

Original Research Article

Episodic diarrhoeal diseases and hygienic practices among caregivers of under-fives attending a rural health-centre in Anambra State, Nigeria.

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.

Method: This was a descriptive cross-sectional survey of 232 consenting parents/caregivers who attended Comprehensive Health Centre, Ukpò. 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 practiced 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 practiced good hand-washing techniques had 0-5 episodes of diarrhoea compared to 169(90%) of 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 parents with poor hygienic practices compared to those with better hygienic practices.

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

29 **Key words:** Diarrhoea diseases, Handwashing, Sanitation, Hygienic practices, Anambra
30 **State.**

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32 **INTRODUCTION**

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

37 Diarrhoeal diseases are basically acquired through the faeco-oral route or by ingestion of
38 contaminated food or water. It is associated with poverty, poor personal and environmental
39 hygiene [4]. The World Health Organization (WHO) states that diarrhoea diseases are leading
40 cause of death among under-fives with about 525,000 children below 5 years dying annually.
41 Furthermore, 1.7 billion cases of diarrhoea diseases occur yearly, however, safe drinking
42 water, and hygienic practices helps prevent it [3,4]. While global mortality may be declining,
43 the overall incidence of diarrhoea remains unchanged at about 3.2 episodes per child per year.
44 In the United States, there are 1.5 million outpatient visits for gastroenteritis, 200,000
45 hospitalizations, and 300 deaths annually especially among children and under-fives inclusive
46 [5]. Furthermore, the WHO also stated that about 10.6 million children die yearly before
47 reaching their fifth birthday and gastroenteritis alone is responsible for almost 20% of these
48 deaths [2,6].

49 In Nigeria, diarrhoeal diseases are among the leading causes of morbidity and mortality
50 amongst under-fives in Nigeria, largely driven by inadequate safe water, sanitation, and
51 hygiene. With the loss of about 2,300 under-fives daily from various diseases such as
52 malaria, pneumonia, diarrhoea, measles and HIV/AIDS, Nigeria ranks as the second largest
53 contributor to under-five mortality [7,8]. Furthermore, an estimated 300,000 under-fives

54 mortalities have been stated to be due to diarrhoeal diseases which is a consequence of
55 limited access to safe water, poor sanitation and hygiene in 2015 [9]. It is also pertinent to
56 note that hygienic and sanitation measures indeed **reduce** the morbidity and mortality
57 associated with diarrhoeal diseases, hence simple, and life-saving effective measures can
58 never be overemphasized [10].

59 Diarrhoea as a cause of morbidity and mortality among under-fives also affects the health and
60 educational performance of children while depreciating the socio-economic status of the
61 parents or care-givers [11]. However, this scourge could be significantly reduced through
62 promotion of hygiene, hand-washing practices by care givers, education of mothers on simple
63 hygienic measures, complete immunization of children, as well as correct and adequate infant
64 feeding practices [12,13]. Other possible ways to reduce diarrhea diseases apart from hand-
65 washing that breaks the faeco-oral transmission are good and adequate water supply, and
66 sanitation practices that act as primary and secondary barriers to disease transmission [14-
67 16].

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

71 **METHODOLOGY**

72 **Study area**

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

80 **Study Population**

81 A total of 232 consenting parents/carers of under-fives (U-5) attending the Infant Welfare
82 Clinic (IWC) of the Ukpo CHC with complaints of frequent passage of loose stool where
83 enrolled for the study. This study lasted over a 24-month period (January 2016 to December,
84 2017).

85 **Sample size determination**

86 Sample size was obtained using the formular for descriptive study $n = \frac{Z^2 P q}{d^2}$

87 Where n= minimum sample size

88 $Z = 1.96$ (constant at 95% confidence)

89 $P = 0.3$ (at 30% population prevalence from previous study)

90 $q = 1 - 0.3$ (1-p)

91 $d =$ degree of accuracy (usually set at 0.05)

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

95 **Study Design**

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

97 **Selection criteria**

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

102 **Study instrument**

103 The study questionnaire was developed by the researchers based on existing literature [5-8].

104 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.

Statistical Analysis

Data was collected on each clinic day with the use of questionnaires, and after coding it was imputed 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.

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.

129 Results

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

Baseline Characteristics	Total (%)	Hygienic Techniques		Chi-square	p-value*
		n= 232			
		Poor (203)	Good (29)		
		n(%)	n(%)		
Age					
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)	-		
Gender					
Male	135 (58)	119 (59)	16 (55)	0.124	0.725
Female	97 (42)	84 (41)	13 (45)		
Exclusively breastfed					
Yes	75 (32)	68 (33)	7 (24)	1.016	0.313
No	157 (68)	135 (67)	22 (76)		
Bottle fed					

Yes	49 (21)	39 (19)	10 (34)	3.551	0.059
No	183 (79)	164 (81)	19 (66)		

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

^a (n , %): Number and proportion

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133 Table 1 summarises the socio-demographic characteristics of the study participants, stratified
 134 by the hygienic techniques of the parents. It also shows the differences between these
 135 covariates within the groups. In both groups, most participants children were aged 0 to 12
 136 months with a greater proportion (58%) being males.

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149 **Table 2: Other variables and hygienic practices of parents/ caregivers of under-fives**

Sewage disposal method

Water closet	86 (37)	72 (35)	14 (48)	2.284	0.319
Pit toilet	141 (61)	126 (62)	15 (52)		
Bush/open air	5 (2)	5 (2)	-		

Source of drinking water,

Bottled/Sachet water	30 (13)	27 (13)	3 (10)	0.757	0.860
Bore-hole	188 (81)	163 (80)	25 (86)		
Rain	14 (6)	11 (5)	1 (3)		

Use of ORS^b

Yes	75 (32)	66 (33)	9 (31)	0.025	0.874
No	157 (68)	137 (67)	20 (69)		

Mother's occupation

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)		

Father's occupation

Labourer	88 (38)	84 (41)	4 (14)	10.107	0.039
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Civil-servant	23 (10)	20 (10)	3 (10)
Trader	98 (42)	79 (39)	19 (66)
Farmer	4 (2)	4 (2)	-
Transporters ^c	19 (8)	16 (8)	3 (10)

Month of attendance

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)		

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

151 ^a (*n* , %): *Number and proportion*

152 ^b *ORS: Oral Rehydration Salt*

153 ^c *Transporters: This includes drivers and motorcyclists.*

154 Table 2 shows that a total of 232 participants were enrolled for the study over the 24-month

155 period with the greatest proportion of cases occurring between December and February. Pit

toilet was the commonest (61%) form of sewage disposal system in both groups 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 3. 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)		

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 2). 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 3).

Table 4. 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 3 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).

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 utilized pit toilet (61%) which may not be of good standard hence supporting the above studies which emphasized 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 practiced 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.

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.

Authors' contributions:

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

Conflicts of interest

None declared

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