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Research Article

Provision of Environmental Infrastructure in Suburban Districts of Abuja, Nigeria: A Panacea for Diarrhoea Control in Under-Five Years Children?

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Abstract

The dwindling fortunes of low and middle-income countries across the globe seem to be exacerbating the burden of diseases. The infrastructure deficit that is noticeable in the urban slums of Sub-Saharan Africa hinders efforts in combating diarrhoea, a persisting health challenge. This qualitative study aimed to assess the available infrastructure in suburban districts of Abuja and their relationship with diarrhoea occurrence in under-five years children. The study population was the under-fives in Abuja Municipal (AMAC) and Bwari (BAC) Area Councils. Available infrastructure was assessed through a pre-tested questionnaire administered to 797 mothers/childminders of under-fives in randomly selected households. Descriptive statistics and the Chi-Square test of the association at $p<0.05$ was used in the analysis. Occupation of the mother/childminders and wealth quintile of the households were shown to be associated with diarrhoea occurrence. The available water resources were limited, and sanitation and hand washing services were basic. A significant relationship ($p<0.05$) was established between some of the independent and dependent variables excluding the source of drinking water. This study suggests that the provision of sustainable infrastructure services and critical engagement of women in environmental infrastructure policy formulation should be prioritized.

Keywords: Water, Sanitation, Hygiene, Environmental, Infrastructure, Diarrhoea

INTRODUCTION

Diarrhoea is still a major disease burden in some parts of the globe, especially in Africa and other low and middle-income countries. The disease has been proven to be preventable and treatable. While deaths arising from this disease have reduced significantly, children from some low and middle-income countries still get sick. (Bakir et al., 2017) and WHO (2017) stated that about 525,000 annual deaths result from diarrhoea among children under five years of age. (Okun Da, 1999) reported that mortality attributable to diarrhoea is 10-fold higher in low-income countries than in industrialized countries. (WHO, 2017) posited that there are an estimated 1.7 billion cases of diarrhoea yearly with an average of 2.9 episodes per child. It is on record that about 9.9% of all under five-year deaths are attributable to diarrhoea. Some of the children die as a result of the disease while the surviving ones face long-term episodes of repeated infections and lasting impairments in addition to other challenges arising from COVID-19, climate change, antimicrobial resistance and issues associated with migration and urbanization (PATH, 2022). Some factors have been identified as precipitating the high prevalence of deaths due to diarrhoea. They include poor knowledge

and attitude towards the disease, short supply of water and sanitation facilities, poverty, poor environmental hygiene, and poor personal hygiene. The deaths were attributable to poor sanitation, hygiene and unsafe drinking water put at 829,000 annually (WHO, 2019). Nigeria remains top of the ladder of countries still prone to cases of diarrhoea deaths among children at 51,810 per 100,000 people (PATH, 2017). In 2021 United Nations Inter-Agency Group for Mortality Estimation (UN IGME) observed that in 2017, while India recorded about 989,000 under-five deaths out of over 1 billion population, Nigeria recorded 714,000 under-five deaths out of about 200 million population. This under-five mortality rate estimate, according to UNIGME (2021), was 166 deaths per 1000 live births in 2003 and 114 deaths per 1000 live births in 2020. For our Abuja study area, it was 133 deaths per 1000 live births in 2003 and 106 deaths per 1000 live births in 2019 (UNIGME, 2021).

Amongst the necessities for the public's good health is the availability of safe drinking (potable) water, which has to be readily accessible and of good quality (safely managed drinking water services), as contaminated water has been identified as the cause of several diseases. It is on record that an estimated 2 billion people globally have no access to safely managed sanitation services, safely managed water services and basic hand washing services (WHO, 2021). Several studies point to sanitation, family status and personal hygiene practices as other important factors contributing to diarrhoea prevalence and health burden (Hunachew B et al., 2018). WHO/UNICEF (2015) opined that poor sanitation is mostly found in rural settings and urban slums among vulnerable populations in low-income countries of South Asia, Southeast Asia and sub-Saharan Africa. (Sambe Ba et al., 2013) observed that in the past few decades, there has been an upsurge of a mass movement to the urban areas in sub-Saharan Africa and this has resulted in the springing up of urban slums. These slums are unplanned and have disorganised landscapes with most of their occupants living in crowded wretched conditions with inadequate safe water supply, drainage and sewerage systems, absence of/ inadequate sanitation and solid waste disposal/treatment systems. Hence, the increased risks of infectious diseases, respiratory infections and diarrhoea. Such slums exist in several cities in Nigeria. The available environmental infrastructure in these urban slums is frequently insufficient, inappropriate, and decrepit, with observed increases in health challenges. Thus, there appears to be a relationship between environmental infrastructure and health. It has been suggested that improving sanitation facilities and access to infrastructure can benefit public health. The Water, Sanitation and Hygiene (WASH) programme that captures interventions in these basic environmental infrastructure deficits has been adjudged a major integrated intervention effort for infectious disease prevention (WHO/UNICEF, 2021). However, toilet facility types and accessibility usually determine the degree of contact between humans and their excreta in the environment. It is noteworthy that most communities in developing countries share toilet facilities and as such, prevalence is affected by not only the type of available toilet structure but also the condition under which such toilets are used by the people. Water scarcity, which is common in most low-income countries, may bring about a decline in personal and hand hygiene habits since the hands are reservoirs of most pathogens.

Despite some knowledge of the risk factors associated with diarrhoea, there is still very limited literature on factors contributing to the prevalence of diarrhoea and the effects of provision or non-provision of these factors in several areas of Nigeria, including the Area Councils of Abuja, Nigeria. The lack of sufficient information on the diarrheal disease burden is detrimental to efficient and cost-effective planning of interventions against diarrhoea which is highly endemic in Nigeria (WHO, 2013). Recurring cholera (acute diarrhoea) and gastroenteritis outbreaks in some regions of Nigeria, including the Federal Capital Territory (FCT), are pointers to its sustained relevance as a disease of high public health importance. It also showed that no efforts should be spared until the diarrhoea scourge is permanently controlled. This study, thus, was designed to capture the available environmental infrastructure in suburban districts of Abuja, Nigeria and their contributions to diarrhoea occurrence in under five years old children.

MATERIALS AND METHODS

Materials

The material used for this study was pre-tested structured questionnaires administered to mothers and child minders of the under fives.

Methods

Study area and population

The study was carried out in 2021 in two suburban districts (Abuja Municipal Area Council (AMAC) and Bwari Area Councils (BAC), of the Federal Capital Territory, Nigeria. Figure 1 is the map of the study area. AMAC lies within Latitudes 8°36' and 9°21' North of the Equator and Longitudes 7°07' and 7°33' East of Greenwich Meridian while Bwari Area Council is located between Latitude 6°45" and 7°45" North of the Equator and Longitude 8°25' and 9°25' East of the Greenwich Meridian (Balogun, 2001). AMAC has a projected population of about 776,298 and a land area of 1,476 km^2 whilst BAC has a projected population of 229,274 and a land area of 938.744 km^2 (Brinkoff, 2017). The study populations were mothers and childminders of children under five years of age who had diarrhoea in the two weeks preceding the survey and who gave their consent for the survey.

Administration of instrument of data and processing

A structured questionnaire was administered to mothers and childminders of under-five-year-olds in the study area totalling 399 and 398 for AMAC and BAC respectively.

This was achieved through random sampling using Taro Yamane sample size calculation. The illiterate participants were assisted in filling out the questionnaire. The filled questionnaires were analysed statistically using descriptive SPSS version 25. A return rate greater than 90% was achieved.

RESULTS AND DISCUSSION

Results

The descriptive results of the data are presented in Tables 1 and 2. Table 3 shows the Chi-Square relationship between some socio-demographic and socio-economic factors and diarrhoea prevalence **(Table 1-3).**

Tables 4 and 5 are the Chi-Square results of the associations between the identified available infrastructure and diarrhoea prevalence in the study areas. In the two weeks preceding the survey of the 399 and 398 under-five study population, not less than 40 under-five children had diarrhoea at least twice. This gave an overall diarrhoea prevalence of 10% for both study areas. This is not far from the 15.1% recorded for FCT in 2018 by National Nutrition and Health Survey **(Table 4 and 5).**

Socio-demographic and socio-economic status of the participants

As shown in (Table 1), the participants in AMAC were mostly female (98.25%) and 82.25% of them were married

Table 1. Socio-demographics and socio-economic/behavioural status of participants in the study areas.

		AMAC		BAC	
Socio-Demographics	**Options**	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
Age	≤ 18	20	5	29	7.32
	19-29	193	48.25	158	39.9
	30-41	160	40	136	34.34
	42-52	27	6.75	63	15.91
	≥53	0	0	10	2.53
Sex	Male	7	1.75	2	0.51
	Female	393	98.25	394	99.49
Marital Status	Single	35	8.75	32	8.08
	Married	329	82.25	277	69.95
	Widowed	21	5.25	24	6.06
	Divorced	14	3.5	39	9.85
	Separated	1	0.25	24	6.06
Occupation of Mother/ Childminder	Farmer	24	6	98	24.75
	Trader	205	51.25	116	29.29
	Artisan	17	4.25	1	0.25
	Stay at Home	93	23.25	164	41.41
	Civil Servant	61	15.25	17	4.29
Educational Qualification	No Formal Education	36	9	63	15.91
	Primary	29	7.25	137	34.6
	Secondary	185	46.25	102	25.76
	Tertiary	131	32.75	13	3.28
	School Drop-Out	19	4.75	81	20.45
Household size	1 – 4	36	9	98	24.75
	5 – 9	20	5	17	4.29
	10 – 14	204	51	117	29.55
	>14	140	35	164	41.41
Household Wealth Quintile	Above N150,000	16	4	8	2
	N100,000 – N150,000	27	6.75	25	6.25
	N50,000 – N 100,000	131	32.75	120	30
	Less than N 50,000	136	34	97	24.25
	No Income at all	88	22	145	36.25
Mother/Childminders diarrhoea knowledge	No knowledge	81	20.25	81	20.45

	Basic Knowledge	190	47.5	189	47.73
	Very Knowledgeable	2	0.5	2	0.5
	Not Sure	103	25.75	103	26.01
	Indifferent	20	5	81	20.45
How Many Times Has Your Child Had Diarrhoea in the Past Two Weeks?	Not at all	144	36	20	5.05
	Once	211	52.75	210	52.5
	2 Times	35	8.75	35	8.75
	3 Times	5	1.25	5	1.25
	More Than 3 Times	0	0	20	5.05

while 88.25% were aged between 19 and 41 years. Their occupations included trading (51.25%), stay-at-home mothers (23.25%) and civil servants (15.25%). The survey showed that 9% of them had no formal education while 48% had a basic knowledge of diarrhoea while 20.25% had no knowledge at all. Most of the household sizes were above 10 in number (86%). For the wealth quintile of the households, the Table showed that 66.75% of the households thrived on NGN 50,000 to NGN 100,000 monthly, while 22% had no visible income. In BAC, the respondents were mostly female (99.49%) and 69.95% of them were married while 90.15% were aged between 19 and 52 years. Their occupations included trading (29.29%), stay-at-home mothers (41.41%) and farmers (24.75%). The Table showed that 15.91% of the participants had no formal education while 47.73% had a basic knowledge of diarrhoea while 20.45% had no knowledge at all. Household sizes of more than 14 were observed in 41.41% of the respondents while household sizes of less than 14 were observed in 58.59% of the respondents. For the wealth quintile of the households in BAC, the Table showed that 54.25% of the households thrived on less than NGN 50,000 to NGN100,000 monthly, while 36.25% had no visible income at all.

Available environmental infrastructure in the study area

From Table 2, in AMAC, improved and basic drinking water sources were available to 43.36% of the study population while 54.89% had improved and limited drinking water sources which were not safely managed. The water sources were not far from their homes based on the return trip time of mostly less than 30 minutes (83.96%) as stipulated by WHO. The hand hygiene practices of the participants were commendable as 87.72% claimed to practice the correct hand washing and 69.67% washed their hands correctly with soap and water while 37.59% washed with water only. Furthermore, Table 2 showed that in BAC, the study population had no access to basic drinking water sources that were improved and safely managed whereas 99.49% had improved and limited drinking water sources which were not safely managed. A less than 30-minute trip time was recorded for 68.34% of the respondents while 31.16% had a return trip time greater than 30 minutes. The hand hygiene practices of the participants were commendable as 93.22% claimed to practice the right hand wash times and 60.30% washed their hands correctly with soap and water while 37.69% washed with water only.

The sanitation aspects of environmental infrastructure as depicted by toilet availability and accessibility were also rated high in AMAC as respondents ascertained that faecal contact with humans was restricted and improved sanitation adhered to. From the study, 96.99% of the respondents indicated improved child stool disposal methods. Improved basic toilets were claimed to be available to 91.48% of respondents while 0.25% still practised open defecation. However, 72.68% of their toilet facilities were privately owned while 27.32% were shared. Similarly, in BAC, toilet availability and accessibility were also rated high as respondents ascertained that faecal contact with humans was minimal and improved sanitation adhered to. From the study, 82.16% of respondents indicated improved child stool disposal methods. Improved toilets were available to 76.88% of respondents while they further indicated no open defecation. However, 45.98% of their toilet facilities were privately owned while 53.52% were shared.

A statistically significant linear relationship ($p<0.05$) was deduced between the independent variables (occupation of mother/childminder and household wealth quintile) and the dependent variable (diarrhoea prevalence) in AMAC but no statistically significant linear relationship ($p>0.05$) was observed between the same variables in BAC (Table 3). In AMAC, a statistically significant linear relationship ($p<0.05$) between the independent variables (hand hygiene practices, child stool disposal method, type of toilet) and the dependent variable (diarrhoea prevalence) was observed (Table 4) but in BAC, a statistically significant linear relationship ($p<0.05$) was observed between the independent variables (water source for domestic use, time taken for a return trip, time spent on getting water and if water treatment was done) and the dependent variable (diarrhoea prevalence) (Table 5).

Table 2. Available environmental infrastructure in the study area.

	AMAC		BAC	
Environmental Infrastructure	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
Basic drinking water source	173	43.36	0	0
Limited water source	219	54.89	396	99.49
Return trip time ≤30 minutes	335	83.96	272	68.34
Return trip time >30 minutes	63	15.79	124	31.16
Hand wash with water only	150	37.59	150	37.69
Hand wash with soap and water	278	69.67	240	60.3
Right hand wash times	350	87.72	371	93.22
Child's stool disposal method (Improved)	387	96.99	327	82.16
Child's stool disposal method (Unimproved)	12	3	69	17.34
Type of Toilet (Improved)	365	91.48	306	76.88
Type of Toilet (Unimproved)	33	8.27	90	22.61
Type of Toilet (Open Defecation)	1	0.25	0	0
Toilet ownership (Private)	290	72.68	183	45.98
Toilet Ownership (Shared)	109	27.32	213	53.52

Table 3. Relationship between the socio-demographics and economic status of participants in the study.

Variables	**Options**	**Frequency**	**Percent**	**X^2**	**df**	**p – value**
For AMAC						
Occupation of Mother/ Childminder	Farmer	24	6	30.443[a]	8	0
	Trader	205	51.25			
	Artisan	17	4.25			
	Stay at Home	93	23.25			
	Civil Servant	61	15.25			
Household Wealth Quintile	Above ₦150,000	16	4	28.962[a]	8	0
	₦100,000 – ₦150,000	27	6.75			
	₦50,000 – ₦ 100,000	131	32.75			
	Less than ₦ 50,000	136	34			
	No Income at all	88	22			
For BAC						
Occupation of Mother/ Childminder	Farmer	98	24.75	5.837[a]	8	0.666
	Trader	116	29.29			
	Artisan	1	0.25			
	Stay at Home	164	41.41			
	Civil Servant	17	4.29			
Household Wealth Quintile	Above ₦150,000	8	2	5.197[a]	8	0.736
	₦100,000 – ₦150,000	25	6.25			
	₦50,000 – ₦ 100,000	120	30			
	Less than ₦ 50,000	97	24.25			
	No Income at all	145	36.25			

Discussion

This study captured the environmental infrastructure available in two suburban districts (AMAC and BAC) of Abuja, Federal Capital Territory of Nigeria and their relationship with diarrhoea occurrence in under-five years old in the area.

This study shows that diarrhoea occurrence is only affected by the occupation of the mother or childminder and the wealth quintile of the family in AMAC, while in BAC, none of the socio-demographic or socio-economic factors was associated with diarrhoea occurrence. This could be attributable to notable differences in the occupational and wealth status of respondents in AMAC which could affect their allocation of finances to issues of hygiene and sanitation. The same cannot be said for BAC respondents who were within the same financial capabilities. This is in agreement with the works by (Kumi-Kyereme et al.,2015) and (Hunachew et al., 2018) that affirmed that household wealth plays a major role in child mortality from diarrhoea.

Table 4. Relationship between the availability of infrastructure and diarrhoea prevalence in AMAC.

Variables	Options	Frequency	Percent	X^2	df	p - value
Drinking Water Source	River/Stream	14	3.5	7.929[a]	12	0.791
	Unsanitary Well	15	3.75			
	Sanitary Well/Borehole	190	47.5			
	Pipe borne tap	45	11.25			
	Bottle water	13	3.25			
	Sachet water	115	28.75			
Water Source for Domestic Use	River/Stream	15	3.75	4.323[a]	8	0.827
	Unsanitary Well	57	14.25			
	Sanitary Well/Borehole	271	67.75			
	Pipe borne tap	57	14.25			
	Water tank reservoir	0	0			
Time Taken for A Return Trip	Less than 20 minutes/day	182	45.5	15.514[a]	8	0.05
	20 to 30 minutes/day	153	38.25			
	>30 minutes to an hour/day	55	13.75			
	More than an hour a day	8	2			
	Never fetches water	2	0.5			
Time Spent on Getting Water	Less than 20 minutes/day	182	45.5	1.245[a]	8	0.996
	20 to 45 minutes/day	153	38.25			
	45 minutes to an hour/day	55	13.75			
	More than an hour a day	8	2			
	Never	2	0.5			
Water Treatment Done?	Yes	222	55.5	2.560[a]	2	0.278
	No	177	44.25			
Hand wash with Water Only	Yes	64	16	39.783[a]	6	0
	No	240	60			
	Not Really	86	21.5			
Hand wash with Soap and Water	Yes	278	69.5	79.539[a]	4	0
	No	50	12.5			
	Not Really	47	11.75			
Hand Wash Time	Before Cooking	250	62.5	33.547[a]	12	0.001
	After Cooking	3	0.75			
	Before Feeding Child	1	0.25			
	After Feeding Child	1	0.25			
	After Cleaning Child	95	23.75			
Child's Stool Disposal	Burning/Burying	12	3	26.552[a]	8	0.001
	Collected by a Garbage truck	179	44.75			
	Thrown into nearby bushes/river	8	2			
	Community dumpsite	5	1.25			
	Pour into toilet	196	49			
Type of Toilet	Pit latrine with lid	158	39.5	17.690[a]	8	0.024
	Pit latrine without lid	33	8.25			
	Pour Flush latrine	83	20.75			
	Water Cistern toilet	125	31.25			
	Open defecation	1	0.25			
Toilet Ownership	Private	290	72.68	3.512[a]	6	0.742
	Compound	99	24.75			
	Community	4	1			
	Public	6	1.5			
	None	0	0			
Time Taken to Get to Toilet	Less than 15 minutes	393	98.25	0.316[a]	2	0.854
	15 minutes to 30 minutes	7	1.75			
	Approximately 30 minutes	0	0			
	30 minutes to 1 hour	0	0			
	More than an hour	0	0			

Table 5. Relationship between the availability of infrastructure and diarrhoea prevalence in BAC.

Variables	Options	Frequency	Percent	X^2	df	p – value
Drinking Water Source	River/Stream	0	0	0.789[a]	4	0.64
	Unsanitary Well	0	0			
	Sanitary Well/Borehole	210	53.03			
	Pipe borne tap	1	0.25			
	Bottle water	0	0			
	Sachet water	185	46.72			
Water Source for Domestic Use	River/Stream	0	0	0.045[a]	2	0.027
	Unsanitary Well	1	0.25			
	Sanitary Well/Borehole	395	99.75			
	Pipe borne tap	0	0			
	Water tank reservoir	0	0			
Time Taken for A Return Trip	Less than 20 minutes/day	71	17.93	16.600[a]	8	0.035
	20 to 30 minutes/day	198	50			
	>30 minutes to an hour/day	119	30.05			
	More than an hour a day	5	1.26			
	Never fetches water	3	0.76			
Time Spent on Getting Water	Less than 20 minutes/day	47	11.87	16.600[a]	8	0.035
	20 to 45 minutes/day	72	18.18			
	45 minutes to an hour/day	150	37.88			
	More than an hour a day	87	21.97			
	Never	40	10.1			
Water Treatment Done?	Yes	2	0.51	15.099[a]	2	0.001
	No	394	99.49			
Hand wash with Water Only	Yes	64	16	6.192[a]	8	0.626
	No	240	60			
	Not Really	86	21.5			
Hand wash with Soap and Water	Yes	27	69.5	2.945[a]	4	0.567
	No	50	12.5			
	Not Really	47	11.75			
Hand Wash Time	Before Cooking	250	62.5	4.175[a]	12	0.98
	After Cooking	3	0.75			
	Before Feeding Child	1	0.25			
	After Feeding Child	95	23.75			
	After Cleaning Child	22	5.5			
Child's Stool Disposal	Burning/Burying	3	0.76	1.492[a]	8	0.9093
	Collected by a Garbage truck	4	1.01			
	Thrown into nearby bushes/river	4	1.01			
	Community dumpsite	61	15.4			
	Pour into toilet	324	81.82			
Type of Toilet	Pit latrine with lid	62	15.66	5.442[a]	6	0.489
	Pit latrine without lid	90	22.73			
	Pour Flush latrine	203	51.26			
	Water Cistern toilet	41	10.35			
	Open defecation	0	0			
Toilet Ownership	Private	183	46.21	0.945[a]	4	0.918
	Compound	209	52.78			
	Community	4	1.01			
	Public	0	0			
	None	0	0			
Time Taken to Get to Toilet	Less than 15 minutes	391	98.74	0.182[a]	2	0.913
	15 minutes to 30 minutes	4	1.01			
	Approximately 30 minutes	0	0			
	30 minutes to 1 hour	0	0			
	More than an hour	0	0			

However, in contrast, (Usman et al., 2009) believed that children from mothers in occupations especially within the informal sector like farming had higher odds of diarrhoea.

Since a higher percentage of the study populations in AMAC and BAC had access to limited water services, which refers to improved water sources but not safely managed, their exposure to non-potable water is high. Interestingly, the drinking water source as a variable was not statistically significant. This can be attributed to the fact that the respondents mostly alluded to treating their drinking water before use which invariably will curtail the exposure of under-fives to enteric bacteria. This agrees with the studies of (Bain et al., 2021) which suggest that half of the population of Nigeria is exposed to high-risk drinking water at the point of use. Furthermore, the study by (Akinyemi et al., 2019) corroborates this assertion and also affirmed that the wealth quintile remains a factor for households' engagement in the treatment of water.

On sanitation variables, the study areas were shown to have improved sanitation facilities. Their improved child stool disposal methods and basic improved toilet types ensure no human and faeces contact. For toilet ownership, AMAC had more privately owned toilets while BAC had more shared toilets. Expectedly, there will be a remarkable reduction in the dangers associated with open defecation for both areas but the intrinsic sanitation management of shared toilets remains a factor to be dealt with. However, child's stool disposal remained statistically significant in AMAC and could be attributed to the fact that though improved and basic toilet facilities abound, there was a large occurrence of dilapidated broken sewers with the sullage being discharged directly into the streets and soils. Also, one cannot ignore the dangers posed by disposing of stool-soiled diapers in the garbage trucks/dumpsites which are mostly unprotected from pets, like dogs. These pets scavenge and take the waste back again to homes where there are no dog pens. This is in agreement with the studies of (Gebru et al., 2014) on accessible and improved sanitation on diarrhoea prevalence.

It was also noted that the type of toilet was statistically significant in AMAC despite the improved but limited toilet types that abound in the study area. This is also attributable to the large occurrence of dilapidated broken sewers and their attendant health risks to the inhabitants. This was noted in the work of (Cameron, 2009). However, the findings of (Engell, 2013) showed no significant difference in the type of toilet and diarrhoea occurrence in households.

The study area was low on hand hygiene practices as most of the respondents indicated practising hand washing only before cooking and after cleaning the child indicating that they are not very aware of the United Nations global hand washing moments despite knowing rightly to wash hands with soap and water. Hence, it was statistically significant in the study. This finding corroborates the study of (Oloruntoba et al., 2014) that concluded that proper hand hygiene at critical times is a major factor for diarrhoea curtailment. This study established that diarrhoea risk factors are community specific as shown in the work of (Fagbamigbe et al., 2017).

CONCLUSION

The effects of the availability of infrastructure on diarrhoea occurrence among children under-five years in Abuja, the Federal Capital Territory require urgent attention. The interventions need to be implemented immediately given that climate change is gradually interrupting water systems. This further impedes health especially as the female folks that bear the brunt of WASH, are stuck in making choices between climate change and sanitation. Our study suggests the urgent need to improve the environmental infrastructure of the FCT, Nigeria. Human and faecal contact must be reduced to the barest minimum by the increased provision of safely managed sanitation services (improved toilets) and encouraging households on their proper use and maintenance. Also, there is the need to sensitize and engage mothers/childminders on environmental, hygiene and sanitation practices. The study has further shown that the involvement of mothers and childminders in programs and policy designs is critical to the success of hand hygiene interventions in alleviating diarrhoea and the global burden of disease in Africa.

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INFORMED CONSENT FROM PARTICIPANTS

All participants were provided written informed consent which they signed up for before the administration of the questionnaire. Participation was voluntary, and confidentiality was assured.

DATA AVAILABILITY STATEMENT

The authors confirm that the data supporting the findings of this study are captured in the manuscript.

DECLARATION OF COMPETING INTERESTS

The authors have no competing interests.

LIST OF ABBREVIATIONS

AMAC	ABUJA MUNICIPAL AREA COUNCIL

BAC	BWARI AREA COUNCIL
WHO	WORLD HEALTH ORGANISATION
WASH	WATER, SANITATION AND HYGIENE
FCT	FEDERAL CAPITAL TERRITORY
NGN	NIGERIAN NAIRA
df	DEGREES OF FREEDOM

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