

## The water supply service during the COVID-19 pandemic among people of concern in Nigeria

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### ABSTRACT

Refugees in the destination countries might have some risks including lack of water supply. Nigeria as one of the destination countries for people of concern (PoCs) including refugees also faced the lack of access to water supply, especially during the COVID-19 pandemic. This study aimed to examine the factors related to reduced access to water supply in refugee camps in Nigeria during COVID-19 pandemic. This study used the secondary data available from UNHCR in Nigeria 2020. The survey used disproportionate stratified random sampling. After data cleaning, the data from 4,016 households were examined in this study. The interview has been done using the computer-assisted telephone interview. The factors related to the reduced access to water supply were living in Adamawa, Benue, Ogun, Taraba, Yobe, and Borne states, coming from Cameroon, Democratic Republic of Congo, Mali, and Syria, having household member 6-15 persons, having household income 41,000-60,000 Naira per month, and had low awareness about COVID-19. The demographic and economic factors were the most significantly related to reduced access to the water supply.

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## 1. INTRODUCTION

According to the United Nation (UN), a refugee (one kind of people of concerns (PoC's)) is people who live outside the country of origin because of fear of being persecuted due to an issue of race, religion, nationality, a part of a social or political group and they are unable or unwilling to avail themselves of the protection from the country [1]. The UN Refugee Agency (UNHCR) describes refugees as people who cross the border area of origin country and seek safety in another country due to fled war, force, or persecution [2]. In 2019, there were 79.5 million people forcibly displaced worldwide and 26 million were refugees [2].

Refugees are defined and protected in International law, and must not be returned to situations where their life Nigeria is the country with multi-ethnic and culturally diverse which consist of 36 states and federal capital territory [3]. In the specific area of North East of Nigeria, there is a crisis of humanitarian and development. Nigeria is one of the African countries that affected by COVID-19 pandemic in the aspects of

economic and health [4]. In terms of the economic aspect, during the COVID-19 pandemic, the macroeconomic was stability weak [5]. Due to the pandemic, Nigeria had the third-highest cases of COVID-19 among countries in Africa [6]. Besides the economic aspect, routine immunization was also reported low [6].

According to UNHCR data, Nigerian refugees in Chad, Cameroon, and Niger were 343,438 as the data on September 30, 2022 [7]. In detail 187,130 was in Niger, 136,036 in Cameroon, and 20,272 in Chad. In Nigeria, according to data on September 30, 2022, all refugees in Nigeria were 90,508, asylum seekers were 1,540, refugee returnees were 3,880, and all internally displaced persons (IDPs) were 3,167,581. Based on the country of origin, the refugees in Nigeria come from Cameroon, Niger, Central African Republic, Dem. Rep of the Congo, Syrian Arab Rep, Turkey, not specified, Mali, Cote d'Ivoire, Chad, and Sudan [7].

There are many issues among refugees in the host countries, such as health, economics, education, hygiene and sanitation. An issue about the water, sanitation, and hygiene (WASH) remains concern in almost all host countries of the refugee, including Nigeria. Refugees live in low sanitation in the slums. Lack of access to water, sanitation, and hygiene could easily refugee in communicable diseases including waterborne diseases, for instance, diarrhea, cholera, etc. Nowadays, during the COVID-19 pandemic, environmental factors are very important to prevent the transmission of the virus. However, most of the refugee camps lack of water supply and refugees could not practice the hand hygiene sanitation very well. Routine of hand washing and avoiding the crowded area is the way to prevent the COVID-19. In Nigeria, 3 of 10 people did not have access to clean water in the home [8]. The data from UNICEF found 1 in 5 children worldwide does not have enough water to meet their daily needs and experienced the lack of water supply due to floods in many areas in Indonesia [9]. The situation is worse because the data reported 60 million people in Nigeria did not have access to the basic clean water supply. The Nigerian people also face the similar things when the poorest and most marginalized people could not access clean water and are risky to be transmitted a virus. Children are the most vulnerable groups that could risk having water-borne diseases in the refugee camps, and the long consequence is malnutrition, including stunting. According to UNICEF data, children in more than 80 countries including Nigeria live in areas with extremely high-water vulnerability. The refugee camp in Algeria found the risky source of water supply that has high conductivity and high concentrations of chloride, nitrate, fluoride, sulfate, sodium, calcium, potassium, and iodide [10], [11]. This worst condition puts children as the biggest victims.

As a host country of refugees, Nigeria with UNHCR support is allowing the refugees to move freely and work legally [3]. Refugee can access to the health and education services like the nationals. Besides of international refugees, there are 2.9 million internally displaced persons in Nigeria. The number of refugees in Nigeria has been steady rise due to the conflict in the West African Sub-region, especially Republic of Cameroon [3]. From December 2017 to May 2021, the figure of refugees in Nigeria increased from about 57,000 to 71,400 and 1,600 asylum-seekers. About 73,000 refugees from various nationalities legally lived in Nigeria in June 2021. The government committed to ensuring availability and access to durable solutions for refugees and IDPs and also pledged to the Global Refugees Forum to include refugees needs in the national development plan [12]. The Nigerian Federal Government and host States within Nigeria provide the legal framework for the realization of their well-being, living with respect and dignity, including legal protection, free education, time-limited humanitarian assistance, participate in workforce, freedom of movement, and access to health care. The aspect that mostly is not well implemented in the refugee camps is the lack of water, sanitation, and hygiene (WASH). This study aimed to examine the factors related to reduced access to water supply among refugees in Nigeria during the COVID-19 pandemic.

## 2. RESEARCH METHOD

This cross-sectional research was a kind of socio-economic impact assessment of the COVID-19 pandemic among persons of concern in Nigeria. This study has been done from June to July 2022 by United High Commissioner for Refugees (UNHCR). The unit of analysis in this study was households from refugees, internally displaced persons, returnees, asylum seekers, stateless persons and community members hosting displaced populations. The topics of the survey include health and nutrition, health, protection, food security, livelihood and social cohesion, and basic needs. The original survey examined the impact of COVID-19 pandemic on the situations of economic, social, cultural, civil, and political rights. The survey used disproportionate stratified random sampling. The interview has been done using the computer assisted telephone interview. The ethical clearance using the secondary data was received by the UNHCR Microdata Library email on June 22<sup>nd</sup>, 2022.

According to the COVID-19 Socio-Economic Impact Assessment Report on PoC, the original survey was led by UNHCR in together with partners in Nigeria. In detail, the survey has been conducted in all locations covering Northeast, South-South, Southeast, Southwest, and North Central for a total of 9 states. Different effects of the COVID-19 lockdown identified measures for different settings There are many dimensions of the impact of the pandemic such as economic, social, cultural, civil, and political rights among refugees. The survey takes a sociocultural value and age-gender diversity lens that provides information about the potential economic impact

of COVID-19. The survey aims to promote gender equality, empowerment, and meaningful participation for refugees and others of concern. The initial survey data collection has been done by UNHCR together with government and community leaders to streamline the process. In order to facilitate proper awareness and ensure the validity of the study, UNHCR and the partners were done with community sensitivity. UNHCR maintains the latest databases of all refugees living in urban and rural areas, as well as those in settlements and host communities. To facilitate data collection and intervention design, household-level data were used for the study at all sites. The database provides an estimate of the study population which informs an estimate of the sample size.

The original survey used the minimum sample size technique using the UNHCR database then the respondents were selected randomly. The survey was conducted with the help of smartphones and tablets via the *Kobo Collect App*. Data were analyzed according to each of the indicators identified under each objective. Most of the data components were analyzed using descriptive statistics. For ease of presentation of results and brevity, country-level analyzes were carried out using the collected data. The reason is to present the impact of COVID-19 on PoC in Nigeria as a whole. However, to facilitate the design of the intervention, the results of the analysis are then disaggregated using relevant variables to contextualize the problems that arise from the research.

This current study used total sampling to select the households which fully answer the questionnaire. The dependent variable of this study is the reduced access to water supply during the COVID-19 pandemic. While the independent variables were sociodemographic, economic, and level of awareness about COVID-19. After data cleaning, totally the data from 4,016 households were examined in this study. The data analysis has been done using STATA version 15 licensed by Mahidol University.

### 3. RESULTS AND DISCUSSION

#### 3.1. Results

The sample of this study was refugee in Nigeria. The condition of sociodemographic and economic are described in Table 1 (see in Appendix). This table shows that 18.50% of the refugee household felt reduced access to water supply during the COVID-19 pandemic. Hence, Figure 1 reveals that the majority of the refugee family lived in Borne State (24.00%) and Adamawa State (22.44%). Almost half of the sample was a refugee (42.88%), followed by a host community member (26.25%). About 60% of the refugee were from Nigeria and followed by Cameroon (38.27%). Compared to male, most of the refugee family has a female as the head of the household (53.06%). About 70% of heads of the household were married during the survey. The majority of the head of the household was aged 19 to 59 years old (89.27%) and worked as a farmer (43.70%). In terms of the household income, before COVID-19 pandemic most of the refugee families got less than 20,000 Naira per month (66.96%). According to awareness of COVID-19, most of the samples were in a moderate level (40.39%).

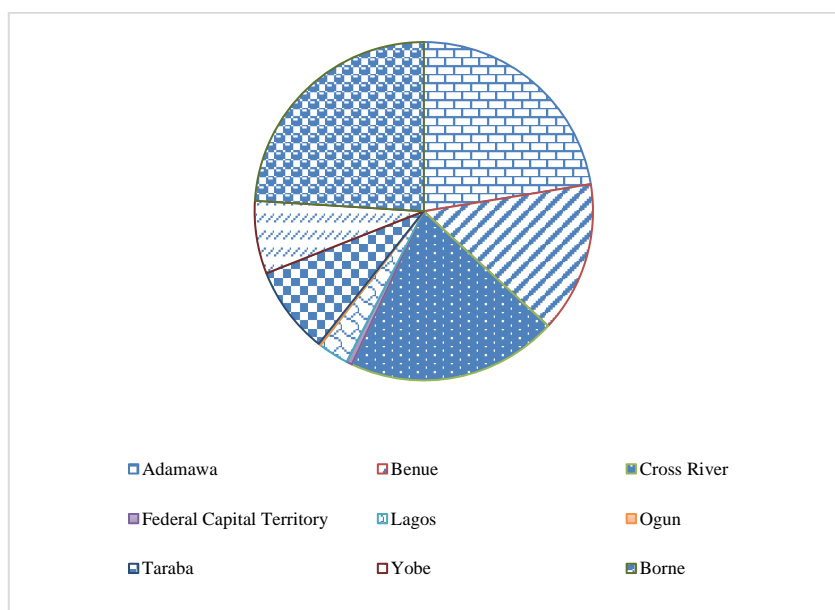


Figure 1. State where the PoC's live

Table 2 describes the result of the crude odd ratio related to factors associated with reduced access to water supply among refugees. The bivariate analysis has been done to find the crude odd ratio of independent variables related to reduced access to water supply among refugees in Nigeria. The results of the bivariate analysis found the variables that related to reduced access to water supply among refugees were state, population group/status, country of origin, gender of head of household, marital status, number of household members, income level, and level of awareness on COVID-19. The significant level was indicated by p-value less than 0.05. However, the factor including the age of the head of the household and the main occupation of the head of the household was found no correlation with reduced access to water supply among refugee in Nigeria during COVID-19. The variables that had a strong association with the reduced access to water supply were the state and the number of household members with a crude odd ratio 1.23 and 1.34, respectively.

Table 2. The crude odd ratio of the factors related to reduced access to water supply

Variables	Crude odd ratio (COR)	p-value (Confidence interval)
State	1.23	0.000 (1.20–1.27)
Population group/status	0.54	0.000 (0.47–0.63)
Country of origin	0.68	0.000 (0.58–0.78)
Gender of the head of household	0.80	0.007 (0.68–0.94)
Marital status of the head of household	0.88	0.001 (0.82–0.95)
The age group of the head of household	0.90	0.343 (0.73–1.12)
Number of household members	1.34	0.000 (1.18–1.52)
The main occupation of the head of household	0.96	0.151 (0.92–1.01)
Level of household income in Naira per month before COVID-19 pandemic	0.86	0.000 (0.80–0.93)
Level of awareness on COVID-19	0.89	0.001 (0.84–0.96)

Table 3 presents the multivariate analysis result using binary logistic regression. The result of this analysis was the adjusted odd ratio which means the variable has adjusted to other independent variables. In terms of state, compared with those who lived in Adamawa state, those who lived in the Benue, Cross River, and Taraba states were found the significant reducing the tendency to lack access to water supply by 80%, 92%, and 96% respectively. While those who lived in Yoba and Borne were 5.12 and 6.18 times more likely to have reduced access to water supply. In terms of the country of origin, compared with refugees from Nigeria, the refugee from Cameroon, the Democratic Republic of Congo, Mali, and Syria was found tended to have reduced access to water supply by 9.11 times, 11.98 times, 10.06 times, 26.12 times, respectively. Compared to heads of household aged less than 19 years old, the refugee family with the head of household aged more than 59 years were 9.20 times more likely to have reduced access to water supply. The number of household member also correlated with lack access to water supply, in detail the refugee family with 6-10 members and 11-15 members had the higher probability to have the reduced access to water supply by 1.27 times and 1.52 times, respectively. According to household income, compared to family with income less than 20,000 Naira, the family with income 41,000–60,000 Naira tends to have lower probability to have reduced access to water supply by 42%. The level of awareness on COVID-19 was also found significantly associated with reduced access to water supply. Compared to the family with high level of awareness, the family with low level of awareness had lower tendency to have reduced access to water supply by 59% as shown in Table 3 (see in Appendix).

There is no correlation was found between population group/status with reduced access to water supply. Gender and marital status of head of household was found no correlation with reduced access to water supply. The main occupation of head of household had not significantly associated with the reduced access to water supply. In conclusion, the factors that related to the reduced access to water supply were living in Adamawa, Benue, Ogun, Taraba, Yobe, and Borne states, coming from Cameroon, Democratic Republic of Congo, Mali, and Syria, had household member 6-15 persons, had household income 41,000-60,000 Naira per Month, and had low awareness about COVID-19.

### 3.2. Discussion

There is lack of studies related to reduced access to water supply among refugees in Nigeria, so the in this section the authors included similar studies from some refugee camps in several countries. According to the results of this study, there were found five factors related to the reduced access to the water supply. Factors related to reduced access to water supply during COVID-19 among refugees in Nigeria. In terms of the state where the refugees lived, the lack of access to water remains the most critical natural resource in refugee communities. The study in Lebanon found the local geography that the water spot located (state) is related to the water scarcity [13]. The state is also related to the hydrogeological system for sensing the water supply using the remote or GIS (Geographic Information Systems) Mapping to plan and conduct drillings [14]. The

geographical area of the state also important to concept the water and sanitation system as discussed among refugees in Zaatari camp, Jordan [15]. The land-based study has been discussed by researcher in Vietnam, she introduces the technology of power for refugees near the sea [16]. The study in Palestine found the factors of temperature in the state are related to the water accessibility [17]. The accessibility in the state can solve the problem of water source, water distribution units and overall network design (pipelines) [18]. One study in several refugee camps found that lack of sanitation especially for women in their menstrual period might impact to the sexual and reproductive health [19].

In terms of the origin and destination countries. One study found the characteristics of the destination country have larger impact than the characteristics of the source country which means the destination country offered some sources which are lacking in the origin country [20]. Adaptation from the home country and destination country is important as illustrated by the study in Australia [21]. The country of origin is related to the definition of refugees, refugees is often and individual or community fleeing from country of origin due to perceived threat because of race, religion, nationality, and membership of a particular or political group [22]. According to several household members, the members of household is related to the total persons need the water and the average amount of water needed per person [23]. In Uganda, open defecation among refugees is one determinants of a communicable diseases including cholera [24]. In terms of level of household income, the accumulation of household income in the community is related to the economic condition in order to plan the water distribution systems including pipes and storage tanks [25]. The economic situation of the community in the refugee camp is important to implement innovative sanitation technologies such as energy and fertilizer to provide the access to basic water, sanitation, and hygiene [26]. If possible, the community with enough economic level can adopt the water reuse-based treatment to solve the lack of water supply, like the implementation in a refugee camp in Jordan [27]. Not only the household income, but the economic factors in the national level is also influenced how the water supply can be accessed, as mentioned in the study in Syria [28]. Supporting the previous statement, the standard for refugee camps which need the appropriate storage and preparation [29]. Additionally, the problem of water shortage and contamination is the main issue in the refugee camps in Bangladesh [30].

According to the level of awareness on COVID-19, waterless is related to communicable diseases, that are water borne diseases and foodborne diseases [31]. During the COVID-19 pandemic, most people were aware about the hand-washing behavior. This is also implemented in the refugee camp in Thailand. That study examined the level of effectiveness of cholera vaccine then the results found some of the sample had the *Escherichia coli* [32]. Unawareness or fear of stigma about the deportation and COVID-19 among refugees might lead to the lack of resources and test kits [33]. In refugees camp in Syria, people are risky to be transmitted by COVID-19 [34]. The refugee who positively diagnosed COVID-19 can increased the capacity in the healthcare so they tend to have reduce the water supply [35]. Generally, the access to water, sanitation, and hygiene (WaSH) services for refugees and IDPs is the important component of sustainable development goals (SDGs) goal 6: achieving universe and equitable access to basic WaSH by 2020 [36]. In South Sudan, the hygiene and sanitation including hand washing with soap is not common [37]. The emergency water treatment is needed in refugee camps as implemented in South Sudan [38]. The piped water is the main source for drinking in the refugee camp in Jerusalem [39]. The water supply is also related to the water scarcity and need the water quality testing first [40].

#### 4. CONCLUSION

The factors related to the reduced access to water supply were living in Adamawa, Benue, Ogun, Taraba, Yobe, and Borne states, come from Cameroon, Democratic Republic of Congo, Mali, and Syria, having household member 6-15 persons, had household income 41,000-60,000 Naira (93 USD-136 USD) per month, and had low awareness about COVID-19. The demographic and economic factors were the most significantly related to reduced access to the water supply. There is a need the collaboration from other stakeholders to provide sufficient water for refugees in Nigeria which is supported by neighboring countries.

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## APPENDIX

Table 1. The general characteristics of the sample (*continue*)

		Variables (n=4,016)	Frequency	Percentage	
Reduced access to water supply during the COVID-19 pandemic State	No		3,273	81.50	
	Yes		743	18.50	
	Adamawa		901	22.44	
	Benue		579	14.42	
	Cross river		809	20.14	
	Federal capital territory		22	0.55	
	Lagos		117	2.91	
	Ogun		8	0.20	
	Taraba		336	8.37	
	Yobe		280	6.97	
	Borne		964	24.00	
	Population group/status	Asylum seeker		33	0.82
		Host community member		1,054	26.25
IDPs			783	19.50	
IDPs returnees			353	8.79	
Refugee			1,722	42.88	
	Refugee returnee		71	1.77	



Table 1. The general characteristics of the sample (*continue*)

	Variables (n=4,016)	Frequency	Percentage	
Country of origin	Nigeria	2,388	59.46	
	Cameroon	1,537	38.27	
	Central Africa Republic	10	0.25	
	Democratic Republic of Congo	50	1.25	
	Mali	10	0.25	
	Other	18	0.45	
	Syria	3	0.07	
Gender of the head of household	Male	1,885	46.94	
	Female	2,131	53.06	
Marital status of the head of household	Divorced	106	2.64	
	Married	2,787	69.40	
	Separated	137	3.41	
	Single	645	16.06	
	Widowed	341	8.49	
The age group of the head of household	<19	48	1.20	
	>59	383	9.54	
	19-59	3,585	89.27	
Number of household members	0-5	1,913	47.63	
	6-10	1,807	45.00	
	11-15	296	7.37	
	16-20	133	3.31	
The main occupation of the head of household	Artisans	133	3.31	
	Business	1,117	27.81	
	Farming	1,755	43.70	
	Not gainfully employed	186	4.63	
	Others	179	4.46	
	Paid job	381	9.49	
	Remittances	125	3.11	
	Students	140	3.49	
	Level of household income in Naira per month before COVID-19 pandemic	<20,000	2,689	66.96
		>80,000	88	2.19
21,000-40,000		863	21.49	
41,000-60,000		292	7.27	
61,000-80,000		84	2.09	
Level of awareness on COVID-19	High	850	21.17	
	Low	777	19.35	
	Moderate	1,622	40.39	
	Poor	318	7.92	
	Very high	449	11.18	

Table 3. The multivariate analysis of reduced water supply among refugees in Nigeria during COVID-19 (*continue*)

	Variables	Adjusted odd ratio	p-value (Confidence interval)
State	Adamawa	Ref	
	Benue	0.20	0.001 (0.08-0.52) **
	Cross river	0.08	0.000 (0.03-0.22) ***
	Federal capital territory	0.52	0.515 (0.07-3.77)
	Lagos	0.83	0.768 (0.23-2.93)
	Ogun	0.44	0.427 (0.06-3.36)
	Taraba	0.04	0.000 (0.01-0.14) ***
	Yobe	5.12	0.000 (3.62-7.25) ***
	Borne	6.18	0.000 (3.96-9.64) ***
Population group/status	Asylum seeker	Ref	
	Host community member	1.02	0.962 (0.45-2.30)
	IDPs	1.06	0.898 (0.42-2.66)
	IDPs returnees	2.41	0.056 (0.98-5.92)
	Refugee	0.97	0.943 (0.41-2.27)
	Refugee returnee	0.52	0.243 (1.18-1.55)
Country of origin	Nigeria	Ref	
	Cameroon	9.11	0.000 (2.78-29.81) ***
	Central Africa Republic	2.86	0.326 (0.35-23.32)
	Democratic Republic of Congo	11.98	0.001 (2.69-53.23) **
	Mali	10.06	0.016 (1.53-66.33) *
	Other	3.79	0.144 (0.63-22.72)
	Syria	26.12	0.024 (1.55-440.87) *
Gender of the head of household	Male	Ref	
	Female	1.20	0.091 (0.97-1.49)
Marital status of the head of household	Divorced	Ref	
	Married	0.69	0.132 (0.42-1.12)
	Separated	1.02	0.960 (0.54-1.90)
	Single	0.92	0.786 (0.53-1.61)

Table 3. The multivariate analysis of reduced water supply among refugees in Nigeria during COVID-19 (*continue*)

	Variables	Adjusted odd ratio	p-value (Confidence interval)
The age group of the head of household	Widowed	0.62	0.092 (0.35–1.08)
	<19	Ref	
	>59	9.20	0.033 (1.19–71.01)
Number of household members	19-59	6.30	0.074 (0.83–47.67)
	0-5	Ref	
	6-10	1.27	0.019 (1.04–1.55) *
The main occupation of the head of household	11-15	1.52	0.015 (1.08–2.12) *
	Artisans	Ref	
	Business	1.43	0.221 (0.80–2.55)
Level of household income in Naira per month before the COVID-19 pandemic	Farming	1.57	0.126 (0.88–2.81)
	Not gainfully employed	0.79	0.496 (0.39–1.57)
	Others	0.93	0.836 (0.48–1.82)
	Paid job	1.12	0.711 (0.61–2.08)
	Remittances	1.83	0.145 (0.81–4.11)
	Students	1.10	0.826 (0.47–2.56)
	<20,000	Ref	
Level of awareness on COVID-19	>80,000	0.70	0.332 (0.34–1.43)
	21,000–40,000	0.88	0.266 (0.70–1.10)
	41,000–60,000	0.58	0.010 (0.38–0.88) *
	61,000–80,000	0.72	0.373 (0.34–1.49)
Level of awareness on COVID-19	High	Ref	
	Low	0.41	0.000 (0.30–0.56) ***
	Moderate	0.79	0.054 (0.63–1.003)
	Poor	0.74	0.116 (0.51–1.08)
	Very high	0.75	0.123 (0.52–1.08)

Note: \*p-value <0.05, \*\*p-value <0.001, \*\*\*p-value <0.001

LR chi2=642.41; prob >chi2 0.000; pseudo R2=0.1670; log likelihood=-1602.0807