersonal communication approach by the health workers at the community health facility; 57.6% got the messages through community announcers working in collaboration with the health workers; 7.5 % received the messages through friends, and 5.0% said they got the messages through family members. None of the respondents said they were sensitized through any form of electronic mass media, Radio, or Television.

The majority of the mothers (62.9%) prefer community leaders as a source of information and message dissemination on WASH behaviour change, and 17.7% indicated a preference for community announcers. The majority, 62.9% (227) of the mothers of U-5s in Lagos urban slums, chose community leaders. Most respondents ( 66.5 %) said they have more access to community leaders for information; 17.5% of them said they easily access community announcers, and only 0.6% disclosed that they have better access to television for information.

**Table 2:** Perceptions of Respondents to Water, Sanitation and Hygiene (WASH) messages

Items	Option	Freq	%	Mean	SD	Remark	Total
Unsafe water can cause illness in children	Positive	325	90.0	2.90	0.300	Positive	361
	Neutral	36	10.0				
	Negative	0	0.0				
Children can die from disease burdens caused by unsafe drinking water	Positive	212	58.8	2.28	0.907	Neutral	361
	Neutral	36	10.1				
	Negative	112	31.1				
You can treat drinking water at home by yourself	Positive	181	50.0	2.30	0.781	Neutral	361
	Neutral	108	30.0				

	Negative	72	20.0				
Good WASH practice is expensive	Positive	260	72.0	2.57	0.734	Positive	361
	Neutral	48	13.3				
	Negative	53	14.7				
Good WASH practice keeps a child healthy	Positive	219	60.8	2.37	0.845	Neutral	361
	Neutral	55	15.1				
	Negative	87	24.1				
Handwashing is not correct without using soap	Positive	221	61.3	2.38	0.840	Neutral	361
	Neutral	55	15.1				
	Negative	85	23.6				
Limited access to WASH facilities inhibits good practice	Positive	318	88.2	2.76	0.648	Positive	361
	Neutral	0	0.0				
	Negative	43	11.8				
Open defecation endangers children's health	Positive	256	70.8	2.52	0.795	Positive	361
	Neutral	36	10.0				
	Negative	69	19.2				
Pooled Mean				2.51	0.731	Positive	361

### 3.4. Perceptions and Attitudes of the mothers to WASH behaviour change messages

Most of the respondents (90%) had a positive perception of the statement "Unsafe water can cause illness in children; 31.1% of respondents had poor knowledge of the severity of the risk associated with unsafe drinking water by their response to the statement: "Children can die from disease burdens caused by unsafe drinking water." Although the pooled mean (2.51) indicated an overall positive perception, 10.1% of the mothers were just neutral in their perception of the risk severity.

Half of the respondents (50.0%) perceived they could treat drinking water at home (self-efficacy); 30.0% were neutral, and 20.0% had a negative perception. They mostly had positive perceptions (60.8%), neutral (15.1%), and negative (24.1%) to the statement "Good WASH practice keeps a child healthy", and their responses to the statement "Open defecation endangers children's health," were positive (70.8%), neutral (10.0%), and negative (19.2%). They perceived the statement "Handwashing is not correct without using soap", responding positively (61.3%), neutral (15.1%), and negatively (23.6%). The majority (72.0%) agreed that "Good WASH practice is expensive." They responded positively (88.2%) and negatively (11.8%) to the statement, "Limited access to WASH facilities inhibits good practice."

**Table 3: Practice of WASH by the mothers of U-5s in Lagos urban slums**

<b>Water Supply Source</b>	<b>Freq.</b>	<b>%</b>
Piped Water	55	15.2
Bore-hole System	106	29.4
Water Truck Vendors	137	37.9
Water Tanker Vendors	63	17.5
<b>Water Storage Patterns</b>		
Drum with lid	160	44.3



Containers without lid	201	55.7
<b>Home Drinking-water Treatment Practice</b>		
Purification with Alum	243	67.3
Filtration with cloth	81	22.4
No Treatment	37	10.3
<b>Hand-washing Practice</b>		
After toilet use	118	32.7
After cleaning the baby's excreta	87	24.1
Before cooking	25	6.9
Before feeding baby	312	86.4
Before and after eating	360	99.7
After cleaning environment	280	77.6
<b>Hand-washing method</b>		
With soap and water	81	22.4
With only water	280	77.6
<b>Toilet Use</b>		
Pit Latrine with cover	94	26.0
Water Closet system	44	12.2
No Toilet	223	61.8
<b>Refuse disposal Patterns</b>		
Open dumpsites	122	33.8
Throwing into canal/river	132	36.6
Using to fill up marshy areas	107	29.6

### 3.5. WASH practices among mothers of U-5 Children in Lagos Urban Slums

Table 3 shows the mothers' sources of drinking water supply were piped water (15.2%), bore-hole systems (29.4%), water truck vendors (37.9%), and water tanker vendors (17.5%). They stored their drinking water in containers with lids (44.3%) and containers without lids (55.7%).

Most of the mothers treated their drinking water at home using alum (67.3%), treatment by filtration with cloth (22.4%), and no form of home water treatment (10.3%).

They washed their hands after toilet use (32.7%), after cleaning baby excreta (24.1%), before feeding the baby (86.4%), before and after eating (99.7%), and after cleaning the environment (77.6%). Meanwhile, only 22.4% washed their hands with water and soap at critical times, while over three-quarters of the mothers (77.6%) washed their hands with only water. On sanitation, the respondents used pit latrines with cover (26.0%) and water closet systems (12.2%), and the majority (61.8%) used no type of toilet facility. They disposed of their waste at open dumpsites (33.8%), into canals and rivers (36.6%), and 29.6% used the waste to fill up marshy areas in the environment.

### 3.6. Factors Promote or Inhibit WASH Practice Among Mothers of U-5s in Lagos Urban Slums

Data collated indicated 78.4% of the respondents said lack of access to potable water, lack of sanitation facilities (63.1%), lack of money to buy soap (56.0%), and lack of understanding of the WASH messages (45.4%) were inhibitive factors to their WASH practice. However, 62.9% said engagement with community leaders encouraged them to the practice good WASH, while 66.5% of them indicated that WASH demonstration sessions play a vital role in promoting WASH practice.

**Table 4: Association of Socio-Demographic Characteristics with Practice of WASH among Mothers of U-5s in Lagos Urban Slums**

		Knowledge and Practice of WASH		Chi-Square value	p-value
		No	Yes		
Age (years)	Below 25 years	70.5%	29.5%	22.440	.000*
	25-29 years	62.5%	37.5%		
	30-34 years	55.1%	44.9%		
	35-39 years	33.3%	66.7%		

	40 years Above	100.0%	0.0%		
Level of education	Never attended school	51.4%	48.6%	48.362	.000*
	Primary school	62.1%	37.9%		
	JSS	38.3%	61.7%		
	SSS/GCE/TTC	92.6%	7.4%		
	NCE/OND	0.0%	100.0%		
Marital Status	Married	60.4%	39.6%	34.087	.000*
	Single	79.0%	21.0%		
	Divorced	40.7%	59.3%		
	Widowed	0.0%	100.0%		
Religion	Christianity	71.3%	28.7%	14.810	.001*
	Islam	52.1%	47.9%		
	African traditional religion	75.0%	25.0%		
Ethnicity	Hausa	75.0%	25.0%	6.309	.043*
	Igbo	65.6%	34.4%		
	Yoruba	55.7%	44.3%		
Occupation	House wife	39.5%	60.5%	35.507	.000*
	Self-employed	53.0%	47.0%		
	Paid employment	0.0%	100.0%		
	Petty trader	70.4%	29.6%		
Total		60.1%	39.9%		

The test of association of the socio-demographic characteristics with knowledge and practice of WASH among mothers of U-5s in Lagos urban slums revealed a significant influence of age, level of education, marital status, religion, ethnicity and occupation on knowledge and practice of WASH among mothers of U-5s in Lagos urban slums at chi-square value = 22.440 ( $p < 0.05$ ), 48.362 ( $p < 0.05$ ), 34.087 ( $p < 0.05$ ), 14.810 ( $p < 0.05$ ), 6.309 ( $p < 0.05$ ) and 35.507 ( $p < 0.05$ ).

The dependent variable (Knowledge and Practice of WASH = PWASH) is a binary variable based on scale (No and Yes) and took the value (No = 0, Yes = 1). The socio-demographic variables were used to determine knowledge and practice of WASH among mothers of U-5s in Lagos urban slums.

#### 4. Discussions

In this study, most of the respondents (90.0%) had good knowledge of the susceptibility of their children to illnesses as a result of unsafe water. The Centres for Disease Control and Prevention (CDC, 2022) notes that adequate exposure to hygiene education, in addition to access to WASH facilities, can prevent illnesses caused by disease burdens. However, 31.1% had poor knowledge of the severity of the risk associated with unsafe drinking water to the health of U-5 children. It is unlike findings from a similar study by Berhe et al. (2020) in the rural Tigray region of Northern Ethiopia, where 95% of the respondents agreed that waterborne diseases could be prevented through the consumption of safe water. Meanwhile, Ogwezzy-Ndisika and Oloruntoba's study (2016) found that over half of the mothers of U-2 children in Lagos had a poor perception of the risk susceptibility their children were exposed to if not breastfed exclusively.

They mostly (89.2%) had positive attitudes to safe water messages, yet only 15.2% got their water from piped taps; 29.4% from borehole systems and the majority of them got water from unimproved water supply sources, including truck water vendors (37.9%), and water tanker vendors (17.5%). There is a huge disparity when compared with the findings of a study by Pathak et al. (2015), where 87.9% of the 206 mothers of U-5 children surveyed in an urban slum of Butwal sub-metropolitan city in Nepal used improved water sources. The results of water sources from this study are similar to those found by Sridhar et al. (2020); 52.5% of the respondents used surface water in selected local government areas of Kaduna State, Northwestern Nigeria.

Unimproved drinking water sources include: Unprotected dug well; Unprotected spring; Surface water (river, dam, lake, pond, stream, canal, irrigation channel); Vendor-provided water (cart with small tank/drum, tanker truck); Bottled water\*; Tanker truck water. "Bottled water is not considered improved due to limitations in the potential quantity, not quality, of the water." (CDC 2020, Assessing Access to Water and Sanitation).

Half of the respondents (50.0%) were confident about drinking water treatment at home. In practice, 67.3% used alum to purify their drinking water; 22.4% did water filtration using cloth, and 10.3% of them did not treat drinking water at home. They said they believed their water was from safe sources. A similar study by Tripathy, Acharya, and Karmee(2017) in Odisha, one of India's urban

slums, found that the majority of the respondents (68.5%) did not practice any form of home drinking water treatment. Findings from Sridhar, Okare, and Mustapha's study (2020) found only 46.2% of respondents practised home water treatment in selected areas of Kaduna State, Northwestern Nigeria. They highlighted the importance of treating drinking water at home to reduce diarrheal infection, level of cholera outbreaks and transmission of diseases among people.

A similar study by Miner, Dakhin, Zoakah, Afolaranmi, and Envuladu (2015) investigating household drinking water purification practices in Lamingo, Plateau State, Nigeria, and determining a correlation between the quality of drinking water and diarrheal infection in children, found that only 26.1% had good knowledge of water purification practice, while 43.3% used alum in purifying home drinking water. They recommend high hygiene behaviour to avoid exposing treated water to pathogenic organisms at the point where it would be consumed.

On water storage practice, the study observed that respondents (44.3%) used containers with a lid, and over half of them used containers without a lid (55.7%). As explained by the Health Belief Model, poor WASH knowledge could influence the perception and practice of good WASH. Similar studies (Batram, Corrales, Davison, Deere, Drury, Gordon, et al., 2009; and Sridhar, Okare, and Mustapha, 2020) canvas adequate water safety plans, particularly with drinking water containers.

Regular handwashing with soap and water or alcohol-based rub has been established as a cost-effective way to prevent the spread of diseases. Yet, billions of people still lack access to handwashing facilities. (UNWater, 2022). In this present study, findings show that 77.6% of the respondents did not comply with the requirement of hand washing using clean water and soap at critical times; only 22.4% of the mother's practised hand washing using clean water and soap. This finding can relate to the WaterAid Report (2022) of a 2019 Water, Sanitation, and Hygiene National Outcome Routine Mapping (WASH NORM) that "Only 16% of households in Lagos have access to hygiene facilities with clean water and soap; and only 3.5% of household members are likely to practice proper handwashing, with water and soap at critical times." A similar study by Adeyemi and Ajibade (2018) to assess knowledge and practice of handwashing among mothers in Alimosho, Lagos, actually presented a poorer result of only 7.8% of the respondents washing their hands with water and soap as prescribed by UNICEF.

The majority of the respondents in this study (61.8%) do open defecation and blamed it on limited access to sanitation facilities for managing faeces; 26.0% used pit latrines with cover, and 12.2% of them claimed they used water system closets. This aligns with the WASH NORM 2019, which notes that only 28% of households in Lagos State have access to sanitation services. A similar study by Fagariba and Song (2016) found that many people living in slum areas of Accra, Ghana do open defecation as a result of the non-availability of sanitation facilities in their residences.

Findings from this present study showed that the refuse disposal pattern among the respondents is not consistent with the requirements of good WASH practice; the majority (36.6%) conveniently dispose of their waste in the river and canal; 33.8% dispose of waste at open dumpsites, and 29.6% use the refuse to fill up marshy areas within their environment. This is close to findings by Fagariba and Song (2016), whose study on waste disposal and management in the city of Accra, Ghana, reported that 16.3% of their study respondents disposed of their solid waste by burying them in large portions of land within their living areas. Urbanisation pressures are having negative impacts on solid waste management in capital cities of developing countries (Ozoh et al., 2021), and poor waste disposal results in environmental hygiene challenges exposing under-five children to the dangers of cholera and diarrhoea (Oguniran, 2022).

Results from the logistic regression analysis revealed that age, level of education, occupation, and marital status were found to have a significant influence on knowledge and practice of WASH among mothers of U-5 in Lagos urban slums include. Other factors, limited access to WASH facilities, lack of economic empowerment and poor knowledge, are found to inhibit good WASH practice.

#### **4.1 Limitation**

During the fieldwork, the researcher always sought a community guide to enable her to have access because the locations are hard-to-reach areas where some community members could get really aggressive, based on fears that findings could prompt their sack from the slum areas.

#### **5. Conclusion**

The study ascertained the level of exposure to WASH behaviour change messages among mothers of U-5 children in Lagos urban slums; the communication approach adopted by the health education officers in sensitising the mother on WASH behaviour; the perception and attitudes of the mothers to WASH behaviour messages; the mothers' practice of WASH; and factors that influenced their WASH practices.

The interpersonal communication approach (face-to-face) was used in sensitising the mothers, and they had much exposure to WASH behaviour change messages. Their perceptions contradict their WASH practices in several ways; they (90%) positively perceive the risk of exposure of their children to the use of unsafe drinking water but expressed poor knowledge (31.1%) of the

severity of the dangers of unsafe drinking water. Only 15.2% of the respondents use piped water sources, 29.4% use borehole water, and 37.9% of them use truck water vendors. On self-efficacy, 50% of the respondents were confident of drinking water treatment at home, but 67.3% actually treated their drinking water using alum, 22.4% filtered drinking water using cloth, and 10.3% did not treat their drinking water at home. They (55.7%) stored water in containers without a lid. Their cost perception outweighs the benefits; despite agreeing (70.8%) that open defecation endangers children's health, 72.0% say good WASH practice is expensive, and the majority of them (61.8%) do open defecation, 26.0% use pit latrine, and only 12.2% claim to use water closet system.

Handwashing is not practised appropriately; only 22.4% washed their hands with soap and water at appropriate times, thereby exposing U-5 children to risks of diarrhoea. Their waste disposal patterns are at variance with acceptable practice; 36.6% dispose of waste close by the canal or river; 33.8% dispose of their waste in open dumpsites in the community, while 29.6% of them use waste generated to fill up marshy areas around the environment.

The respondents' age, level of education, marital status, and occupation significantly influenced their practice of WASH. They listed lack of economic power, and limited access to facilities as inhibiting factors, while close engagement with community leaders encourages them to good WASH practices.

Embedding WASH behaviour sensitisation in the routine child immunization programmes, as is the practice, has not allowed the mothers to have an adequate understanding of the importance of WASH; they easily remember the main messages of child immunization and take WASH messages as 'an addition' when they should have better knowledge of WASH behaviour like they do child immunization.

### **5.1 Recommendations**

Future studies should explore policies empowering community women for cooperative production of cleaning agents like soap.

A community WASH centre 'owned' by the people should be established where regular engagements with community leaders who would have been trained on good WASH behaviour can take place.

WASH facilities should be provided; mothers should be engaged through integrated communication approaches for adequate knowledge of WASH behaviour.

WASH sensitisation programmes should have a distinctive identity separate from child immunization programmes; this can enable mothers to attach more importance to WASH behaviour and a better understanding of the messages.

### **5.2 Contribution to Knowledge**

The study identified that perceived severity is a key driver to the practice of WASH; if mothers fail to think and understand that the consequence of unsafe drinking water could result in death.

If cost perception outweighs the perceived benefits of good WASH practice, mothers of U-5 children in Lagos urban slums get discouraged from putting in more effort toward good WASH behaviour.

This study observes that a network of mothers of U-5 children in Lagos urban slums interacting more with community leaders about WASH issues, behaviour and access at the heart of it would make a significant impact when kept active by selected supervisors from among the communities.

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