

PREVALENCE AND MANAGEMENT OF DIARRHOEA AMONG CHILDREN IN NSUKKA, NIGERIA

¹OMELONYE, Kelvin Ebere, ¹OKOLO, Chidinma Adanna, ^{2and3}NWIBO, Daniel Don, ⁴CHUKWUKA, Christian Onyeka, ⁵NWIBO, Mirabel Ifeyinwa and ¹UBACHUKWU, Patience Obiageli

¹Department of Zoology and Environmental Biology, University of Nigeria, Nsukka.

²Laboratory of Pharmaceutical Microbial Medicinal Chemistry, Graduate School of Pharmaceutical Sciences, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-0033 Japan.

³Department of Chemistry, University of Nigeria, Nsukka, Nigeria.

⁴Department of Biology/Biotechnology, Federal University, Ndufu-Alike, Ikwo, PMB 1010, Abakaliki, Ebonyi State, Nigeria.

⁵Department of Food Science and Technology, Faculty of Agricultural Sciences, University of Nigeria, Nsukka, Nigeria.

Corresponding Author: Okolo, C. A. Department of Zoology and Environmental Biology, University of Nigeria, Nsukka. **Email:** chidinma.levi@unn.edu.ng **Phone:** +234 8069076354

ABSTRACT

Two months preliminary survey of the prevalence of diarrhoea among children (aged 5 – 10 years) was carried out in Nsukka area of Enugu State, Nigeria. Questionnaires were used to obtain information on the demographic details of the parents and children, prevalence, management and control of diarrhoea among children of this age group. These were distributed to parents of the children used for the study. Using Pearson's correlation coefficient, we found that diarrhoea among children of this age was neither correlated with residential location ($r = -0.47$, $p = 0.652$), occupation of the parent ($r = 0.134$, $p = 0.194$) nor sex of the child ($r = 0.092$, $p = 0.377$). However, the educational level of the parents was correlated with childhood diarrhoea ($r = 0.346$, $p = 0.001$). These results suggested that the children of less educated people were more prone to diarrhoeal infection when compared to children of the more educated counterparts.

Keywords: Prevalence, Management, Diarrhoea, Children, Nsukka

INTRODUCTION

Diarrhoea is derived from the Greek word 'diarroiā' meaning 'flowing through'. World Health Organization (WHO) defined diarrhoea as having three or more loose or liquid stools per day, or having more stools than normal for any individual. Diarrhoea is common in children and usually accompanied by vomiting, abnormal increases in stool weight and liquidity. Hogue *et al.* (2000) suggested that increase in stool water excretion above 150 to 200 ml every 24-hour is an objective parameter for acute diarrhoea (a chronic form of the disease). In terms of pathology, diarrhoea often results from

gastrointestinal infection caused by bacteria (Lastovica and Le Roux, 1993), virus, parasitic organisms and protozoa. The infection is spread through contaminated food or drinking water or from person to person as a result of poor hygiene. As noted above, chronic diarrhoea leads to fluid loss and may be life threatening, especially in young children, malnourished individuals, and immunocompromised patients. The most severe symptom in many patients is the urgency of defecation and faecal inconsistencies (Haslett *et al.*, 1999). All over the world, diarrhoea is leading cause of child morbidity. In 2004, it was the third leading cause of death among populations of low-

income countries, and the second leading cause of death among children under five years of age responsible for 6.9% of the overall deaths and accounting for 1.5 million the deaths of children yearly. Unfortunately, 80% of these deaths were estimated to occur among those less than two years of age (Bryce *et al.*, 2005; WHO, 2009; Fischer-Walker *et al.*, 2012). Traveller's diarrhoea, a peculiar kind of diarrhoea that commonly affects travellers visiting developing countries, is an attack of usually abrupt and watery stool with abdominal cramps, anorexia and vomiting lasting for 2 – 5 days (Hogue *et al.*, 2000). However, in 60 – 70% of affected patients, no organism is identified on examination. Antibiotics and cytotoxic drugs can also cause drug-induced form of diarrhoea.

According to CHRSPR (1998), diarrhoea is one of the top causes of childhood mortality in sub Sahara African and has been estimated to be responsible for 25 to 75% of all childhood illnesses in Africa. In addition, episodes of diarrhoea leads to about 14% of outpatient visits, 16% of hospital admissions and accounts for an average of 35 days of illness per year in children less than five years old. The report also stated that unlike the decline in mortality rates, diarrhoea incidence does not appear to have changed substantially over the last decade. In Nigeria, available reports indicate that more than 315,000 deaths of preschool age children are recorded annually as a result of diarrhoea disease (Ogbu *et al.*, 2008). A study "review of diarrhoeal disease cases admitted to a busy referral hospital in Ghana" (Baffoe-Bonnie *et al.*, 1998) indicated that children less than 5 years of age make up 84% of all child admissions and 56.5% of them being infants below one year. Approximately, one third of deaths among children less than 5 are caused by diarrhoea (Snyder and Merson, 1982). In terms of mechanism of infectivity inhibition of ion absorption, stimulation of ion secretion, retention of fluid in the intestinal lumen, and disorders of intestinal motility may cause diarrhoea. Retention of fluid in the bowel lumen may also occur precipitated by food intolerance associated with carbohydrate malabsorption, disaccharides deficiencies, lactulose therapy, poorly absorbable salts (magnesium sulphate,

sodium phosphate and citrate, antacids), and ingestion of mannitol and sorbitol. Digestion and absorption of nutrients is a complex, highly coordinated and extremely efficient process; normally less than 5% of ingested carbohydrate, fat and protein are excreted in the faeces. Acute diarrhoea is extremely common and usually due to faecal-oral transmission of bacterial toxins, viruses, bacteria or protozoan organism. Infective diarrhoea is usually short-lived and patient with a history of diarrhoea lasting more than 10 days rarely have an infective cause (Haslett *et al.*, 1999). The most common cause of chronic or relapsing diarrhoea is irritable bowel syndrome, which can present with increased frequency of defecation and loose, watery or pellet stool. Diarrhoea rarely occurs at night and is most severe before and after breakfast. The stool often contains mucus but never blood, and 24 hour stool volume is less than 200g. Chronic diarrhoea can be categorized as disease of the colon or small bowel, or mal-absorption (Haslett *et al.*, 1999). Contaminated food or water, early introduction of milk formula or solid food, poor personal hygiene, lack of maternal education and care, diseases and malnutrition, are the common means of acquiring diarrhoea. Transmission of diarrhoeal pathogens through human faeces is very common. Such pathogens from contaminated faeces excreted into the environment, often get onto people's hands or water bodies where they are consumed. Significant transmitters of diarrhoeal pathogens include flies and animals. Flies that have come in contact with faeces easily transmit pathogens to food and water as they perch around, while animals (especially in rural settings) also spread the pathogens by walking in faecal material and by frequenting domestic environments they make contacts with children, domestic materials and foods (Curtis *et al.*, 2000). This study attempts to establish a link between prevalence of diarrhoea and demographic variables among children in Nsukka, Nigeria.

MATERIALS AND METHODS

Description of Study Area: Nsukka (latitude 6°51'N and longitude 7 ° 27'E) (Figure 1) is a

town and Local Government Area (LGA) in Enugu State, south eastern Nigeria. The landmass and topography is characterised by hill and grasslands where rodents are widely distributed. Nsukka LGA has an area of 1,810km² and a population of 270,257 at the 2006 census (Okoye and Obiezue, 2008). Nsukka is a tropical rainforest region with sharply falling density population to average density.

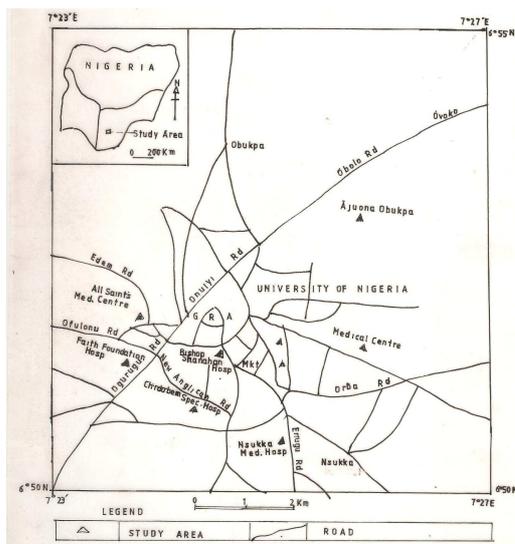


Figure 1: Map of Nsukka town showing locations of study area. Source: Topographic Map of Nigeria (2000)

The study area can be seen as underdeveloped or still developing, save for the university campus located within it. It is dotted by areas of farmlands close to residential areas, poor drainage systems leading to flooded roads and pools of stagnant waters, indiscriminate construction of houses and unplanned urbanization. The annual rainfall for Nsukka town varies from 986 mm to 2,098.2 mm (Oformata, 1978).

Data Collection: Information on the diarrhoea status of children was collected using structured questionnaire. The questionnaire was distributed to parents of the children used for the study. The questionnaire was made up of information on the demographic details of both the parents and the child. Also, the prevalence, management and control measures of diarrhoea were included in the questionnaire (Table 1).

Data Analysis: The questionnaires were analyzed using SPSS (Statistical Package for Social Sciences). Percentage frequencies were obtained for variables while correlation was used to ascertain relationship between variables and diarrhoea.

RESULTS

The prevalence of diarrhoea in Nsukka was higher, with 24.2% infections. Following it was Ajuona (7.4%), while University of Nigeria Nsukka, Bishop Shannahan Hospital, Onuiyi, Odim and Amaigbo had percentage of 6.3. Also, from the sampled population, the age bracket of 18 – 30 years had the highest prevalence (45.3%), while 40 and above had the lowest prevalence (25.3%). More female parents (68.4%) were sampled than the males (31.6%). Meanwhile, from the educational level of the parents, more of the parents sampled had university education (64.2%), followed by those that attended Senior Secondary School (SSS) (13.7%). Only 1.1% of the parents left the question unanswered. Civil servants however, recorded the highest prevalence (48.4%), while students and traders followed with 24.2% and 18.9% respectively. 4.2% of the parents did not respond to the question (Table 2).

On the other hand, 42.1% of the children at 5 years of age had the highest prevalence. Children at 10 years recorded 18.9% and then, 6 and 7 year – old – children, 15.8% and 13.7% respectively. More male children (53.7%) were sampled than the females (46.3%). The educational level of the child indicated that children in primary school recorded the highest prevalence (71.6%), while nursery school children recorded only 18.9% prevalence, but 1.1% of the children had no response (Table 3).

The questionnaire also revealed that 54.7% of the children had diarrhoea before 2011, while 31.6% had diarrhoea in 2011. On the other hand, 38.9% of the children had not diarrhoea before 2011 and 62.1% had not diarrhoea in 2011, while 1.1% of the sampled population left the question unanswered (Table 4). While the children suffered this ailment, 42.1% of the parents sampled visited the

Table 1: Data collection instrument for diarrhoea patients**Dear Respondent,**

This interview is designed to find out your views on prevalence and management of diarrhoea in children aged 5 to 10 years. Your response will be strictly confidential.

A: Demographic Details of the Parent

- 1) Residential Area
- 2) Age (years): 18-30 [] 30-40 [] 40 and above []
- 3) Sex: Male [] Female []
- 4) Educational Level: Primary [] JSS [] SSS/O'Level [] A Level [] University []
Other (specify).....
- 5) Occupation: Trader [] Farmer [] Civil servant [] other (specify).....

B: Demographic Details of the Child

- 1) Age (years): 5 [] 6 [] 7 [] 8 [] 9 [] 10 []
- 2) Sex: Male [] Female []
- 3) Educational Level: Nursery School [] Primary [] Other []

C: Prevalence and Management of Diarrhoea

- 1) Has your child had diarrhoea before? Yes [] No [] Can't say []
- 2) Has he/she had diarrhoea this year? Yes [] No [] Can't say []
- 3) Which of these healthcare providers did you see when your child suffered the ailment?
Doctor [] Pharmacist [] Nurse [] Chemist [] Herbal home [] other (specify).....
- 4) Did the healthcare provider tell you about diarrhoea? Yes [] No [] Can't say []

D: Control of Diarrhoea

- 5) Were you told that poor personal hygiene (e. g. not washing the hands after using the toilet, not washing vegetables or fruits before eating etc) can cause/trigger the transmission of diarrhoea? Yes [] No [] Can't say []
- 6) Do you know that lack of good toilet facilities can cause/trigger the transmission of diarrhoea? Yes [] No [] Can't say []
- 7) Do you know that lack of good drinking water can cause/trigger the transmission of diarrhoea? Yes [] No [] Can't say []
- 8) Do you regularly honour appointment dates with the healthcare providers based on your child's health condition? Yes [] No [] Can't say []
- 9) Do you give your child the medication prescribed by the healthcare providers? Yes [] No [] Can't say []
- 10) If No, how then do you manage your child's health condition?

Thank you.

hospital (doctor) for treatment. 32.6% of the question was not attempted either because their wards had not suffered the ailment or due to self medication. However, 9.5% met nurses, while 7.4% visited the pharmacist (Table 5).

Notwithstanding, most of the contacts were aware that poor personal hygiene, lack of good toilet facilities, lack of good drinking water etc can trigger/cause diarrhoea (Table 6).

The residential location was not correlated with diarrhoea. Occupation of the parent, age and sex do not also have any influence on the prevalence of childhood diarrhoea because they were not significantly correlated with diarrhoea. However, educational level of the parent was significantly correlated with diarrhoea ($r = 0.218$, $p = 0.034$) and ($r = 0.346$, $p = 0.001$) (Table 7).

DISCUSSION

It is widely recognized that diarrhoea is a major cause of child morbidity and mortality and it is affected by several socio-economic, environmental and behavioural factors, this has rarely been confirmed by longitudinal studies or clinical diagnosis. There are a number of studies on diarrhoeal morbidity based on cross-sectional surveys. However, the measurement of diarrhoea from such surveys is complicated and comparison across different background characteristics is difficult (Woldemicael, 1995). In Nigeria, the prevalence of diarrhoea was found to be highest among children 6 – 12 months of age, the period when most children are weaned (Olugbemiro *et al.*, 1994).

Table 2: Demographic details and percentage composition of the parents of children diagnosed for diarrhoea in Nsukka, Nigeria

Variables	Number	Percentage (%)
Location		
Nsukka	23	24.2
Ajuona	7	7.4
UNN	6	6.3
BSH	6	6.3
Onuiyi	6	6.3
Odim	6	6.3
Amaigbo	6	6.3
Age (Years)		
18 – 30	43	45.3
40 and Above	24	25.3
Sex of Parent		
Male	30	68.4
Female	65	31.6
Educational Level		
University	61	64.2
Senior Secondary School	13	13.7
No response	1	1.1
Occupation		
Civil servant	46	48.4
Student	23	24.2
Trader	18	18.9
No response	4	4.2

Table 3: Demographic details and percentage composition of children diagnosed for diarrhoea in Nsukka, Nigeria

Demographic details	Number	Percentage (%)
Age of the child (years)		
5	40	42.1
6	15	15.8
7	13	13.7
10	18	18.9
Sex of child		
Male	51	53.7
Female	44	46.3
Educational level		
Primary	68	71.6
Nursery	18	18.9
No response	1	1.1

It was also reported that at five years, children are still very much prone to this disease because the child has lost inborn immunity and it is exposed to different types of infections from eating food prepared by unclean water and from unhealthy environment (Woldemicael, 1995). Although, researches have not really been carried out on the stipulated age bracket (5 – 10 years), the reports generated in the course

of this work suggested that diarrhoea was prevalent in the age bracket researched on. Children at 5 years showed the highest infection rate because they were still acclimatizing to the environmental conditions dirty floor, contaminated food and/or water etc which causes/triggers diarrhoea. Consequently, the educational level of the parents of the child is one of the determinants of diarrhoeal infection. This suggests that the children of less educated people are more prone to diarrhoeal infection than children of more educated individuals who must have read or heard much about the ailment. Though in this research work, residential area and age of the child has little or no correlation with diarrhoea, Woldemicael (1995) noted that the level of diarrhoeal morbidity are the age of the child, number of children in the house, type of floor material and place of residence.

Table 4: Prevalence of diarrhoea among children in Nsukka, Nigeria

Diarrhoeal cases/Response	Number	Percentage (%)
Diarrhoea before		
Yes	52	54.7
No	37	38.9
Can't say	6	6.3
No response	–	–
Diarrhoea this year		
Yes	30	31.6
No	59	62.1
Can't say	5	5.3
No response	1	1.1

Table 5: Healthcare provider visited during childhood diarrhoea in Nsukka, Nigeria

Healthcare provider	Number	Percentage (%)
Doctor	40	42.1
Nurse	9	9.5
Pharmacist	7	7.4
No response	31	32.6

Table 6: Control measures of childhood diarrhoea in Nsukka, Nigeria

Control measures	Response	
	Yes	No
Poor personal hygiene	91.6	5.3
Lack of good toilet facilities	87.4	7.4
Lack of good drinking water	89.5	7.4

Table 7: Correlation between diarrhoea and some demographic variables

Variables	r	p
	Diarrhoea before	
Residential location	-0.179	0.082
Educational level of parent	0.218	0.034
Occupation	0.123	0.235
Age of the child	0.022	0.834
Sex of the child	-0.127	0.219
	Diarrhoea this year	
Residential location	-0.047	0.652
Educational level of parent	0.346	0.001
Occupation	0.134	0.194
Age of the child	0.022	0.851
Sex of the child	-0.092	0.377

Conclusion: Parents who visit the hospital should be educated on safe food and water precautions which are the mainstream of diarrhoea prevention. There must be co-operation between patient and medical practitioners for easy and correct physical examination, history and diagnosis. Rural residents should be sensitized on the behavioural effects of diarrhoea, and then be provided with the essential/basic amenities like pipe-borne water, which they mostly need to keep themselves, children and homes clean. Also, parents should teach their children to practice the act of regular washing of hands mostly after using the toilet, playing and before and after meal. This survey would help necessary authorities in formulating and implementing policies that would ensure a `diarrhoea-free society` in Nsukka, Nigeria, Africa and the world at large.

ACKNOWLEDGEMENT

We immensely acknowledge the critics of this study by members of the Parasitology and Public Health Research Group, Department of Zoology and Environmental Biology, University of Nigeria, Nsukka.

REFERENCES

BAFFOE-BONNIE, B., ADDO-YOBBO, E. and PLANGE-RHULE, J. (1998). Five-year review of diarrhoeal disease cases admitted to a busy referral hospital in Ghana. <http://www.cmj.hr/1998/39/3>

[/9740650.html](#). Accessed 17th February, 2011.

- BRYCE, J., BOSCHI-PINTO, C., SHIBUYA, K. and BLACK, R. E. (2005). WHO estimates of the causes of death in children. *Lancet*, 365: 1147 – 1152.
- CHILD HEALTH RESEARCH SPECIAL PROJECT REPORT (CHRSPR) (1998). *Child Health in Sub Saharan Africa*. <http://www.harponet.org/doc/spec2.pdf>. Accessed 17th February, 2011.
- CURTIS, V., CAIRNCROSS, S. and YONLI, R. (2000). Domestic hygiene and diarrhoea: pinpointing the problem. *Tropical Medicine and International Health*, 5(1): 22 – 32.
- FISCHER-WALKER, C. L., PERIN, J., ARYEE, M. J., BOSCHI-PINTO, C. and BLACK, R. E. (2012). Diarrhea incidence in low- and middle-income countries in 1990 and 2010: a systematic review. *BMC Public Health*, 12: 220.
- HASLETT, C., CHILVERS, E., HUNTER, J. A. A. and BOON, N. A. (1999). *Principles and Practice of Medicine*. 18th Edition, Churchill Livingstone, New York.
- HOGUE, V. W. (2000). Constipation and diarrhoea. Pages 571 – 588. In: HERFINDAL, E. and GOURLEY, D. (Editors). *Textbook of Therapeutics: Drug and Disease Management*. Lippincott Williams and Wilkins, Philadelphia.
- LASTOVICA, A. J. and LE ROUX, E. (1993). Prevalence and distribution of *Campylobacter* species in the diarrhoeic stools and blood cultures of pediatric patients. *Acta Gastro-Enterologica Belgica*, 56: 34.
- OFORMATA, G. E. (1978). *The Nsukka Environment*. First Edition, Fourth Dimension Publishers, Enugu.
- OGBU, O., AGUMADU, N., UNEKE, C. J. and AMADI, E. S. (2008). Aetiology of acute infantile diarrhoea in the South-Eastern Nigeria: An assessment of microbiological and antibiotic sensitivity profile. *The Internet Journal of Third World Medicine*, 7(1): 34 – 38.

- OKOYE, I. C. and OBIEZUE, R. N. N. (2008). A survey of the gut parasites of rodents in Nsukka ecological zone. *Animal Research International*, 5(2): 846 – 847.
- OLUGBEMIRO, S., ADEYEMO, A. A., GBADEGESIN R. A. and ADEMOWO, O. G. (1994). *Persistent Diarrhoea in Nigerian Children Aged Less than Five Years: A Hospital-Based Study*. University College Hospital, Ibadan, Nigeria.
- SNYDER, J. D. and MERSON, M. H. (1982). The magnitude of the global problem of acute diarrhoeal disease: a review of active surveillance data. *Bulletin of World Health Organisation*, 60: 605 – 613.
- TOPOGRAPHIC MAP OF NIGERIA (2000). *Nsukka Town Planning Authority*. Nsukka sheet 287.
- WOLDEMICAEL, G. (1995). *Diarrhoeal Morbidity among Young Children in Eritrea: Environmental and Socio-Economic Determinants*. Department of Statistics and Demography, University of Asmara, Asmara, Eritrea.
- WORLD HEALTH ORGANIZATION (1996). Prevention and treatment of traveller's diarrhoea. www.who.int/topics/diarrhoea/en/. Accessed 29th March, 2011.
- WORLD HEALTH ORGANIZATION (2005). The treatment of diarrhoea: a manual for physicians and other senior health workers. Pages 8 – 13. www.who.int/topics/diarrhoea/en/. Accessed 20th February, 2011.
- WORLD HEALTH ORGANIZATION (2009). Diarrhoeal Disease. www.who.int/topics/diarrhoea/en/. Accessed 29th March, 2011.