



## **Episodic Diarrhoeal Diseases and Hygienic Practices among Caregivers of Under-fives Attending a Rural Health-centre in Anambra State, Nigeria**

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### **Authors' contributions**

*This work was done in collaboration between all authors. Authors MCO and UCA designed the study and performed the statistical analysis. Authors JNE, EID, IGE, MCO and UCA wrote the protocol and wrote the first draft of the manuscript. Authors MCO, UCA and JNE managed the analyses of the study. Authors EID and IGE managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Background:** Hand-washing, environmental sanitation and other hygienic practices are public health measures to prevent diarrhoea. This study assessed episodic diarrhoeal diseases and hygienic practices in Anambra State, Nigeria.

**Methodology:** This was a descriptive cross-sectional survey of 232 consenting parents/ caregivers

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who attended Comprehensive Health Centre, Ukpo. The respondents were enrolled on each clinic day by exit interview in the selected facility, hence convenient sampling was done. Data were collected using a structured interviewer-administered questionnaire on the child's socio-demographics, feeding pattern, episodes of diarrhoea in the last 24 months, as well as parents hand-washing techniques.

**Results:** Diarrhoea was commoner among those aged 0-12 months 157(77%). More males 135 (58%) were affected. Pit toilet was the commonest form of sewage disposal 141(61%). Also, 188(81%) of the under-fives had <5 episodes of diarrhoea in 24 months as their parents practised good hygienic measures compared to 44(19%) who had >5 episodes as a result of poor hygienic practices and this was statistically significant ( $p=0.023$ ). Furthermore, 23(10%) of the under-fives whose parents practised good hand-washing techniques had 0-5 episodes of diarrhoea compared to 169(90%) of the same population who had 0-5 episodes in the last 24 months as a result of poor hand-washing. Results also showed that there was a 2.6-fold (aOR: 2.62, 95%CI: 1.11-6.19;  $p = 0.038$ ) increased likelihood of having more than 5 episodes in children of parents with poor hygienic practices compared to those with better hygienic practices.

**Conclusion:** Diarrhoea was commoner in infants and may be as a result of poor hygienic practices among the caregivers. Improved hygienic practices are recommended.

*Keywords: Diarrhoeal diseases; handwashing; sanitation; hygienic practices; Anambra State.*

## 1. INTRODUCTION

Diarrhoeal disease affects the gastrointestinal tract and is characterised by frequent passage of stool in excess of normal for an individual or the passage of three or more loose or watery stools per day after infancy [1]. It is ranked as a major contributor to morbidity and mortality globally especially among children [1-3].

Diarrhoeal diseases are basically acquired through the faeco-oral route or by ingestion of contaminated food or water. It is associated with poverty, poor personal and environmental hygiene [4]. The World Health Organization (WHO) states that diarrhoea diseases are leading cause of death among under-fives with about 525,000 children below 5 years dying annually. Furthermore, 1.7 billion cases of diarrhoea diseases occur yearly, however, safe drinking water, and hygienic practices helps prevent it [3,4]. While global mortality may be declining, the overall incidence of diarrhoea remains unchanged at about 3.2 episodes per child per year. In the United States, there are 1.5 million outpatient visits for gastroenteritis, 200,000 hospitalisations, and 300 deaths annually especially among children and under-fives inclusive [5]. Furthermore, the WHO also stated that about 10.6 million children die yearly before reaching their fifth birthday and gastroenteritis alone is responsible for almost 20% of these deaths [2,6].

In Nigeria, diarrhoeal diseases are among the leading causes of morbidity and mortality

amongst under-fives in Nigeria, largely driven by inadequate safe water, sanitation, and hygiene. With the loss of about 2,300 under-fives daily from various diseases such as malaria, pneumonia, diarrhoea, measles and HIV/AIDS, Nigeria ranks as the second largest contributor to under-five mortality [7,8]. Furthermore, an estimated 300,000 under-fives mortalities have been stated to be due to diarrhoeal diseases which is a consequence of limited access to safe water, poor sanitation and hygiene in 2015 [9]. It is also pertinent to note that hygienic and sanitation measures indeed reduce the morbidity and mortality associated with diarrhoeal diseases, hence simple, and life-saving effective measures can never be overemphasised [10].

Diarrhoea as a cause of morbidity and mortality among under-fives also affects the health and educational performance of children while depreciating the socio-economic status of the parents or care-givers [11]. However, this scourge could be significantly reduced through the promotion of hygiene, hand-washing practices by care givers, education of mothers on simple hygienic measures, complete immunisation of children, as well as correct and adequate infant feeding practices [12,13]. Other possible ways to reduce diarrhoea diseases apart from hand-washing that breaks the faeco-oral transmission are good and adequate water supply, and sanitation practices that act as primary and secondary barriers to disease transmission [14-16].

The study explored the relationship between episodic diarrhoea and parents'/caregivers' hand-washing, sanitation, and other hygiene practices and solutions for healthier upbringing were proffered.

## 2. METHODOLOGY

### 2.1 Study Area

This study was conducted at Ukpo Comprehensive Health Centre (CHC) - a rural out-station of the Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State. Ukpo is situated in Dunukofia local government area (LGA) and houses the LGA headquarters. The population is predominantly agrarian with civil servants and private business owners. The main religion is Christianity with few traditional worshippers. The major language is Igbo. Being a rural LGA as gazetted in the State, it therefore stimulates the interest of study considering the fact that hygienic practices may be low.

### 2.2 Study Population

A total of 232 consenting parents/carers of under-fives (U-5) attending the Infant Welfare Clinic (IWC) of the Ukpo CHC with complaints of frequent passage of loose stool were enrolled for the study. This study lasted over a 24-month period (January 2016 to December, 2017).

### 2.3 Sample Size Determination

Sample size was obtained using the formula for descriptive study;

$$n = \frac{z^2 p q}{d^2}$$

Where

n= minimum sample size  
z= 1.96 (constant at 95% confidence)  
p=0.3 (at 30% population prevalence from previous study)  
q= 1-0.05 (1-p)  
d=degree of accuracy (usually set at 0.05)

With a prevalence of 30% for diarrhoea in under-fives in a similar study [6], and z of 1.96 and sampling error of 5%. The calculated minimum sample size was 232.

### 2.4 Study Design/ Sampling Technique

This was a descriptive cross-sectional study, using interviewer-administered questionnaires.

Total population sampling was done with parents/ caregivers who gave their consent being interviewed before leaving the facility on each clinic visit. Those who were interviewed before were excluded by asking if they had earlier had the questionnaire.

### 2.5 Selection Criteria

Consenting parents/ caregivers of under-fives (U-5) attending the Infant Welfare Clinic (IWC) of the Ukpo CHC with complaints of frequent passage of loose stool were enrolled for the study while those caregivers who attended the child welfare clinic with complaints of soft, non-watery stool were excluded from the study.

### 2.6 Study Instrument

The study questionnaire was developed by the researchers based on existing literature [5-8]. It was a structured questionnaire, pre-tested in Neni CHC which is another comprehensive health centre of the Teaching hospital, in a similar rural population. The questionnaire obtained information on Socio-demographics and hygienic practices of caregivers and the under-fives.

### 2.7 Statistical Analysis

Data was collected on each clinic day with the use of questionnaires, and after coding it was inputted into STATA statistical software version 15, which was used for all data analyses. The hygienic techniques adopted by the parents/carers were classified into good vs bad. This grading was simply rated good where optimum standard for hygiene for non transmission of disease is maintained and bad where standards below to allow infections occur. Data were summarised in frequency tables and differences between both groups compared using Pearson's Chi-square analysis. Univariate logistic regression analysis was conducted to identify significant confounding covariates of the association between hand washing techniques and episodes of diarrhoea. Significant covariates (which changed the measure of effect by >10%) were included in the final multivariate logistic model and presented as adjusted odds ratio (aOR) with 95% confidence interval (95%CI) with the level of statistical significance based on a p-value of < 0.05.

### 2.8 Ethical Consideration

The study was approved by the Nnamdi Azikiwe University Teaching Hospital Ethics committee. Informed consent was obtained from the parents or caregivers` s of all the respondents after the aim of the study was individually explained to them. Respondents were assured that involvement in the study was voluntary and they were at liberty to withdraw at any stage. They were also assured of the anonymity of their identity and the confidentiality of their responses.

### 3. RESULTS

Table 1 summarizes the socio-demographic characteristics of the study participants, stratified by the hygienic techniques of the parents. It also shows the differences between these covariates within the groups. In both groups, most participants children were aged 0 to 12 months with a greater proportion (58%) being males while the parents` occupation significantly differed in those with poor vs good hygienic techniques (p-values 0.030 and 0.039 for mothers` and fathers` occupations respectively).

Table 2 shows that only 75% were exclusively breastfed, while Pit toilet was the commonest (61%) form of sewage disposal system in both groups. Borehole was the commonest source of drinking water and 157(68%) did not use ORS in loose stool episodes.

Table 3 shows that a total of 232 participants were enrolled for the study over the 24-month period with the greatest proportion of diarrhoeal cases occurring between December and February.

A total of 188 (81%) children had 0 to 5 episodes of diarrhoea while 19% had greater than 5 episodes in 24 months ( $X^2 = 5.19$ ;  $p=0.023$ ) (Table 4). Ten percent of under-fives whose parents practised good hand-washing techniques had 0 to 5 episodes of diarrhoeal diseases over the past 24 months, compared to 90% of those whose parents had poor techniques. Furthermore, 77% in these under-fives had greater than 5 episodes of diarrhoeal disease compared to 23% whose parents/ caregivers had good hand-washing (Table 4).

**Table 1. Sociodemographic characteristics and hygienic practices of caregivers of under-fives**

Characteristics	Total (%)	Hygienic techniques		Chi-square	p-value*
		n= 232			
		Poor (203) n(%)	Good (29) n(%)		
<b>Age</b>					
0 – 12 months	179 (77)	157 (77)	22 (76)	3.153	0.533
13 - 24 months	47 (20)	41 (20)	6 (21)		
25 - 36 months	2 (1)	1 (0)	1 (3)		
37 – 48 months	2 (1)	2 (1)	-		
49 – 59 months	2 (1)	2 (1)	-		
<b>Gender</b>					
Male	135 (58)	119 (59)	16 (55)	0.124	0.725
Female	97 (42)	84 (41)	13 (45)		
<b>Mother's occupation</b>					
Housewife	36 (16)	33 (16)	3 (10)	10.730	0.030
Civil-servant	31 (13)	28 (14)	3 (10)		
Trader	76 (33)	59 (29)	17 (59)		
Student	10 (4)	10 (5)	-		
Farmer	79 (34)	73 (36)	6 (21)		
<b>Father's occupation</b>					
Labourer	88 (38)	84 (41)	4 (14)	10.107	0.039
Civil-servant	23 (10)	20 (10)	3 (10)		
Trader	98 (42)	79 (39)	19 (66)		
Farmer	4 (2)	4 (2)	-		
Transporters <sup>a</sup>	19 (8)	16 (8)	3 (10)		

\* P-value for the Chi-square test of the differences between the two categories

<sup>a</sup> Transporters: This includes drivers and motorcyclists.

(n, %): Number and proportion

**Table 2. Other feeding, sanitation and hygienic practices of parents/caregivers of under-fives**

<b>Exclusively breastfed</b>					
Yes	75 (32)	68 (33)	7 (24)	1.016	0.313
No	157 (68)	135 (67)	22 (76)		
<b>Bottle fed</b>					
Yes	49 (21)	39 (19)	10 (34)	3.551	0.059
No	183 (79)	164 (81)	19 (66)		
<b>Sewage disposal method (N, %)</b>					
Water closet	86 (37)	72 (35)	14 (48)		
Pit toilet	141 (61)	126 (62)	15 (52)	0.319	0.874
Bush/open air	5 (2)	5 (2)	-		
<b>Source of drinking water (N, %)</b>					
Bottled/Sachet water	30 (13)	27 (13)	3 (10)		
Bore-hole	188 (81)	163 (80)	25 (86)	0.860	
Rain	14 (6)	11 (5)	1 (3)		
<b>Use of ORS<sup>b</sup> (N, %)</b>					
Yes	75 (32)	66 (33)	9 (31)	0.874	
No	157 (68)	137 (67)	20 (69)		

\* P-value for the Chi-square test of the differences between the two categories

(n, %): Number and proportion

<sup>b</sup> ORS: Oral Rehydration Salt

**Table 3. Month of attendance and hygienic practices**

<b>Month of attendance</b>					
January	46 (20)	40 (20)	6 (21)	24.489	0.011
February	27 (12)	27 (13)	-		
March	19 (8)	19 (9)	-		
April	17 (7)	16 (8)	1 (3)		
May	13 (6)	9 (4)	4 (14)		
June	18 (8)	17 (8)	1 (3)		
July	15 (6)	14 (7)	1 (3)		
August	5 (2)	5 (2)	-		
September	13 (6)	12 (6)	1 (3)		
October	16 (7)	13 (6)	3 (10)		
November	22 (9)	17 (8)	5 (17)		
December	21 (9)	14 (7)	7 (24)		

**Table 4. Association between hand-washing practices and episodes of diarrhoea**

Episodes of Diarrhoea	Hand-washing		Total	Chi-square	p-value
	Poor	Good			
0 to 5 episodes	169 (90)	19 (10)	188 (81)	5.19	0.023
> 5 episodes	34 (77)	10 (23)	44 (19)		

**Table 5. Odds of diarrhoeal disease by hand-washing and other hygienic practices**

Hand-washing/Hygienic practices	Unadjusted OR* (95% CI)	p-value	Adjusted OR** (95% CI)	p-value
Good	1 (reference)	0.023	1 (reference)	0.038
Poor	2.62 (1.11 – 6.19)		2.59 (1.05 – 6.36)	

\*OR: Odds Ratio

\*\* Adjusted for age, breastfeeding pattern and source of water supply

Table 5 shows the odds of having greater than 5 episodes of diarrhoeal disease among U-5s according to hygienic practices employed by parents. In the unadjusted (univariate) model,

there was a 2.6-fold (OR: 2.62, 95%CI: 1.11 – 6.19; p-value: 0.023) increase in the risk of having more than 5 episodes of diarrhoea in 24 months in children whose parents practised poor hand-washing techniques, compared to those with good techniques. Following adjustment for age, breastfeeding pattern and source of water supply; there was a slight reduction to a 2.59-fold increase in this risk (aOR: 2.59; 95% CI: 1.05 – 6.36; p-value: 0.038).

#### 4. DISCUSSION

Diarrhoeal diseases are important public health problems and affect rural areas and resource-poor communities especially in developing countries. However, simple Water, Sanitation and Hygiene (WASH) [16] interventions have been proven to be life-saving [15-19].

This study showed that there was relationship between diarrhoeal episodes and hygienic practices of parents/ care-givers of under-five children in Ukpo community of Anambra State (p<0.05). The study further showed that diarrhoea was commonest among age-group 0-12 months (77%). This was similar to findings in Sudan [20] where diarrhoea was said to be common after the age of 6 months because of the introduction of supplementary foods. This was consequent upon the fact that the utensils and the hand-hygiene of the care-givers might have been poor prior to food preparation and administration. In addition to the supplementary foods that might be poorly prepared, the changing nutritional habits may also interfere with mucosal integrity and cause diarrhoea among these age groups.

Similar studies in Congo and Guinea-Bissau [21,22] also lends credence to this age group, however, socio-economic, behavioural and environmental factors had significant interplay with episodic diarrhoea in these studies. It is imperative therefore to state that this study in Ukpo showed that parents/ caregivers in these rural community were more of labourers 83(38%), traders 98(42%), and utilised pit toilet (61%) which may not be of good standard hence supporting the above studies which emphasised that socio-economic, behavioural, and environmental factors as interplays to episodic diarrhoea occurrence.

This study further showed statistically significant difference between parents who had good hygienic practices, that is, good hand-washing and environmental sanitation techniques,

compared to those who had poor hygienic practices (p<0.023) with regard to diarrhoeic episodes. This finding was similar to several studies [22-25] which buttressed the facts that regular hand-washing, readily available pipe-borne water for washing hands, and good sanitation with hygienic practices reduced diarrhoea among children.

Further findings in this study also showed that 10% of under-fives whose parents practised good hand-washing technique had less than 5 episodes of diarrhoea compared to 90% who did not and eventually had more than 5 episodes in the last 24 months. Still on the outcome of this study, it was noted that there was almost 3 times likelihood of having diarrhoea as a result of poor hand-washing 203(87.5%), lack of exclusive breastfeeding 157(68%), and poor water supply-188(81%) and 14(6%) for borehole and rain water respectively, as well as use of pit toilet 141(61%). These findings were similar to several studies in Myanmar [26] where inadequate water supply, poor sanitation and hygiene of facilities were instrumental to diarrhoea occurrence.

#### 5. CONCLUSION

This study has shown that hygienic practices such as hand-washing and environmental sanitation, education, of parents/ care-givers affect diarrhoeic episodes of under-fives, especially in rural areas. It is therefore recommended that government and philanthropic individuals in the community should ensure adequate provision of running water for hand-washing, proper waste disposal and hygiene education in the population would go a long way to stem the tide of diarrhoeal diseases.

#### CONSENT

As per international standard or university standard, respondents written consent has been collected and preserved by the authors.

#### ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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