Original article

Maternal Environmental Factors as Predictors of Occurrence of Gastroenteritis among Under-five Children in Akure South Local Government Area, Ondo State

Oluwaseyi Oye Olofintuyi [*1], B O Ogundele [2], Olasunkanmi Rowland Adeleke [*1], Joseph Sunday Adegboro [1], Rachael Seun Oluwadare [1]

[1] Department of Human Kinetics and Health Education, Adekunle Ajasin University, Akungba-Akoko, Nigeria
[2] Department of Human Kinetics and Health Education, University of Ibadan, Nigeria

*Corresponding authors: Olofintuyi Oluwaseyi O and Adeleke Olasunkanmi R, olasunkanmi.adeleke@aaua.edu.ng, oluwaseyiolofintuyi406@gmail.com

Abstract

Aim: To examine maternal environmental factors as predictors of the incidence of gastroenteritis among under-five children in Akure South Local Government Area, Ondo State.

Materials and Methods: A descriptive study was carried out in two state-owned hospitals between April and August 2019 using a purposive and convenience sample of 120 mothers of under-five children. Data collected were analyzed using PPMC and regression to test the hypotheses at 0.05 alpha level.

Results: The study shows that three out of four environmental predictors were potent predictors of the incidence of gastroenteritis. They include: quality of water source (β = .387, t = 7.638, P < 0.05), method of sewage disposal (β = .508, t = 9.651, P < 0.05) and hygienic practices (β = .341, t = -6.799, P < 0.05), while area of residence (β = -.048, t = 1.008, P > 0.05) was not a potent predictor. Area of residence, quality of water source, hygienic practices and method of sewage disposal had a significant joint contribution used to predict the incidence of gastroenteritis.

Conclusion: Area of residence, quality of water source, hygienic practices and method of sewage disposal all increase the incidence of gastroenteritis when proper attention is not paid to them. Education about handwashing is necessary for mothers and environmental health workers in collaboration with the Ministry of Health, and the Ministry of Environment should ensure that every house has the proper means to dispose of sewage, especially a septic tank (flush toilet); this will help reduce the disposal of feces in the environment.

(Olofintuyi OO, Ogundele BO, Adeleke OR, Adegboro JS, Oluwadare RS. Maternal Environmental Factors as Predictors of Occurrence of Gastroenteritis among Under-five Children in Akure South Local Government Area, Ondo State. SEEMEDJ 2021; 5(1); 37-46)

Received: Aug 26, 2020; revised version accepted: Jan 25 2021; published: Apr 28, 2021

KEYWORDS: gastroenteritis, environment, mothers, infection

Introduction

Children's health is central to the growth and development of any nation's economy, as they are the future leaders. A child's health needs to be addressed immediately, from the day when the mother learns she has conceived. Therefore, it is imperative that the mother provides adequate support to a child's emotional, mental and physical well-being by helping them make healthy choices about hygienic and sanitation practices. Over the years, babies and children below the age of five experience one health challenge or another due to a variety of factors, which may be hereditary, genetic, congenital or environmental in nature, and which often lead to admission into hospitals and an alarming rate of infant mortality.

Gastroenteritis, also known as infectious diarrhea, is the irritation of the gastrointestinal tract – the stomach and the small intestine. It is often accompanied by abdominal pains, diarrhea and vomiting (1). Gastroenteritis can affect people of all age groups (both adults and children can be affected). Persons who are most at risk are individuals with low immunity, especially infants and elderly adults.

According to the World Health Organization (WHO), over 70% of diarrhea-related deaths among children less than 5 years old occur in Africa (2), and Nigeria has one of the highest under-5 mortality rates in the world (328 deaths per 100 000) (3). Recent studies have shown an increase in the prevalence of rotavirus-induced diarrhea in different parts of Nigeria. For instance, a study conducted in Benin City (4) reported a prevalence rate of 19.2%, and one in Sokoto, Northern Nigeria, a high prevalence rate of 25% (5). In Ibadan (6), a prevalence of 18.5% was reported, while Kaduna recorded a prevalence rate of rotavirus-induced gastroenteritis of 32.2% among under-five children (7). Moreover, a study (8= conducted in Akure recorded a high percentage of incidence (31%) in children in the age group between 0 and 12 months. The incidence of gastroenteritis remains a significant burden on children in developing countries due to a range of elements, such as the lack of available healthcare services, lack of safe drinking water, poor sanitation, poor hygiene of both child and caregiver and overcrowding (1).

The transmission of infectious diarrhea (gastroenteritis) can be related to the area of residence. The risk of contracting gastroenteritis can increase as a result of animals living with humans or in close proximity to human dwellings; they can transmit it directly to humans or through contaminated water and overcrowding (9). Any airborne and respiratory infection is likely to spread in overcrowded areas, especially among infants because of their weak immune system.

The quality of drinking water is also linked with the likelihood of suffering from a gastroenteritis infection. The source of water fit for drinking should be considered in regard to its nearness to any toilet facility, in order to avoid water contamination. Several reference works have revealed that children with access to safe drinking water are less likely to suffer from gastroenteritis than those who use water from unsafe sources (10, 11). Likewise, poor handling and storage of drinking water is seen to be significantly associated with an increased risk of infectious diarrhea (12-14).

The method of sewage disposal by the caregiver in a household is quite significant for the incidence of gastroenteritis among under-five children. No access to a hygienic toilet may lead to large amounts of fecal waste being discharged into the environment, especially without adequate treatment, which is likely to have a major impact on infectious disease burden and quality of life (15(. The prevalence of diarrhea is lower among children who live in a house with less dirty sewage than in children who do not (16).

Poor food hygiene practices have been reported to increase the risk of diarrhea episodes among infants when unsterilized feeding utensils and bottle feeders are used (17). The mothers' practice of handwashing before food preparation is associated with a lower risk of diarrhea among children. There is a high risk of

diarrhea among children aged < 2 years if the mother has poor food hygiene practices (18). Some findings (19, 20) also reveal that a combination of environmental factors has an effect on the rapid increase of gastroenteritis. The role of a mother cannot be overemphasized as most activities that help prevent gastroenteritis take place in the home, and the outcome of the illness depends greatly on the initial steps or actions taken by the mothers at home. Due to the high incidence of gastroenteritis in children under five years of age in Akure South Local Government Area, Ondo State, compared to the incidence rate in other parts of Nigeria, this study aimed to investigate the maternal environmental factors as predictors of the incidence of gastroenteritis among under-five children in Akure South Local Government Area of Ondo State.

We hypothesized that: 1) There is no significant relationship between the area of residence, quality of water source, hygienic practices, method of sewage disposal and the incidence of gastroenteritis among under-five children in Akure South Local Government Area of Ondo State; 2) There is no significant relative contribution of maternal environmental factors (area of residence, quality of water source, hygienic practices, method of sewage disposal) on the incidence of gastroenteritis among under-five children in Akure South Local Government Area of Ondo State; and finally, 3) There is no significant joint contribution of maternal environmental factors (area of residence, quality of water source, hygienic practices, method of sewage disposal) to the incidence of gastroenteritis among under-five children in Akure South Local Government Area of Ondo State.

Materials and Methods

A descriptive research design of the correlational type was used for this study. This study was conducted between April and August 2019. The population for this study comprised of mothers of under-five children in Akure South Local Government Area of Ondo State. The sample used for this study included one hundred and twenty (120) mothers of under-five children selected from the Mother and Child Hospital, Akure, and Ondo State General Hospital in Akure South Local Government Area of Ondo State. Purposive sampling technique was used to select two (2) state-owned hospitals in Akure South Local Government Area of Ondo State; both are dedicated to the care of pregnant mothers and children, have a high level of patronage and are located in densely populated areas. Convenience sampling technique was used to select a number of mothers whose children under the age of five have experienced or are currently affected by the infection.

The instrument used for this study was a self-developed questionnaire designed by the researchers in line with the variables under study. The instrument was validated by making a draft copy available for criticism to experts in the field of maternal and health education, which led to subtraction, addition and possible modification of the research instrument. The corrected version of the instrument was used for the collection of data. It was validated by three experts in the field of health education and its reliability was ensured by using Cronbach alpha with the coefficient value of 0.79 obtained. The descriptive statistics of frequency counts was used to present background information of the respondents, while inferential statistics of regression was used to test the research hypotheses at the 0.05 level of significance.

Results

Table 1 shows the relationship between each independent variable (access to clean water, sanitation facilities used, hygienic practices and area of residence) and the dependent variable (incidence of gastroenteritis); there is a significant relationship between the incidence of gastroenteritis and quality of water source ($r = 0.054$, $P < 0.05$), sanitation facilities used ($r = 0.739$, $P < 0.05$) and hygienic practices ($r = 0.461$, $P < 0.05$), but not area of residence ($r = 0.148$, $P > 0.05$). Hygienic practices (mean = 13.81) are the highest contributing factor to reducing the incidence of gastroenteritis among under-five children based on the mean value, followed by

sanitation facilities used (mean = 12.78), while area of residence (9.68) has the lowest mean value.

Table 1. Correlation matrix showing the relationships between study variables.

Variables	Mean	Std. Dev	1	2	3	4	5	p-value
Incidence of gastroenteritis	49.7760	5.70624	1.000					
Access to clean water	11.1083	1.88669	.540	1.000				0.00
Sanitation facilities used	12.7833	2.18160	.739	.347	1.000			0.00
Hygienic practices	13.8083	1.19731	.461	-.069	.274	1.000		0.00
Area of residence	9.6750	1.91044	.148	.001	.078	.178	1.000	0.106

Source: Field survey (2019); Keys: 1 = Incidence of gastroenteritis, 2 = Access to clean water, 3 = Sanitation facilities used, 4 = Hygienic practices, 5 = Area of residence (p is significant if < 0.05)

Table 2 shows the relative contribution of the independent variables (area of residence, access to clean water, hygienic practices and sanitation facilities used) to the prediction of incidence of gastroenteritis. The results showed the following: access to clean water (β = .387), sanitation facilities used (β = .508) and hygienic practices (β = .341), while area of residence (β = .048) is not significant..

Table 2. Relative effect of environmental factors on the prediction of incidence of gastroenteritis

Environmental factors	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	-4.012	3.656		-1.097	.275
Quality of water source	1.171	.153	.387	7.638	.000
Method of sewage disposal	1.328	.138	.508	9.651	.000
Hygienic practices	1.623	.239	.341	6.799	.000
Area of residence	.143	.142	.048	1.008	.316

Source: Field survey (2019)

Table 3 reveals a significant joint contribution of the independent variables (area of residence, quality of water source, hygienic practices, method of sewage disposal) to the prediction of incidence of gastroenteritis. The result yielded a coefficient of multiple regressions R = 0.865 and

multiple R-square = 0.748. This suggests that the combination of four factors accounted for 74% (Adj.R2 = .740) variance in the prediction of the incidence of gastroenteritis. The ANOVA result from the regression analysis shows a significant influence of maternal environmental factors on the incidence of gastroenteritis, F (4, 115) = 85.549, P < 0.05.

Table 3. Summary of regression for the joint contributions of environmental factors to the prediction of incidence of gastroenteritis

R = .865

R Square = .748

Adjusted R square = .740

Std. Error = 2.91120

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2900.143	4	725.036	85.549	.000[b]
	Residual	974.635	115	8.475		
	Total	3874.778	119			

Source: Field survey (2019)

Discussion

The study revealed that quality of water source has a significant relationship with the incidence of gastroenteritis. The table further reveals that a poor-quality source of water will increase the incidence of gastroenteritis. This may happen if the water used by mothers for their children comes from a bad-quality source, which may be in close proximity to where the toilet is located. Children with access to safe drinking water are almost 20% less likely to suffer from gastroenteritis than those who use water from unsafe sources, such as unprotected dug wells or springs, tanker truck/cart and surface water (11). In the same vein, (10) affirmed that the probability that a child would contract diarrhea increases for households that drink from streams at a significant level of five percent (5%). Thus, households that use streams as their main source of drinking water are 0.032 more likely to have children suffering from diarrhea when compared to those living in households that use piped water as their main source of drinking water.

Hygienic practices have a significant relationship with the incidence of gastroenteritis. The findings of this study revealed that a high percentage of mothers of under-five children always wash their hands before preparing their child's meal as well as after their children defecate or urinate; they also reheat their child's meal. This indicates that a good number of mothers always practice both food and hand washing hygiene. Likewise, the outcomes of this study have shown that there is a positive correlation and a significant relationship between hygienic practices and the incidence of gastroenteritis among mothers of under-five children. The mothers' practice of handwashing before food preparation was associated with a lower risk of diarrhea among children; there is also a significant association between the incidence of gastroenteritis and washing hands with soap after cleaning the infants' perineum (18). Infants whose mothers sometimes or never wash their hands with soap after cleaning the infant's perineum were more likely to have diarrhea than infants whose mothers always wash their hands with soap after cleaning their infant's perineum. That is to say, the practice of handwashing reduces the risk of gastroenteritis.

The type of sanitation facilities used for sewage disposal shows a significant relationship with the

incidence of gastroenteritis in this study. The disposal practices of fecal waste of the youngest children were significantly correlated with the prevalence of gastroenteritis. Children whose mothers reported disposing of the fecal waste of their youngest child in a pit toilet/latrine reported the highest prevalence of diarrhea in comparison to those who throw it into the garbage or rinse it away. Thus, children who lived in a house with less dirty sewage had a significantly lower risk of having gastroenteritis than children who did not (16). This finding is further confirmed by the submission (15) that the proportions of children from households that use a latrine or diaper for stool disposal suffer from diarrhea less when compared to those that do not. The type of sanitation facility used showed that parents and children living in houses with non-flush toilets are twice as likely to suffer from diarrhea compared to houses with a flush toilet. Children living in households with a separate flush toilet are about 50% less likely to suffer from diarrhea than children with access to a pit latrine, dry toilet and toilet shared by other households; they are generally unhygienic and pose a higher risk for the children to get gastroenteritis.

Regarding the relationship between the area of residence (where the mothers live) and the incidence of gastroenteritis, the study has shown that there is no significant relationship. The observation from the results of this study revealed that a significant portion of the respondents reside in a dirty environment, a place surrounded by stagnant water which could be a breeding place for flies, and even that domesticated animals also reside with them. This indicates that the environment where the mothers reside may be a place for infection to be comfortably transmitted. This is in line with the affirmation of (9) that households in rural areas with domesticated animals in close proximity show an increased risk of gastroenteritis. The presence of animals in close proximity to human dwellings adds to the risk of transmission of zoonotic infections to humans directly or through contaminated water.

This study also revealed that when the environmental factors such as hygienic practices, sanitation and quality of water source are combined together, they have a significant relationship with gastroenteritis. This is confirmed from the findings of (19), where in a 2-week study conducted regarding the prevalence of diarrhea, they discovered that it was 23.1%, and that residence, availability of latrine, availability of a handwashing facility, source of water, and waste disposal practices were independently associated with diarrhea. Furthermore, the findings of (20) showed that many factors, such as socio-economic, behavioral like breastfeeding and environmental factors such as water, sanitation and method of waste disposal are linked to gastroenteritis. Environmental factors such as the type of water source, presence of sanitation facilities, solid waste disposal system and floor type in the kitchen are found to be crucial contributors to the high prevalence of diarrhea and gastroenteritis.

Conclusion

Based on the results of this study, it was concluded that: 1) Gastroenteritis is a major health problem that has over the years assumed greater significance in developing countries like Nigeria; 2) Many maternal factors emanating from the environment, such as area of residence, method of sewage disposal, quality of water source and hygienic practices were assessed and most were found to be significant predictors of the incidence of gastroenteritis, except for area of residence; and 3) However, the conglomeration of maternal environmental factors has a significant relationship with the incidence of gastroenteritis.

Recommendations

At this point, it is recommended that environmental health workers in collaboration with the Ministry of Health and the Ministry of Environment ensure that every house has proper means of disposing sewage, especially a septic tank (flush toilet), as this will help reduce the disposal of feces in the environment. Likewise, the government and other well-to-do

people in the society should work hand in hand to provide potable water supply, which the people can easily access, as well as a way to maintain it. Health educators should also train mothers on handwashing hygiene procedures and show them simple ways of how it can be done for them to apply it over time. Mothers should be encouraged to practice handwashing as it prevents infection. Water and sanitation interventions in urban slums should be highly effective in combating the incidence of this disease among children.

References

1. 1. Schlossberg D. Clinical infectious disease (second ed.); 2015. p. 334. ISBN 978-1-107-03891-2.

2. World Health Organization. Children: reducing mortality Fact sheet. http://www.who.int/mediacentre/factsheets/fs178/en/index.html.2013.

3. GBD 2015 Mortality and Causes of Death Collaborators. Global, regional, and national life expectancy, all-cause and cause-specific mortality for249 causes of death, 1980–2015: a systematic analysis for the GlobalBurden of Disease Study 2015. Lancet. 2016; 388:1459-1544.

4. Iyoha O, Abiodun PO. Human rotavirus genotypes causing acute watery diarrhea among under-five children in Benin City, Nigeria. Nigerian J Clin Pract. 2015; 18(1): 48–51.

5. Alkali BR, Daneji AI, Magaji AA, Bilbis LS. Clinical symptoms of human rotavirus infection observed in children in Sokoto, Nigeria. Adv Virol. 2015;2015:890957. doi: 10.1155/2015/890957

6. Omatola CA, Olusola BA, Odiabo GNN. Rotavirus infection among under five children presenting with gastroenteritis in Ibadan, Nigeria. Arch Basic Appl Med. 2016; 4(1):44-49.

7. Mohammed A, Aminu M, Ado S, Jatau E, Esona M. Prevalence of rotavirus among children under five years of age with diarrhea in Kaduna State, Nigeria. Nigerian J Paediatrics. 2016; 43(4):264-268.

Acknowledgement. We appreciate Prof. Ogundele B.O. and Prof. Ayenigbara G.O. for their time to proofread this paper and make corrections where necessary.

Disclosure

Funding. No specific funding was received for this study.

Competing interests. None to declare.

8. Kattula D, Francis MR, Kulinkina A, Sakar R, Mohan VR, Babji S, Ward HD, Kang G, Balraj V, Naumova EN. Environmental predictors of diarrhoeal infection for rural and urban communities in South India in children and adults. Epidemiol Infec. 2015; 143(14):3036-47. doi: 10.1017/S0950268814003562.

9. Okebugwu QC, Adebolu TT, Ojo BA. Incidence of Rotavirus Infection in Children With Gastroenteritis in Akure, Ondo State, Nigeria. FUTA Journal of Research in Sciences. 2017; 13(1):122-128.

10. Gloria E, Abigail P, John AA. Water and Sanitation as Predictors of Child Diarrhoea in Ghana. Asian Journal of Economics, Business and Accounting. 2017; 3(1):1-13.

11. Aditya S, Mahesh NS. Diarrhea and acute respiratory infections among under-five children in slums: Evidence from India. Peer Journal Pre Prints 2014.

12. Oloruntoba, Sridhar MK. Bacteriological quality of drinking water from source to household in Ibadan, Nigeria. Afr J Med Medical Sci. 2007; 36(2):169–175.

13. Trevett AF, Carter RC, Tyrrel SF. Water quality deterioration: study of household drinking water quality in rural Honduras. Int J Environ Health Res. 2004;14(4): 273–283.

14. Jinadu MK, Olusi SO, Agun JI, Fabiyi AK. Childhood diarrhea in rural Nigeria: studies on prevalence, mortality and socio-environmental factors. J Diarrheal Dis Res. 1991;9(4): 323–327.

15. Oloruntoba EO, Folarin TB, Ayede AI. Hygiene and sanitation risk factors of diarrhoeal disease among under-five children in Ibadan, Nigeria. Afr Health Sci. 2014; 14(4):1001–1011.

16. Desmennu AT, Oluwasanu MM, John-Akinola, YO, Oladunni O, Adebowale AS. Maternal Education and Diarrhea among Children aged 0-24 Months in Nigeria. Afr J Repr Health. 2017; 21[3]: 27-36.

17. Dairo MD, Ibrahim TF, Salawu AT. Prevalence and determinants of diarrhea among infants in selected primary health centres in Kaduna north local government area, Nigeria. Pan Afr Med J 2017; 28:109. doi: 10.11604/pamj.2017.28.109.8152.

18. Ogbo FA, Agho K, Ogeleka P, Woolfenden S, Page A, Eastwood J. Global Child Health Research Interest Group. Infant feeding practices and diarrhea in sub-Saharan African countries with high diarrhea mortality. PLoS One 2017;12(2)e0171792.

19. Workie GY, Akalu TY, Barak AG. Environmental factors affecting childhood diarrheal disease among under-five children in Jamma district, South Wello zone, Northeast Ethiopia. BMC Infect Dis. 2019;19:804.

20. Getachew A, Alebachew T, Mulat GH, Tadesse G, Daniel H, Zemichael G, Marta A. Environmental factors of diarrhea prevalence among under five children in rural area of North Gondar zone, Ethiopia. Ital J Pediatr. 2018; 44:95 https://doi.org/10.1186/s13052-018-0540-7

.

QUESTIONNAIRE ON MATERNAL ENVIRONMENTAL FACTORS AS PREDICTOR OF OCCURRENCE OF GASTROENTERITIS AMONG UNDER-FIVE CHILDREN IN AKURE SOUTH GOVERNMENT AREA, ONDO STATE

Instruction: Please tick (√) the most appropriate column that suits your answer
Background Information
1. Age (in years): (a) 15-20 [ ] (b) 21-25 [ ] (c) 26-30 [ ] (d) 31-35 [ ] (e) 36-40 [ ] (f) 41-45 [ ] (g) 46 and above [ ]

2. Educational status: (a) None [ ] (b) Primary [ ] (c) Secondary [ ] (d) Tertiary [ ]

3. Family size (in person): (a) 1-5 [ ] (b) 6 and above [ ]
4. Monthly income (in Naira): (a) ≤ 15000 [ ] (b) 16000-25000 [ ] (c) 26000-35000 [ ] (d) 36000-45000 [ ] (e) 46000-60000 [ ] (f) 61000-10000 [ ] (g) 101000-150000 (h) 151-250000 [ ] (i) above 250000 [ ]
SECTION B
Instruction: Please tick (√) the most appropriate column to indicate the extent to which you agree or disagree with the statements below.

S/N	Quality of water source	Always	Sometimes	Not at all
1.	Open well			
2.	Bore hole			
3.	River or stream			
4.	Bottled water to drink			
5.	Treated water			
	Method of sewage disposal	**Always**	**Sometimes**	**Not at all**
6.	Septic tank			
7.	Pit toilet			
8.	Open field defecation			
9.	River			
10.	In a bucket			
	Hygienic practices	**Always**	**Sometimes**	**Not at all**
11.	I do not wash my hands before preparing my child's food after feeding my child			
12.	I do wash my child's hands after defecating or urination			
13.	I reheat food before my child eats			
14.	I wash my child's feeding bottle			
15.	I wash my hands before and after I clean up my child's feces			
	Area of residence	**Yes**	**Maybe**	**No**
16.	I live in a crowded environment			
17.	Animals live around my house			
18.	My environment is free from flies			
19.	I reside in a place where water stores			
20.	I live in a clean and tidy environment			

	Occurrence of gastroenteritis infection	**Once**	**Twice**	**More than twice**	**Never**
21.	I have a child who has suffered from this illness before				
22.	It affects all my children when they are between the ages of two and five				
23.	It comes when I stop breastfeeding my child				
24.	It affects my child when taken to day care center				
25.	It starts with my child in the community				
26.	It has affected the child of my neighbor before transfer to my child				
27.	It has affected my child even when I get immunization for the child				
28.	It has affected my child who did not take immunization				
29.	It affects my male child				
30.	It affects my female child				
31.	How many times does your child vomit in one day?				
32.	What is the frequency of diarrhea in one day?				

Author contribution.
Acquisition of data: Olofintuyi OO, Ogundele BO, Adeleke OR, Adegboro JS, Oluwadare RS.
Administrative, technical or logistic support: Olofintuyi OO, Ogundele BO, Adeleke OR, Adegboro JS, Oluwadare RS
Analysis and interpretation of data: Olofintuyi OO, Ogundele BO, Adeleke OR, Adegboro JS, Oluwadare RS.
Conception and design: Olofintuyi OO, Ogundele BO, Adeleke OR, Adegboro JS, Oluwadare RS.
Critical revision of the article for important intellectual content: Olofintuyi OO, Ogundele BO, Adeleke OR, Adegboro JS, Oluwadare RS.
Drafting of the article: Olofintuyi OO, Ogundele BO, Adeleke OR, Adegboro JS, Oluwadare RS.
Final approval of the article: Olofintuyi OO, Ogundele BO, Adeleke OR, Adegboro JS, Oluwadare RS.
Provision of study materials or patients: Olofintuyi OO, Ogundele BO, Adeleke OR, Oluwadare RS
Statistical expertise (statistical analysis of data): Olofintuyi OO, Ogundele BO, Adeleke OR, Adegboro JS