Case Study

Knowledge of Diarrhoeal Diseases and Hygiene Practices of In-School Adolescents

Titilayo Lekan-Agunbiade[1*], Ayodele Onayade[2], Olalekan Agunbiade[3]

[1]Microbiology Laboratory, Midland Regional Hospital, Portlaoise, Ireland

[2]Department of Community Health, Obafemi Awolowo University, Ile-Ife, Nigeria

[3]Intensive Care Unit, Midland Regional Hospital, Portlaoise, Ireland

***Corresponding author:** Titilayo Lekan-Agunbiade, Microbiology Laboratory, Midland Regional Hospital, Portlaoise, Ireland, Tel: +353 894494322 E-mail: titilayolekanagunbiade@gmail.com

Received: 21 May 2021; **Accepted:** 11 June 2021; **Published:** 21 July 2021

Citation: Titilayo Lekan-Agunbiade, Ayodele Onayade, Olalekan Agunbiade. Knowledge of Diarrhoeal Diseases and Hygiene Practices of In-School Adolescents. Fortune Journal of Health Sciences 4 (2021): 394-411.

Abstract

Diarrhoeal diseases are among the most frequent childhood illnesses and the leading cause of preventable death in developing countries.

This descriptive cross-sectional study aimed to determine the level of knowledge of causes, symptoms, and management of diarrhoeal diseases, assess personal hygiene practices, determine the association between knowledge of diarrhoeal diseases and hygiene practices as well as ascertain determinants of positive hygiene practices among in-school adolescents in selected middle schools between the ages of 10-15 years in Ife Central Local Government, Ile-Ife, Nigeria.

Methods

Data were collected using self-administered questionnaires and observational checklists and were analysed using IBM *SPSS Statistics version 20.*

Results

The study revealed that the level of knowledge of causes, symptoms, management of diarrhoea, and personal hygiene among the respondents were high (94.7%, 66.7%, 51.3%, and 96.9% respectively) and an association existed between knowledge of diarrhoea causes and hygiene practices of respondents. The major determinants of positive hygiene practice were sex, availability of kitchen facilities at home, type of school, and availability of toilet facilities in schools.

Conclusion

The study established a high knowledge level of diarrhoea and personal hygiene practices among respondents. However, there is a need for reinforcement from parents, teachers, and the government as well as the availability of hygiene enabling facilities at home and in schools to empower respondents to maintain their health and to influence the health of their families as well the entire society.

Keywords: Diarrhoeal diseases, hygiene practices, knowledge, in-school-adolescents, enabling factors, causes, and symptoms.

Abbreviations

World Health Organization (WHO)

United Nations Children Education Fund (UNICEF)

Federal Capital Territory (FCT)

Health Belief Model (HBM)

1 Introduction

Diarrhoea is an important cause of morbidity and mortality in all regions of the world and among all ages [1, 2]. Though mortality rates among the older children and adolescents are lower than those observed in children under five years, diarrhoea still poses a substantial burden accounting for approximately 2.8 billion diarrhoea episodes among older children, adolescents, and adults. Diarrhoea is defined by the World Health Organization (WHO) as the passage of three or more loose or watery stools or liquid stools per day or a definite decrease inconsistency and increase in frequency based upon an individual baseline. Diarrhoea is usually a symptom of an infection in the intestinal tract, which can be caused by a variety of bacterial, viral, and parasitic organisms [3]. Diarrhoea can be acute or chronic.

According to the United Nations Children Education Fund (UNICEF), diarrhoea prevalence rate in Nigeria is 18.8 percent and is one of the worst in Sub-Saharan Africa. Diarrhoea is estimated to accounts for over 16 percent of child deaths. Diarrhoea incidences accounted for about 1.9 million deaths and new cases are estimated at 4 billion annually [4]. 88 percent of diarrhoeal diseases worldwide are attributable to unsafe water, inadequate sanitation, and poor hygiene [5]. With a population of 140 million people living in Nigeria, about 70 million people do not have

access to improved drinking water, while less than half (44%) of the population have access to improved sanitation facilities (36% in rural areas).

In a survey that UNICEF carried out in six states in Nigeria, they found that an average of 82% of respondents washed their hands before eating, while only 53% of people washed their hands with soap after defecation. Alarmingly, only about 14% of people wash their hands with soap after cleaning a child's faeces.

In the last quarter of 2009, it was estimated that more than 260 people died of the acute form of diarrhoea, in four Northern states [6]. The 2010 outbreak of gastroenteritis in some regions of Nigeria: Jigawa, Bauchi, Gombe, Yobe, Borno, Adamawa, Taraba, Federal Capital Territory (FCT), Cross River, Kaduna, Osun, and Rivers brought to the forefront the vulnerability of poor communities and most especially children to the infection [7].

Schools have repeatedly been implicated in the spread of gastrointestinal disease including diarrhoea [8-10] because large numbers of young people of different ages come in close contact with each other. Some of whom may not have developed good personal hygiene habits or immunity to various diseases [11]. Recently it was estimated that infections which adolescents contact in schools will lead to infections in up to half of their household members [12]. It has also been established that repeated diarrhoeal episodes during childhood and adolescence can lower fitness and productivity during adulthood [2]. For children five years of age or older, adolescents and adults, mild to moderate diarrhoea can lead to absenteeism from school or work and may require treatment by a health care provider. More severe diarrhoea can lead to hospitalization; serious sequelae such as Guillain Barre Syndrome and hemolytic uremic syndrome and in some cases death [13].

Since diarrhoea affects a significant portion of children and adolescents, an enormous amount of resources are spent in providing care which could be spent on meeting other important needs. In addition, indirect costs are incurred such as time lost to economic activities in looking after sick children and adolescents and days lost from school. These have negative impacts on the economic growth and poverty reduction efforts of developing countries.

Most of the medical literature on diarrhoea mostly explores the knowledge of mothers and caregivers about diarrhoeal diseases. In addition, the majority of past studies mostly focus on the menstrual hygiene of adolescent girls. Thus, the present study aimed to investigate knowledge of diarrhoeal diseases and hygiene practices by determining knowledge of causes, symptoms, and management of diarrhoeal diseases; assessing hygiene practices; determining the association between knowledge of diarrhoeal diseases and the level of hygiene practices; as well as to ascertain the determinants of positive hygiene practices among in-school adolescents. To propose strategies to control these diseases among adolescents aged between 10 and 15, thereby contributing to the overall control of the diseases in general.

2 Conceptual Framework

Health Belief Model (HBM) based on the theory that a person's willingness to change health-related behavior is

primarily due to perceived susceptibility, perceived severity, and perceived benefits was used for this study. This model attempts to explain and predict healthy behavior by focusing on the attitudes and beliefs of individuals [14]. It was proposed that a person might only use soap to wash his /her hands if he/she believes that a negative condition like diarrhoea can be prevented - Perceived susceptibility. In addition, if a person believes that recommendation such as using soap when washing hands will prevent diarrhoea, then such a person will react to such recommendation positively and adopt its practice - Perceived severity. Conclusively, if people believe that they can use soap comfortably and with confidence, they will have no problem doing that, if they can afford to buy the soap [15] - Perceived benefit.

3 Method

This descriptive cross-sectional study was designed to assess knowledge of diarrhoea and hygiene practices of Ife Central Local Government, Osun-State, Nigeria. The study employed Leslie Fisher's formula for estimating sample size and respondents were selected through multistage of 318 adolescents in middle schools between the ages of 10-15 in sampling technique. In the first stage, middle schools in Ife Central Local Government were stratified based on ownership into two groups; public and private schools (middle schools were called junior secondary schools in private school settings). After stratification, three public schools (Ife Middle School, Anglican Central Middle School, and Urban Day Middle School 1) and three private schools (St. Mulumba Catholic School, Adepetu Comprehensive College, and Christ Way High School) were selected by Simple Random Technique via balloting. From each selected school, six classes were selected using a simple random sampling technique. The list of all the students in each of the classes was retrieved and eligible students within the age group of 10-15years were selected using a simple random sampling technique (balloting).

4 Ethics Approval and Consent to Participate

Ethical clearance was obtained from the Ethics and Research Committee of the Institute of Public Health, Obafemi Awolowo University, Ile-Ife. Permission to collect data was also obtained from the Ife Central Local government and the principal of the schools used for the study. Consent from parents, as well as assent from the participants, was taken before questionnaire administration.

5 Survey Instrument

The data were collected using a purpose-designed questionnaire and observational checklist. The questionnaire sought information on respondents' socio-demographic, personal hygiene, knowledge of the causes, symptoms, and management of diarrhoea as well as determinants of positive hygiene practices among respondents. Also, a checklist was used to observe the school environments for the presence of water with safe source, sufficient water points in the right places for all needs, availability of soap or suitable alternatives at hand washing points, sufficient toilets for boys, girls, and teachers, well-situated toilets, security, and privacy when using toilets, hygienic condition of toilets, availability of hand washing facilities close to the toilets, cleaning, and maintenance plan, nature of floors and building designs to minimize physical hazards, adequacy of bins and other equipment for managing solid waste, availability and correctly designed drainage system.

The questionnaire was validated by face and content validity criteria. Face validity was established by giving the instruments to adolescents who understand the concepts been measured in the research. Content validity was determined by the researchers who assessed each item on the instrument for content clarity, scope, and relevance to the study. The questionnaire was pretested in St. Peter's Middle School in Ife East Local Government, Osun State. Questions that pre-test participants found embarrassing or difficult to answer were noticed, revised, and re-tested. Internal consistency of 0.8 was also achieved for the instrument using the Cronbach's Alpha method.

Participants' knowledge of causes, symptoms, and management of diarrhoea was assessed by scoring responses to questions in the knowledge sections of the questionnaire. Every correct response was scored 1 while questions incorrectly answered or those that the respondents skipped or were unsure of were scored 0. Respondents who obtained an aggregate score of 60% or more were classified as having good knowledge while those who obtained less than 60% were classified as having poor knowledge.

For hygienic practices, the most appropriate answers were scored 3 followed by less appropriate which were scored 2 and the least appropriate answers were scored 1. Therefore, respondents who obtained aggregate scores of 60% or more were classified as having good hygiene practices while those who obtained less than 60% were classified as having poor hygiene practices.

5 Method of Data Analysis

The data were coded and entered into a record file with EPI DATA statistical software and were analysed using IBM *SPSS Statistics version 20*. Univariate (frequency distribution), bivariate (cross-tabulation and chi-square analysis), and multivariate (logistic regression) levels of analysis were employed. Statistical significance level was set at $p < 0.05$ for all analyses.

6 Results

Three hundred and eighteen respondents were recruited for this study out of which majority were aged 12-14 years (60.4%) (Figure 1), females (60.7%), from Yoruba ethnic group (78.9%), Christians (79.2%), from monogamous family (57.9%) and lived in houses within a compound (44%). Most of the respondents have well water as the source of water (44.7%), had kitchens in their houses (83.3%), had water closet as the type of their toilet (55.7%), and were from class 1 of junior secondary school (35.8%) (Table 1).

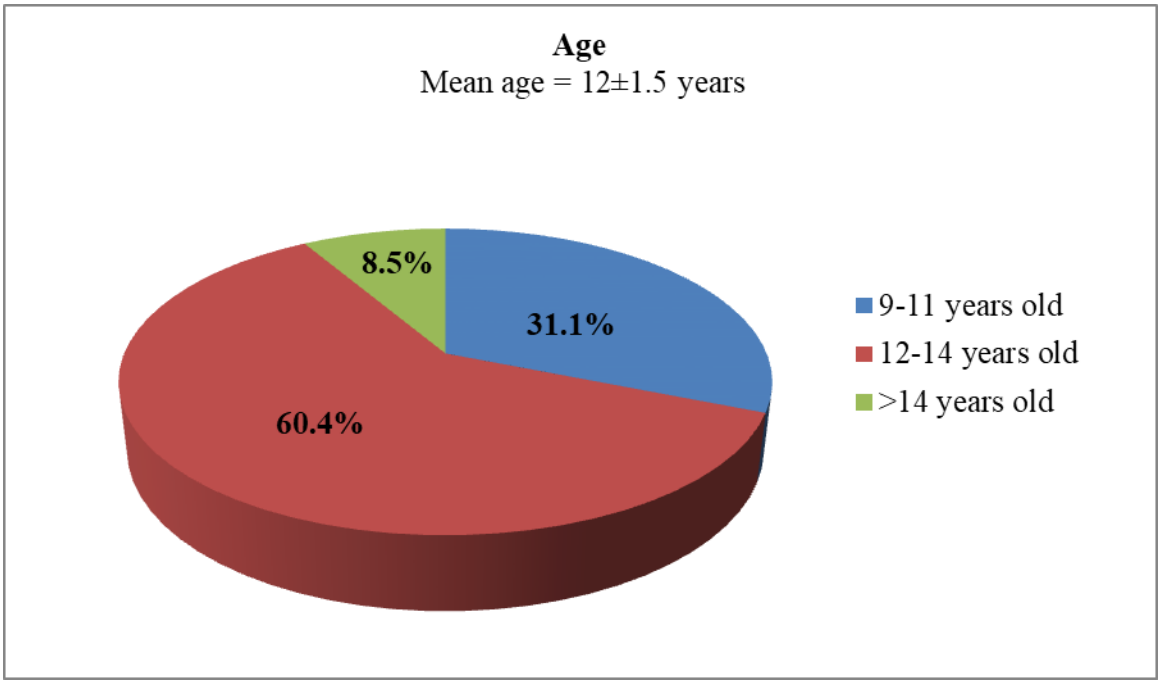

Figure 1: Respondents' Age

Table 1: Socio-Demographic and other Background Information n=318

Socio-demographic characteristics	Frequency (%)
Ethnicity	
Hausa	18 (5.7)
Igbo	48 (15.1)
Yoruba	251 (78.9)
Others	1 (0.3)
Religion	
Christianity	252 (79.2)
Islam	55 (17.3)
Traditional	11 (3.5)
Type of Family	
Monogamous	184 (57.9)
Polygamous	79 (24.8)
Living With One Parent	55 (17.3)
Class	
J.S.S 1	112 (35.2)
J.S.S 2	110 (34.6)
J.S.S 3	96 (30.2)

Residential facility	
Bungalow	94 (29.6)
Flat	122 (38.4)
Room and parlor	80 (25.2)
A room	22 (6.9)
Living environment	
Compound	140 (44)
Community	112 (35.2)
Reserved areas/estate	66 (20.8)
Source of water	
Well	142 (44.7)
River/spring	52 (16.4)
Pumping system/borehole	117 (36.8)
Rain	7 (2.2)
Kitchen facility	
Available	265 (83.3)
Unavailable	53 (16.7)
Toilet facility	
Pit	74 (23.3)
"Shot put"	60 (18.9)
Water closet	177(55.7)
Bush/flowing water	7 (2.2)

Almost all the respondents agreed that diarrhoea is caused by a lack of proper hygiene practices (88.1%), that it is necessary to wash hands frequently to avoid diarrhoea (91.2%), and that the environment must be in neat condition to avoid diarrhoea (95.6%). The overall level of knowledge of causes of diarrhoea of respondents was good (94.7%) (Table 2).

Table 2: Knowledge of Causes of Diarrhoea

Knowledge Of Causes Of Diarrhoea	**Yes**	**No**	**Not Sure**
Diarrhoea is caused by poor hygiene practices	280(88.1)	23(7.2)	15(4.7)
Washing hands frequently to prevent diarrhoea	290(91.2)	23(7.2)	5 (1.6)
Washing hand before meal avoids diarrhoea	304(95.6)	9(2.8)	4(1.6)
Hand washing after using a toilet avoids diarrhoea	300(94.3)	10(3.1)	8 (2.5)
Hand washing after playing around prevents diarrhoea	296(93.1)	15(4.7)	7 (2.2)
Nails must be cut short to avoid food contamination	299(94)	14(4.4)	5 (1.6)
The environment must be kept clean to avoid diarrhoea	304(95.6)	5(1.6)	9 (2.8)

Littering of the environment with faeces can lead to food contamination	265(83.3)	40(12.6)	13(4.1)
Having good and functioning toilet is necessary to prevent diarrhoea	284(89.3)	22(6.9)	12(3.8)
Siting of a residential area near refuse dump should be avoided	269(84.6)	39(12.3)	10(3.1)
Drinking dirty water can cause diarrhoea	271(85.2)	36(11.3)	11(3.5)
Covering buckets of water prevents contamination	269(84.6)	39(12.3)	10(3.1)

Most of the respondents opined that diarrhoea is usually a symptom of an infection in the intestinal tract (85.2%) and the majority concurred that diarrhoea involves frequent passing of loose watery stool (78.3%), abdominal cramp (75.8%), abdominal pains (79.2%), fever or high temperature (70.7%), being sick or vomiting (78.3%), blood or mucus appearing in the stools (75.2%), aching limbs and headache (63.2%) are all symptoms of diarrhoea. The respondents' overall level of knowledge of diarrhoea symptoms was good (66.7%) (Table 3).

Table 3: Knowledge of Diarrhoea Symptoms n=318

Knowledge Of Diarrhoea Symptoms	**Yes**	**No**	**Not Sure**
Diarrhoea is usually a symptom of an infection in the intestinal tract	271(85.2)	10(3.1)	37(11.6)
Frequent passing of loose watery	249(78.3)	10(3.1)	37(11.6)
Abdominal cramp	241(75.8)	39(12.3)	38(11.9)
Abdominal pains	252(79.2)	37(11.6)	29(9.1)
Fever or high temperature	224(70.4)	56(17.6)	38(11.9)
Prolonged diarrhoea can lead to dehydration	239(75.2)	41(12.9)	38(11.9)
Dizziness/lightheadedness can occur as a result of dehydration	246(77.4)	27(8.5)	45(14.2)
Death can occur as a result of dehydration	236(74.2)	39(12.3)	43(13.5)
Being sick or vomiting	249(78.3)	40(12.6)	29(9.1)
Blood or mucus appearing in the stools	239(75.2)	42(13.2)	37(11.6)
Aching limbs and headache	201(63.2)	35(11)	82(25.8)

More than half of the respondents agreed that oral rehydration solution (ORS) is used in oral rehydration therapy (ORT) (65.4%) and that early intervention and administration of ORS reduces dehydration (71.1%). More than half of the respondents (51.3%) had an overall good knowledge of diarrhoea management (Table 4).

Table 4: Knowledge of Diarrhoea Management

Knowledge Of Diarrhoea Management	**Yes**	**No**	**Not Sure**
Oral rehydration solution (ORS) is also known as salt-sugar solution	221(69.5)	35(11)	62(19.5)
ORS is used in Oral rehydration therapy (ORT)	208(65.4)	36(11.3)	74(23.3)
ORT is the oral administration of salt-sugar solutions to prevent or correct diarrhoeal dehydration.	221(69.5)	42(13.2)	55(17.3)
ORS contains specific amounts of important electrolytes that are lost in diarrhoea stool.	216(67.9)	41(12.9)	61(19.2)
ORS is recommended irrespective of age and the type of diarrhoea	218(68.6)	37(11.6)	63(19.8)
Early intervention and administration of ORS reduces dehydration	226(71.1)	34(10.7)	58(18.2)

There was a strong association between knowledge of the cause of diarrhoea and hygiene practices of respondents (x^2=4.382, p value=0.036, df=1) (Table 5).

Table 5: Association between Knowledge of Diarrhoea and Hygiene Practices n=318

Level of knowledge of causes diarrhoea	**Level of hygiene practices**			**df**	χ^2	**P-value**
	Poor	**Good**	**Total**			
Poor	2	8	10	1	4.382	0.036*
Good	15	293	308			
Total	17	301	318			
Level of knowledge of diarrhoea symptoms						
Poor	4	0	6	2	4.631	0.099
Good	52	50	206			
Total	56	50	212			
Level of knowledge of diarrhoea management						
Poor	6	4	10	1	0.524	0.469
Good	149	159	308			
Total	155	163	318			

χ^2= chi-square Df= degree of freedom P<0.05

Table 6 reveals that more than half of respondents bathe twice a day (55%), brushed their teeth twice a day (56.6%), replaced their toothbrushes quarterly (61.6%), and washed their hands with soap and water (68.2%). The overall personal hygiene practice level of respondents was rated to be good (96.9%).

Personal Hygiene Practices	**Frequency (%)**
Bathe	
Twice a day	175 (55)
Daily	109(34.3)
Every alternate day	34(10.7)
Took bath with	
Soap and water	277 (87.1)
Water only	34 (10.7)
Ashes	7 (2.2)
Brushed teeth	
Twice a day	180 (56.6)
Daily	120 (37.7)
Every alternate day	18 (5.7)
Cleaned teeth using	
Brush and toothpaste	271 (85.2)
Plant twigs	37 (11.6)
Water only	10 (3.1)
Replaced toothbrush	
Quarterly	196 (61.6)
Half-yearly	77 (24.2)
yearly	45 (14.2)
Washed hands with	
Antimicrobial solution	86 (27)
Soap and water	217(68.2)
Water	15 (4.7)
Ash and water	0 (0)
Wash hair	
Daily	256 (80.5)
Monthly	44 (13.8)
Quarterly	18 (5.7)
Washed hands before and after a meal	
Yes	292 (91.8)
No	21 (6.6)

Not sure	5 (1.6)
Washed hands after going to the toilet?	
Yes	284 (89.3)
No	32 (10.1)
Not sure	2 (0.6)
Washed hands after playing with animals	
Yes	279 (87.7)
No	29 (9.1)
Not sure	10 (3.1)
Wash under and socks	
Daily	265(83.3)
Alternate day	33(10.4)
Weekly	20(6.3)
Cut nails	
Weekly	270 (84.9)
Monthly	29 (9.1)
Quarterly	19 (6)
Frequently threw litters/dirt/refuse	
In the dustbin	290 (91.2)
On the ground	20(6.
On the road	8(2.5)
Iron your cloth	
Frequently	216(67.9)
Sometimes	88(27.7)
Rarely	11(3.5)
Never	3(0.9)

Most respondents believed that if the stool is passed anywhere it may cause disease (79.6%) and a majority agreed to wash hands with soap or ash after defecation (77%) and before eating food (89.6%). A large percentage of respondents were aware of the importance of hand washing (87.7%), good toilet utilization (81.4%), and the importance of handling water well to prevent diarrhoeal disease (85.8%) in the prevention of diarrhoeal disease.

Most of the respondents consented to the availability of hand washing facilities (87.1%), toilet facilities (87.4%), toilet papers (72.3%), and soap and water (81.1%) in their schools. The neatness of school toilets was guaranteed by two hundred and fifty-five respondents (80.2%) as well as the accessibility of water by hundred and sixty-six respondents (83.6%). But, one hundred and ninety-nine respondents opined that despite the availability of these facilities, there were always queuing for toilet use during break time (62.6%) (Table 7).

Table 7: Determinants of Positive Hygiene Practices. n=318

Knowledge	**Yes**	**No**	**Not sure**
Disease results if the stool is passed anywhere.	253(79.6)	32(10.1)	33(10.4)
Wash hands with soap or ash after defecation.	245(77)	56(17.6)	17(5.3)
Wash hands before eating food.	285(89.6)	20(6.3)	13(4.1)
Cover and wash buckets of drinking water to avoid diarrhoea.	281(88.4)	23(7.2)	14(4.4)
Cover and wash Pit latrine regularly.	283(89)	22(6.9)	13(4.1)
Flush after using a water system toilet.	285(89.6)	20(6.3)	13(4.1)
Awareness			
I am aware of the importance of handwashing	279(87.7)	17(5.3)	22(6.9)
I am aware that good toilet utilization can prevent diarrhoea disease.	259(81.4)	44(13.8)	15(4.7)
I am aware that it is important to handle water well to prevent diarrhoeal disease.	273(85.8)	22(6.9)	23(7.3)
Enabling Factors			
Handwashing facilities are available in my school.	277(87.1)	29(9.1)	12(3.8)
Toilet facility is available in my school.	278(87.4)	30(9.4)	10(3.1)
The toilet facility in my school is always neat.	255(80.2)	47(14.8)	16(5)
Toilet paper is available for use in the school's toilet.	230(72.3)	79(24.8)	9(2.8)
There is always queuing for using the toilet during break time.	199(62.6)	98(30.8)	21(6.6)
Water is accessible in my school.	266(83.6)	34(10.7)	18(5.7)
Soap and water are available for hand washing in my school.	258(81.1)	45(14.2)	15(4.7)

Logistic regression was performed to ascertain determinates of positive hygiene practices among the respondents. The logistic model was significant (x^2 =41.032, df=13, p value=0.000) and the model explained 50% (Nagelkerke R^2) of the variance in the level of hygiene of respondents and correctly classified 318 cases. The major determinants of positive hygiene practice among respondents were the sex of respondents, availability of kitchen facility and school toilet, and type of school. Females were 78.175 times more likely to have positive hygiene practices than males. Availability of kitchen facility at home and respondents' attendance of private school increases the likely

hood for positive hygiene practice whereas the availability of toilet decreases the likelihood for positive hygiene practice (Table 8).

Table 8: Logistic Regression to Ascertain Determinates of Positive Hygiene.

Variables	Slope E	df	P-value	Odds ratio	95% CI
Sex Female [1] Male	1(Ref) 4.359	1	0.019*	78.175	2.031-3008.455
Kitchen facility Available[1] Unavailable	1(Ref) 3.831	1	0.000*	46.112	5.470-388.702
Toilet facility Available[1`] Unavailable	1(Ref) -3.204	1	0.023*	0.041	0.003-0.644
Neatness of toilet Neat[1] Dirty	1(Ref) -1.617	1	0.137	0.199	0.024-1.675
Toilet paper Available[1] Unavailable	1(Ref) -1.356	1	0.163	0.258	0.038-1.735
Queuing at the toilet during break Yes[1] No	1(Ref) -0.699	1	0.499	0.512	0.073-3.573
Accessibility of water Accessible[1] Not accessible	1(Ref) 1.948	1	0.428	7.016	0.057-864.022
Soap and water Available[1] Unavailable	1(Ref) 0.980	1	0.683	2.665	0.024-293.540
Type of school Private[1] public	1 (Ref) 4.121	1	0.025*	61.594	1.682-2255.484

χ^2= chi-square Df= degree of freedom P<0.05

Figure 2 reveals that 5 out of the visited 6 schools had toilets: that provided privacy and security; were hygienic and easy to clean; had bins and other equipment for managing solid waste and had a neat environment; had safe water source that was free from contaminants; situated their toilet far from classrooms and playing ground. However, four schools did not have smooth and easy to clean floors.

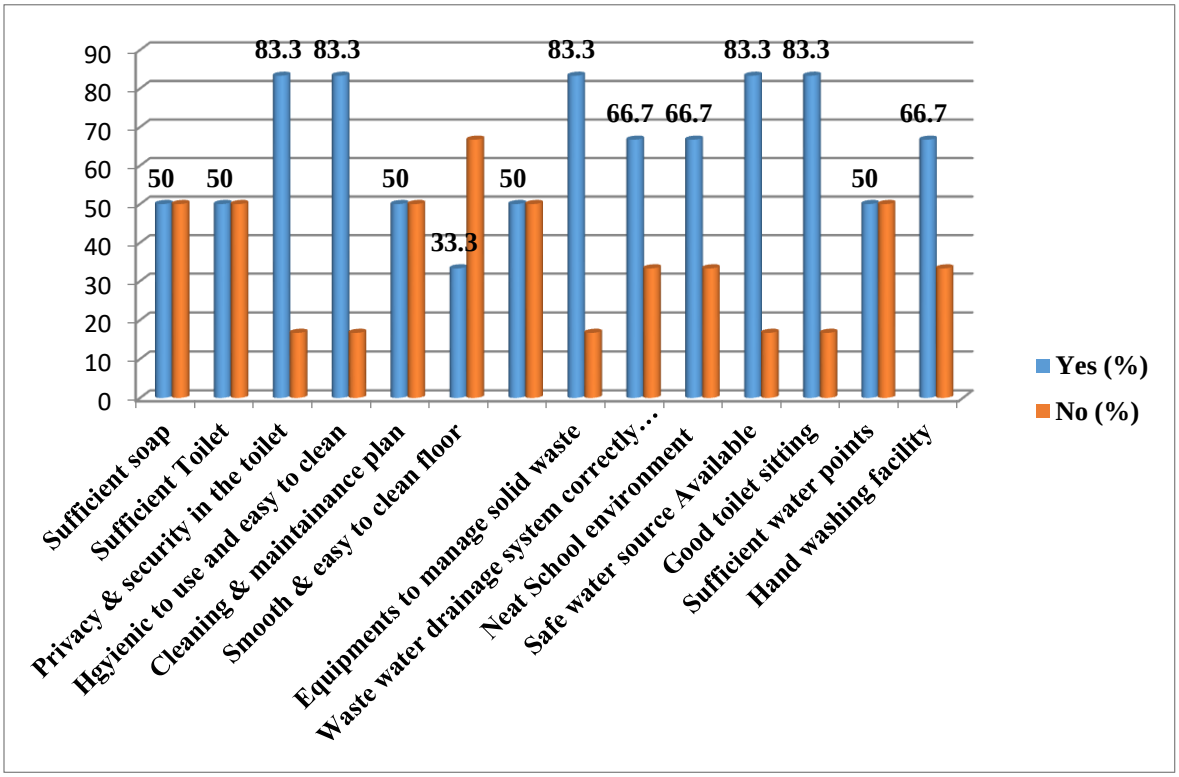

Figure 2: Result of the Checklist n=6

7 Discussion of Findings

This study aimed to investigate knowledge of diarrhoeal diseases and hygiene practices among in-school adolescents in Osun state. Three hundred and eighteen respondents were recruited for the study. This study revealed that most of the respondents had good knowledge of causes 301 (94.7%), symptoms 212 (66.7%), and management 163 (51.3) of diarrhoea. Knowledge and awareness are some of the measures, which have been discovered to have a causal pathway to behavior [15]. Good knowledge of diarrhoea can help motivate students to have good hygiene practices. Therefore, it was not surprising to find out that the respondents also have high-level hygiene practices. This finding is supported by the discovery of Curtis *et al* [16] that to encourage good hygiene practices, the students must have a good grasp of the dangers of doing otherwise. This can be achieved through the implementation of educational programs in schools and according to the submission of Ghose *et al* [17] when students know about personal hygiene and lifestyle as they mature, they are in a better position as adults to maintain their health and influence the health of the family. The finding above is also corroborated by a study done by Mulubirhan [18] in the year 2014 in which participants had adequate knowledge of water handling. Also, the majority of the respondents who had adequate knowledge on hand washing, water handling, and latrine utilization had positive hygiene behavior, and the likelihood of a child who is knowledgeable on water handling issues to have positive hygiene behavior is higher compare to those who are not knowledgeable.

This study showed that most of the respondents 308 (96.9%) had good personal hygiene practices. This is supported

by the findings of Oluwafemi [19] where the majority (98.2%) of the students also had good knowledge of personal hygiene practices. Good personal hygiene practices are motivated through the availability of enabling facilities in school and at home, this is in line with what was discovered by Scott *et al* [20] that hygiene behavior that students learn at school made possible through sanitation and hygiene-enabling facilities play a major role in ensuring good hand washing practices. This can help position the students as a good influence on their societies.

The majority of the schools visited for this study had many enabling facilities such as water points, soap, bins, and other equipment for managing solid waste, a good water drainage system, sufficient and neat toilets for both sexes with minimum security, and hand washing facilities. This discovery gives a better picture than the report of a study conducted by Christiana *et al* [21] in Ibadan in which there were an absence of wash hand basins in 77% of the schools and no soap in 88 percent of the schools with wash hand basins. The reasons for these improvements may be due to improved financial reimbursement to schools to purchase these items and improvement in the infrastructural facilities in schools in Osun state. These improvements motivate students to practice good hygiene.

Awareness of health impacts of good sanitation behavior is important because it determines the degree of sustainability of the intervention in sanitation [19]. This study showed that the respondents had a good awareness of hygiene practices and this greatly helped in having positive hygiene behavior. This discovery agreed with the findings of Mulubirhan in which 71.6% of those who had awareness about water handling practiced positive hygiene behavior and there was a 24% difference in the positive hygiene behavior between those who were aware of hand washing practices and those who were not. Mulubirhan also discovered that school children who had proper awareness of water handling and hand washing practice were more likely to have positive hygiene behavior compare to those school children who were not aware.

Scott *et al* discovered that there were associations between knowledge of diarrhoea and hygiene practices. This discovery is also supported by the submission from a study conducted by the United Nations Children's Fund and Ethiopia Ministry of Health [22] that hygienic measures can be poorly practiced if there is poor knowledge. The results of these studies buttressed the findings in this study as there was a strong association between knowledge of causes of diarrhoea and hygienic practices. When students know behaviors that can result in diarrhoeal disease, they are better positioned to protect themselves from the harmful consequences associated with diarrhoea and this knowledge eventually will motivate good hygienic behavior in them.

It was revealed in this study that the determinants of the positive hygiene practices were gender, type of school, availability of toilet facilities in school, and kitchen facilities at home. This is in congruence with the findings of Suen *et al* [23] which showed the existence of gender disparity towards hygiene practices. This study further showed that the availability of kitchen facilities at home and respondents' attendance of private school increased the likelihood for positive hygiene practice. This point to the importance of the availability of hygiene enabling facilities both in school and at home in the motivation of hygiene practices.

8 Conclusions

This study was carried out to assess the knowledge of diarrhoeal diseases and hygiene practices among in-school adolescents. It was revealed that the respondents had good knowledge of the causes, consequences, and treatment of diarrhoea. This study also disclosed that there was a high level of personal hygiene practices among the respondents and the level of environmental hygiene of their schools was also very high.

Relating knowledge of diarrhoea of respondents to their hygiene practices, the study established an association between knowledge of the cause of diarrhoea and hygiene practices of respondents.

Based on the understanding of the factors that influence hygiene behavior, the study showed that the major determinants of positive hygiene practice among respondents were the sex of respondents, availability of kitchen facilities at home, type of school, and availability of toilet facilities in schools.

9 Recommendations

The promotion of good hygienic practices should be encouraged and reinforced in the schools and at home. This requires the design of coherent and comprehensive school health policies, supportive environments at home and in schools, as well as the involvement, encouragement, and redefinition of responsibilities of students, parents, teachers, school staff, health professionals, private, and public organizations in the promotion of positive hygienic practices. The findings may not be generalizable to out-of-school children. Therefore further studies on out-of-school children are warranted.

10 Acknowledgements

The authors thank Associate Professor Akin Omisore for his great editorial assistance during the study period. The authors received no funding for this study.

11 Conflicts Of Interest

The authors declare that they have no financial and non-financial conflicting interests.

12 References

1. Gouse WB, Dye C. Estimate of worldwide distribution of child deaths. Lancet 2 (2002): 25-33.
2. Black R, Morris S, Bruce J. Where and why are 10 million children dying every year. Lancet 361(2003): 2226-34.
3. Kapital 929 fm. Only 14 of Nigerians wash their hands after defecating (2016).
4. Monto AS. Epidemiology of viral respiratory infections. American Journal of Medicine 112 (2002): 4S–12S.
5. Nandrup-Bus I. Mandatory hand washing in elementary schools reduces absenteeism due to infectious illness among pupils: a pilot intervention study. American Journal of Infection Control 37 (2009): 820–826.

6. Igomu T. cholera epidemic: far from being over. NBF News (2016).
7. Gyoh SK. Cholera epidemics in Nigeria: an indictment of the shameful neglect of government. Africa Health 33 (2011): 5.
8. Van Wijk C, Tineke M. Motivating Better Hygiene Behaviour. In importance for Public Heath Mechanisms of Change. Edited by Steven E. The Hague, Netherlands: IRC International Water and Sanitation Centre (2003).
9. Dube B, January J. Factors leading to poor water sanitation hygiene among primary school going children in Chitungwiza. Journal of Public Health in Africa 3 (2012): e7.
10. Tambekar DH, Shirsat SD. Minimization of illness absenteeism in primary school students using low-cost hygiene interventions. Online Journal of Health Allied Sciences 11 (2012): 7.
11. Guerrant RL, DeBoer MD, Moore SR, Scharf RJ, Lima AA. The impoverished gut-a triple burden of diarrhoea, stunting and chronic disease. Nature Reviews Gastroenterology & Hepatology 10 (2013): 220-9.
12. Center for disease control (CDC). Diarrhoeal Diseases in Less Developed Countries" (2021).
13. Esrey SA, Feachem RG, Hughes JM. Interventions for the control of diarrhoeal diseases among young children: improving water supplies and excreta disposal facilities. Bull world health Organ 63 (1985): 1115-1127.
14. University of Twente Report. Health belief model (2021).
15. World Health Organization (WHO). The World Health Report 2002, reducing risks, promoting healthy life (2021).
16. Curtis V, Schmidt W, Luby S, Florez R, Touré O, Biran A. Hygiene: new hopes, new horizons. Lancet Infectious Disease 11 (2011): 312–321.
17. Ghose J, Rahman M, Hassan J, Khan M, Alam M. Knowledge and practicing behavior related to personal hygiene among the secondary school students of Mymensingh sadar upazilla, Bangladesh. Bangladesh Journals Online 1 (2012): 34-37.
18. Mulubirhan A, Abera K. Assessment of factors influencing hygiene behavior among school children in Mereb-Leke District, Northern Ethiopia: a cross-sectional study. BMC Public Health 14 (2014):1000.
19. Oluwafemi I. Knowledge and practice of personal hygiene among senior secondary school students of Ambassadors College, Ile-Ife, Nigeria. Research gate (2016).
20. Scott B, Curtis V, Rabie T, Garbrah-Aidoo N. Health in our hands but not in our heads: understanding hygiene motivation in Ghana. Health Policy and Planning 22 (2007): 225–233.
21. Egbinola C, Amanambu A. Water supply, sanitation and hygiene education in secondary schools in Ibadan, Nigeria. Bulletin of Geography. Socio-economic Series 29 (2015): 31-46.
22. United Nations Children's Fund and World Health Organization, 'WHO/UNICEF Joint Statement: Clinical management of acute diarrhoea', UNICEF, New York (2014).
23. Suen LKP, So ZYY, Yeung SKW, Lo KYK, Lam SC. Epidemiological investigation on hand hygiene knowledge and behavior: a cross-sectional study on gender disparity. BMC Public Health 19 (2019): 401.