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RESEARCH ARTICLE

Determinants of Households' Access to Improved Water Sources, Sanitation and Handwashing facilities among Under-18 Orphans: A Secondary Analysis of 2018 Demographic Health Surveys

Abimbola Jamiu Solagbade[1]✉, **Funmilayo Modupe Omodara**[1], **Edith Samuel Isiek**[1], **Grace Charles Ishatah**[1]

[1] College of Medicine, University of Ibadan, Ibadan, Nigeria

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ABSTRACT

Background: This study aimed to investigate households' access to improved water sources, sanitation and handwashing facilities among under-18 orphans in Nigeria.

Methods: Data were obtained from the 2018 Nigerian Demographic and Health Survey. A total of 6152 orphans were included. Access to improved water, sanitation and presence of handwashing facilities were the main outcome variable. SPSS version 26.0 was used for data analysis. Statistical significance was declared at $p < 0.05$.

Results: The respondents mean age was 10.5±4.5years which about half (50.3%) were female. Respondents from rural areas were 73.8% less likely to have access to improved source of water supply compared to those who were from urban areas (OR=0.262, CI: 0.231-0.297). Also, those with higher education were 9.2 times more likely to have access to improved sanitation as compared to those who had no education (OR=9.212, CI: 1.131-75.005). Also, orphans from rural communities were 13.8% less likely to have access to basic hand washing facilities compared to those who were from urban communities (OR=0.862, CI: 0.762-0.976).

Conclusion: This study revealed that some socio-demographic characteristics were significant determinants to access to improved water, sanitation and presence of handwashing facilities in the households.

Introduction

Globally, 2 billion people lack access to basic sanitation services, and 785 million people lack access to clean water and few handwashing facilities (1). Millions of people worldwide continue to pass away from illnesses linked to insufficient water supply, sanitation, and hygiene (2-3). Each year, poor access to improved water, sanitation, and hygiene causes the deaths of around 829,000 individuals from low- and middle-income nations (4). The risk of mortality from access to unimproved water sources is reportedly higher among under-18 (5). The risk of transmission of

✉ Corresponding Author: Abimbola Jamiu Solagbade
Email address: solagbadeaj@gmail.com

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diseases is increased when water services are absent, insufficient, or improperly managed (1).

Parents are a child's main caregivers and saviours, yet sadly, countless of children spend their lives without them. Such youngsters are classified as "orphans" in society since their parents are either deceased or incapable of raising them. Orphans might have one parent or two parents (6-7). According to the United Nations Children`s Fund, there are 147 million orphans worldwide, of whom 2 to 8 million are thought to reside in orphanages (8). Non-governmental organizations (NGOs) or social workers care for these orphans with little resources and assistance to provide them with the necessities of life, including education and healthcare, since they are a marginalized group with little influence over their own lives (9).

One of the most important aspects of raising living conditions to preserve and enhance health, human development, and growth is access to clean water and basic sanitation (10-11). It is one of the major issues that must be resolved in order to achieve the Sustainable Development Goal (12). In order to prevent the current coronavirus pandemic, research also highlights how crucial it is to provide clean water, sanitation, and hygienic environments (13). Orphanages typically have toilets; however, they frequently do not function (14). Orphans with unimproved sources of drinking water and sanitation facilities are more likely to be suffer diseases such as cholera, typhoid, schistosomiasis, infections of the respiratory system, skin, and eye infections among others (15-16).

Children are a nation's future; thus, it is important to have a healthy, secure, educated, and well-developed child population that will grow up to be contributing members of the community, with orphans having a significant part in society (7). The availability of better systems for accessing water, sanitation, and excellent hygiene has been determined by a number of factors (17-18). However, this study aimed to investigate the determinants of household's access to improved drinking water, sanitation and handwashing facilities among under-18 orphans which there is dearth of literature among this population.

Materials and Methods

Study design and area

This study used cross-sectional design and, in this study, we used an in-depth secondary data analysis of the Demographic Health Survey in Nigeria.

Data sources

This study used data from the 2018 National Demographic and Health Survey (NDHS) which is a two-stage cluster sampling procedure used in a national population-based household survey. However, the household dataset was used which included sociodemographic information of respondents; information about water, sanitation (toilet) and basic hand washing facilities. The 2018 DHS Survey obtained data from 188010 respondents across all the 6 geopolitical regions of Nigeria but only 6152 respondents of under -18 years were included in this survey.

Outcome variables

The outcome variables for this study are water, sanitation and handwashing facilities. All the variables used in this study were extracted from the respondent's records. The dependent variable was determined by the respondent's response to access to water source, sanitation facility (type of toilet facility), and basic hand washing facilities [Table 1].

Independent variables

The independent variables included the sociodemographic characteristics of the respondents, and other variables which include age of respondent (years), sex, current marital status, highest educational level attained, orphanage status, region, wealth index combined, and type of place of residence.

Statistical analyses

Data were analysed using the SPSS (Statistical Package for the Social Sciences) software version 26. Descriptive statistics was done to describe features of the data set by generating summaries and presentation in frequency table. To evaluate the association between the independent variable and the outcome variable, logistic regression was used. Logistic regression model was applied to estimate the odds ratios (OR) and 95% confidence intervals (CI) for improved (vs. unimproved) water sources and sanitation facilities, respectively, and presence of handwashing facilities with p value <0.05.

Table 1: Coding of variables

Variable	Category	Definition
Water	Improved	Water that came from a pipe, borehole, dug well, protected spring, filtration plant, or rainwater
	Unimproved	Water that came from unprotected dug well, unprotected spring, surface water, vendor-provided water, bottled water, or tanker truck water
Sanitation	Improved	Pour-flush latrine, simple pit latrine, ventilated improved pit latrine, pit latrine with slab, composting toilet, or if toilet flushed to a public sewer or septic system
	Unimproved	Pit latrine without slab, open-pit latrine, bush, field, no toilet facility, bucket toilet, traditional dry vault, dry toilet, or toilet that flushed to "somewhere else"
Handwashing	Yes	Observed, fixed place, Observed, mobile place
	No	Not observed: not in dwelling, Not observed: no permission to see, Not observed: other reason

Ethical Approval

This study is based on the Nigeria Demographic and Health Survey (NDHS). The datasets used in this study were obtained via online registration to the NDHS program which is readily available on the DHS website http://dhsprogram.com/data/available-datasets and can be accessed for research with prior permission. DHS strictly follows all the ethical concerns, including informed consent, hence no ethical approval or informed consent was required for the current study.

Results

Socio-Demographic Information of Respondents

Six thousand, one hundred and fifty-two (6152) respondents were engaged in this study. The respondents mean age was 10.5±4.5 years which some (36.8%) of the respondents were in the 11 – 15 years age group. About half (50.3%) were females and 38.5% had primary education. Majority of the respondents (93. 6%) only lost one of their parents, 21.0% were from North West, and 59.2% were rural dwellers [Table 2]. Many (68.7%) had access to improved source of water supply, slightly above half (51.3%) had access to improved sanitation and 78.0% had access to hand washing facility [Figure 1].

Table 2: Socio-demographic information of respondents

Variables	Classification	F	%
Age of Respondent (years)	0 - 5	1035	16.8
	6 - 10	1891	30.7
	11 - 15	2266	36.8
	16 and above	960	15.6
Sex	Male	3057	49.7
	Female	3095	50.3
Highest Educational Level Attained	No education, preschool	2089	34.0
	Primary	2369	38.5
	Secondary	1686	27.4
	Higher	8	0.1
Orphanage Status	Single	5758	93.6
	Double	394	6.4
Region	North Central	1082	17.6
	North East	1399	22.7
	North West	1290	21.0
	South East	1046	17.0
	South South	844	13.7
	South West	491	8.0
Wealth index combined	Poorest	1132	18.4
	Poorer	1461	23.7
	Middle	1521	24.7
	Richer	1215	19.7
	Richest	823	13.4
Type of place of residence	Urban	2512	40.8
	Rural	3640	59.2

F: Frequency

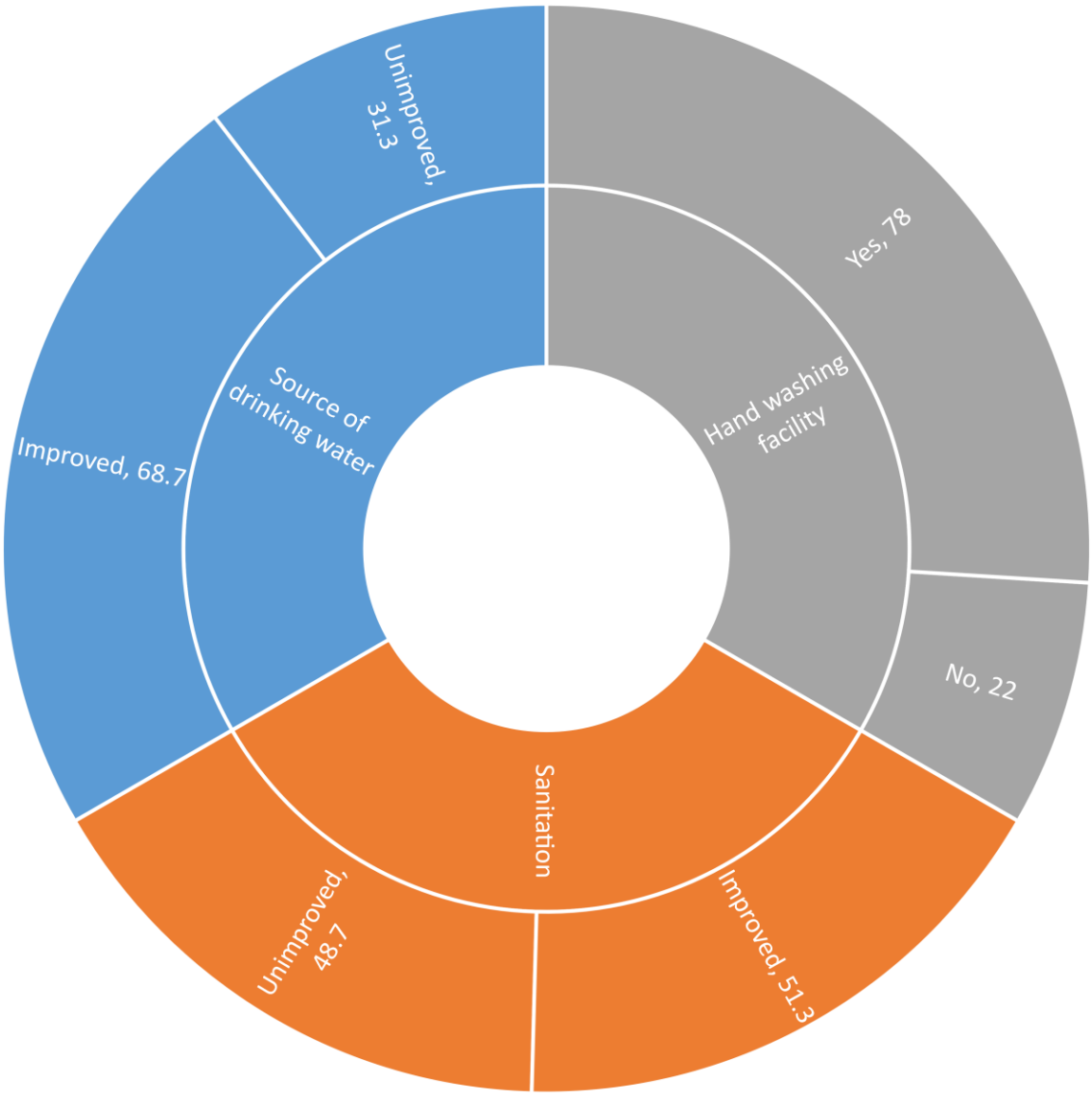

Figure 1: Sanitation, Source of drinking water and handwashing facility of respondents

Factors influencing access to improved water, sanitation and handwashing facilities among under-18 orphans

Respondents who had primary and secondary education were 1.4 and 2.0 times more likely to have access to improved source of water supply compared to those who had no education (OR=1.355, CI: 1.197-1.534; OR=1.980, CI: 1.716-2.285 respectively). Orphans in richest family are 19.5 times more likely to have access to improved water as compared to those who had poorest wealth index (OR=19.472, CI: 14.294-26.525). Furthermore, respondents from rural areas were 73.8% less likely to have access to improved source of water supply compared to those who were from urban areas (OR=0.262, CI: 0.231-0.297).

Education was revealed to be a great determinant of access to improved sanitation as respondents who had higher education were 9.2 times more likely to have access to improved sanitation as compared to those who had no education (OR=9.212, CI: 1.131-75.005). Also, wealth index is a great influence on access to improved sanitation as the orphans in richest family were 123.7 times more likely to have access to improved sanitation as compared to the poorest (OR=123.692, CI: 85.816-178.286). Also, respondents from rural communities were 67.3% less likely to have access to improved sanitation as compared to those who were from urban communities (OR=0.327, CI: 0.294-0.364).

Table 3: Factors influencing access to improved water, sanitation and handwashing facilities among under-18 orphans

Variables	Water Source		Sanitation (Toilet) Facility		Basic Hand Washing	
	aOR	95%CI	aOR	95%CI	aOR	95%CI
Age (years)						
0 - 5 (Ref)	-	-	-	-	-	-
6 - 10	0.816*	0.693-0.962	0.923	0.793-1.074	0.995	0.829-1.194
11 - 15	0.986	0.840-1.158	1.046	0.903-1.212	0.988	0.828-1.180
16 and above	0.964	0.796-1.168	1.183	0.992-1.410	1.093	0.882-1.355
Sex						
Male (Ref)	-	-	-	-	-	-
Female	0.979	0.879-1.090	0.990	0.896-1.094	1.119	0.992-1.263
Highest Educational Level Attained						
No education, preschool (Ref)	-	-	-	-	-	-
Primary	1.355***	1.197-1.534	1.335***	1.186-1.503	1.149*	1.000-1.320
Secondary	1.980***	1.716-2.285	2.184***	1.915-2.490	1.406***	1.201-1.646
Higher	9.667	7.716-10.285	9.212*	1.131-75.005	5.918	0.000-.
Orphanage Status						
Single (Ref)	-	-	-	-	-	-
Double	1.130	0.902-1.414	1.230*	1.002-1.511	1.235	0.952-1.602
Region						
North Central (Ref)	-	-	-	-	-	-
North East	0.760**	0.644-0.896	1.654***	1.409-1.941	0.218***	0.170-0.278
North West	1.264**	1.063-1.504	1.033	0.878-1.217	0.355***	0.275-0.459
South East	1.372**	1.141-1.651	1.342**	1.131-1.592	0.372***	0.285-0.485
South South	1.120	0.925-1.356	2.140***	1.781-2.572	0.152***	0.117-0.197
South West	4.726***	3.430-6.513	2.567***	2.056-3.204	0.460***	0.333-0.636
Wealth index combined						
Poorest (Ref)	-	-	-	-	-	-
Poorer	1.777***	1.519-2.079	2.725***	2.232-3.328	0.913	0.765-1.090
Middle	2.774***	2.364-3.254	6.471***	5.328-7.859	1.226*	1.023-1.469
Richer	7.959***	6.507-9.735	22.542***	18.159-27.982	1.291**	1.065-1.566
Richest	19.472***	14.29-26.52	123.692***	85.816-178.28	2.873***	2.217-3.724
Type of place of residence						
Urban (Ref)	-	-	-	-	-	-
Rural	0.262***	0.231-0.297	0.327***	0.294-0.364	0.862**	0.762-0.976

*p < 0.05; **p < 0.01; ***p < 0.001 ref – reference variable

Analysis revealed that those who had primary and secondary education were 1.1 and 1.4 times more likely to have access to basic hand washing facilities compared to those who had no education (OR=1.149; CI: 1.000-1.320; OR=1.406, CI: 1.201-1.64 respectively). However, orphans who belongs to richest family were 2.9 times more likely to have access to basic hand washing facilities compared to the orphans in the poorest family (OR=2.873, CI: 2.217-3.724). Also, respondents from rural communities were 13.8% less likely to have access to basic hand washing facilities compared to those who were from urban communities (OR=0.862, CI: 0.762-0.976) [Table 3].

Discussion

About half of the respondents were females contrary to another study which showed a lower proportion of female participants although the study was also among orphanage children (19). This could be due to the fact that in Nigeria male orphans are more easily adopted by individuals or families into foster homes/care as compared to their female counterparts (20). This may be related to the patriarchal believe that male children are more valuable than females. The majority of the respondents in our study were single orphans which implies having only one parent similar to another study conducted which in most case of under-18 years has one of his or her parent dead (21). The large number of single orphans in developing countries including Nigeria is a result of many negative circumstances such as diseases (HIV/AIDS) armed conflicts including the Boko Haram insurgency particularly in Northern Nigeria where the fathers/men are targets of such attacks leaving the children as single orphans. Another contributing factor to single orphans in Nigeria is the high maternal mortality which results to children losing their mothers soon after birth. Also, this study showed that respondents had access to an improved source of water supply which was corroborated with findings from a previous study (22). This could be as a result of the area where the orphans live. Generally, in Nigeria, there is an increase access to improved water sources in the urban centres as compared to the rural areas (23). Also, orphans who live with caregivers that have access to improved water sources will by extension have access to the same services. Furthermore, it was found that more than half of the orphans had access to an improved toilet facility, which was quite higher that reported in another study (24). The differences could be because the current study was conducted in all thirty-six states in Nigeria including the Federal capital territory, Abuja whereas the latter was conducted in only one state of the country. Also, a large proportion of orphans had access to handwashing facilities but a lower result was recorded in earlier research where about half of households had access to a handwashing facility (25). The contrast in findings may be due to the disparity in the study population. While the former study focused on children 0-59 months of age, the current study only focused on orphans below 18 years.

The present study showed that educational status were significant determinants to the access to improved source of water supply among orphans which this is similar to findings from another study (26). The availability of WASH infrastructures in schools where the orphans are enrolled in may have similarly increased their access to improved water sources. We also observed that those in rural areas compared to those in urban areas were 73.8% less likely to have access to an improved source of water supply. This may not be unrelated to the underlying inequality in the access to water and sanitation services among rural and urban residents in Nigeria where urban residents have increased access to improved water sources as compared to the rural communities (23). Similar findings were obtained from a previous study where 94% were less likely to have access to improved water sources (21-22).

Education is a resource factor of quality health outcomes in communities in sub-Saharan Africa (27-28); and this is because educated people are usually more aware of conditions that guarantee their well-being, and they could have easier access to resources that can create healthy conditions around them (11). However, our findings supported this which showed that orphans who had higher education were more likely to have access to improved sanitation compared to their counterparts who had no education. This result is corroborated by other studies (29 – 31). Access to improved sanitation facilities, particularly efficient and decent toilet remains very critical not only to achieve

sustainable development goals (SDG) but also to sustain environment and development. However, in this study, rural dwellers were less likely to have access to improved toilet facilities. This was also confirmed in a similar study (22). Factors responsible for the widening gap in access to safe toilets between rural and urban areas in Nigeria among others include age in years, household size, education level, poverty, and marital status (32).

Furthermore, our findings revealed that those who had primary and secondary education were more likely to have access to basic hand washing facilities compared to those who had no education. Similarly, a previous study reported that households where heads had completed secondary and above educational level had basic handwashing facilities compared to counterparts who had no formal education (33).

Limitations

The results of this study should be interpreted with the following limitations. Since the information is recorded retrospectively, it might be prone to recall bias, and the analyses were conducted using data collected in a cross-sectional survey, which prevents causal inferences.

Conclusion

This study revealed showed that some of the orphans still had unimproved water source, sanitation and no hand washing facilities. However, highest level of education, orphanage status, wealth index and type of place were significant determinants to access to improved water, sanitation and presence of handwashing facilities in the households. In order to narrow the inequality gap in access to water and sanitation facilities, governmental and nongovernmental organizations working on water sanitation and hygiene (WASH) should consider a multifaceted policy approach that accounts for the regions and residence variations among rural and urban residents. This will tackle the inequality and further lead to the achievement of the sustainable development goals (SDG). The study showed that education was positively associated with access to improved water and sanitation facilities, it is recommended that orphans across the regions of Nigeria be granted access to education either through a free education scheme which will in turn improve their access water and other sanitation facilities.

Authors Contributions

All co-authors have involved in all stages of this study while preparing the final version. They all agree with the results and conclusions. AJS: Conceptualization, methodology, data analysis, writing – original draft, writing - review and editing. FMO: Conceptualization, writing – original draft, writing - review and editing. ESI: Conceptualization, data curation, writing – original draft, writing - review and editing. GCI: Data curation, writing - review and editing.

Declaration of interest

The authors declare no competing interest.

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Data sharing statement

Data supporting the findings and conclusions are available upon request from corresponding author.

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