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A Study Behaviour of Travelers' Disease Symptoms of Vomiting and Diarrhoea among Residents in Osun State, Nigeria

Olasunmbo A Ajayi[1*], Abimbola A, Owoseni[2] Jacob O Oluwoye[3], Olayinka O Oluranti[2]

[1]Dept. of Food Science and Technology, Bowen University, Iwo, Nigeria
[2]Dept. of Biological Sciences, Bowen University, Iwo, Nigeria
[3]Dept. Urban Planning and Transportation, Alabama A & M University, USA

ABSTRACT- Diarrhoea disease is one of the main reasons for absenteeism at work and school in developed and developing countries, thereby contributing to economic losses. The explosion in the number of street food vendors hawking ready-to-eat food is reported in every local government in Nigeria including Osun. Street foods are frequently contaminated, thereby contributing to the number of foodborne diseases. Individuals who presented to the clinics with travelers' disease symptoms (diarrhea and vomiting) in the randomly selected clinics in Iwo, Osogbo, Ile-Ife and Ilesha townships in Osun State were invited to participate in the survey. In the period of July-October 2015, 57 completed questionnaires were collected and analyzed. Overall, 42.1% were males and 57.9% were females. About 22.8% of the participants were <5 years old, 15.8% were between 10-19 years, 36.8% were 20-40 years, 19.3% were 40-60 years. Those that experienced symptoms of traveler's disease (diarrhea and vomiting), were 87.7%, while 10.3% were unsure. Furthermore, 59.6% consumed food purchased from street vendors and 40.4% claimed they did not consume street vended foods. In addition, 43.9% reported >6 number of stools/24 h. The most frequently consumed foods identified were moin-moin, amala/iyan, rice and sachet water. A strong correlation was found between having symptoms of traveler's disease and consumption of street vended foods (ρ (57) =0.357**, $p<0.06$). This study concludes that travelers' disease (diarrhea and vomiting) is persistent and has a high prevalence in Osun State, Nigeria.

Key-Words: Travelers' disease, Foodborne disease, Street- vended-foods, Osun State, Diarrhoea

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INTRODUCTION

Diarrhoea disease is one of the main reasons for absenteeism at work and school in developed and developing countries, thereby contributing to economic losses. It has been reported that about 2.2 million people die every year from diarrhoeal diseases worldwide [1]. The majority of these diarrhoeal cases can be attributed to contamination of food and drinking water. Diarrhoea is also a major cause of malnutrition in infants and young children. There is an explosion in the number of street food vendors hawking ready-to-eat food because of high un-employment and need to generate income to sustain the families in communities of many African countries including Nigeria [2]. Ready-to-eat food can be described as food ready for immediate consumption at the point of sale. It could be raw or cooked and can be consumed without further treatment [3]. Increased patronage for street vended foods may

[*]**Address for Correspondence:**
Olasunmbo A. Ajayi
Department of Food Science and Technology
Faculty of Agriculture, Bowen University, Iwo, Nigeria

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because of change in social patterns characterized by increased mobility, large number of itinerary workers and less family centered activities [4]. Furthermore, in today's society, it has become very common for individuals to travel many miles from home for employment opportunities thereby relying more on street vended foods. Several studies have revealed street food contamination by bacteria [5-8], thereby contributing to the number of foodborne diseases. Consistent consumption of street vended foods could result in increasing prevalence of travelers' disease (diarrhoea and vomiting) because of contamination. Food contaminated with pathogens often times smell, look and taste normal, plus the foodborne pathogen and their associated toxins can survive traditional cooking techniques [9]. Furthermore, although street food products provide readily available nutritious meals for the consumer, the safety and microbiological quality of these food products is subject to debate [2]. There is dearth of data and information linking consumption of street vended foods to the occurrence of diarrhoeain Osun State, Nigeria. Therefore, this research work was carried out to study reported cases of vomiting and diarrhoea among residents in four main towns within Osun stateand the purpose is to identify, examine and analyze cases of diarrhoea and vomiting in four main towns in Osun State, Nigeria.

MATERIAL AND METHODS

Location of the study area: Four locations (Iwo, Osogbo, Ile-Ife and Ilesha) in Osun State were selected. Osogbo is the capital of Osun State, and is situated at Longitude 4.56^0 E, Latitude 7.76^0 N 114km to Iwo. Iwo is situated at Longitude 4.10^0 E, Latitude 7.63^0 N and is 54km to Osogbo; Ile-Ife is situated at Longitude 7.46^0 N, Latitude 4.56^0 E and is 45km to Osogbo, the capital city of Osun state; Ilesa is situated at Longitude 4.73^0 E, Latitude 7.61^0 N and is 25km to Osogbo; while Osogbo and a distance of 234 km to Lagos, the capital city of Lagos state.

Study population: The survey was conducted between July-October 2015, to evaluate the prevalence of travelers' diarrhoea symptoms and eating behavior among residents of Osun State, Nigeria. For a period of 3 months, anyone who came for consultation at the randomly selected private clinics with complaints of diarrhoea/vomiting with or without other symptoms were subjected to a questionnaire designed by the research team, but administered by the medical/nursing staff of the clinic after obtaining their informed consents. The questionnaire was pre tested for clarity and validity on 20 randomly selected individuals in Iwo, Osun State. The results of the pre-test were used in the revision of the initial survey tool. The final version of the survey tool contained 39 questions from four sections. Namely, i) demographic characteristics, ii) occurrence of symptoms of travelers' disease and travel information, iii) food consumption habits and type of food consumed and iv) severity of symptoms and home remedies applied to ameliorate conditions. Two clinics were randomly selected in each town for the survey, but only six clinics participated and completed the questionnaires. For this study, diarrhoea was defined as three or more loose or liquid stools in a 24-hour period or two or more loose stools accompanied by fever or other gastrointestinal symptoms including abdominal cramps, nausea, or vomiting. Participants who claim to have less than 3 stools within 24 h period and not having other gastrointestinal symptoms were eliminated from the study.

Limitation of the study

A study was conducted during a religious fasting period and dry weather season in the year.

Statistical Analysis

Data obtained were subjected to descriptive statistical analysis (frequency distributions) and Spearman's rank correlation coefficient (ρ), between symptoms of travelers' disease, consumption of street vended food and type of food using IBM SPSS statistical software version 20.

RESULTS AND DISCUSSION

Table 1 is the summary of the demographic characteristics of the individuals. A total of 57 respondents met the inclusion criteria for the study. Overall, 42.1% were males and 57.9% were females. About 22.8% of the participants were below or <5 years old, 15.8% were between 10-19 years, 36.8% were 20-40 years, 19.3% were 40-60 years and 5.3% were >60 years. When asked about their level of education, 40.4% did not respond, because more than half are less than 5 years old. However, out of those who responded, 26.3% had Secondary (high) school, 10.5% had Bachelor's degree and 8.8% had Primary or elementary school certificate.

Table 1: Demographics of respondents in the survey (N = 57)

Parameter	*N* (%)
Gender	
Male	24 (42.1)
Female	33 (56.9)
Age	
<5 years	13 (22.8)
10-19 years	9 (15.8)
20-40 years	21 (36.8)
40-60 years	11 (19.3)
> 60 years	3 (5.3)
Education	
Primary	5 (8.8)
Junior Secondary	2 (3.5)
Senior Secondary	15 (26.3)
NCE/OND/HND	6 (10.5)
College	6 (10.5)
No Response	23 (40.4)
Occupation	
Driver	3 (5.3)
Trader	9 (15.8)
Civil servant	4 (7.0)
Student	11 (19.3)
Business	6 (10.5)
Others	24 (42.1)

Prevalence of Travelers' disease symptoms- When asked if respondents experienced symptoms of diarrhoea and vomiting in the past seven days, 87.7% said yes, 10.3% don't know and 1.8% said no. Of these, 56.1% experienced diarrhea first while 42.1% first experienced vomiting (Fig. 1 and 2).

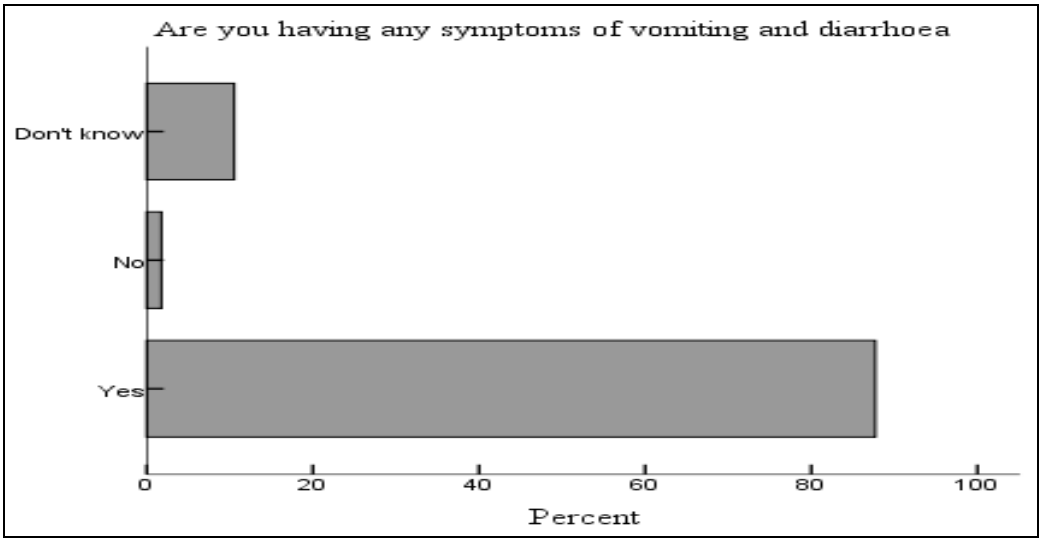

Fig. 1: Percentage of respondents with travelers' symptoms

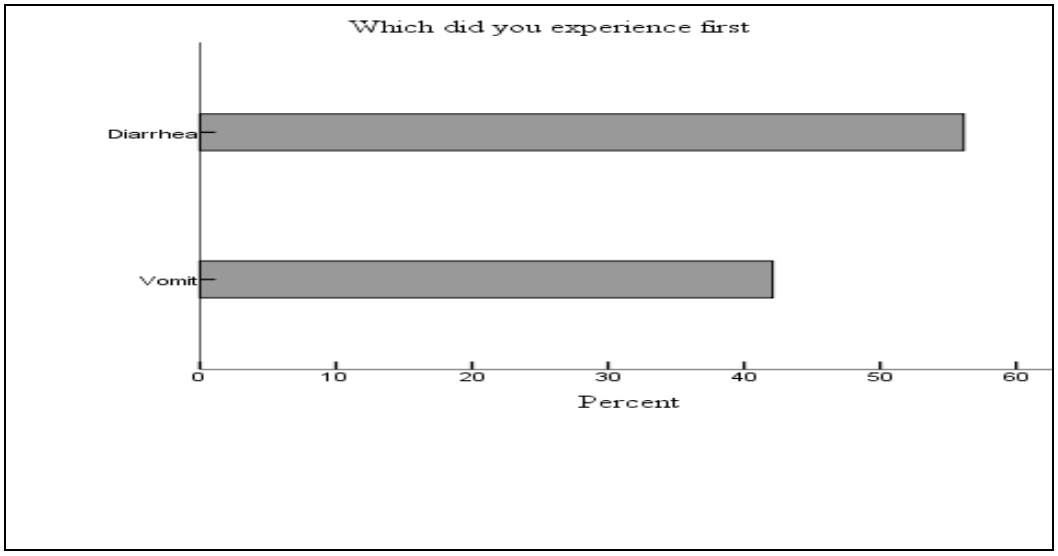

Fig. 2: Percentage of respondents indicating symptom initially experienced

When asked if participants were still experiencing the symptoms, 77.2% said yes while 22.8% said no. About 35.1% travelled in the past seven days before the onset of symptoms while 64.9% did not (Fig. 3 and 4).

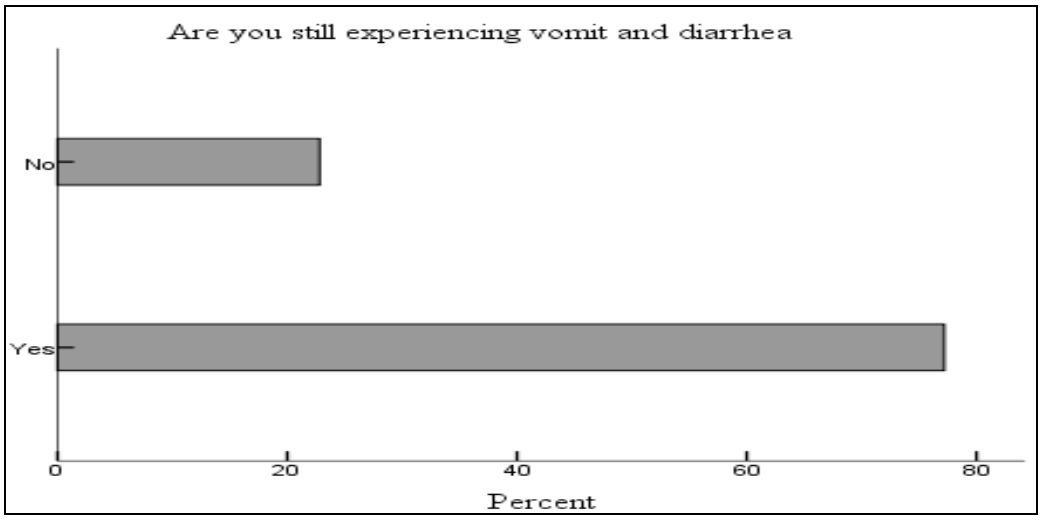

Fig. 3: Percentage of respondents presenting to clinics with symptoms

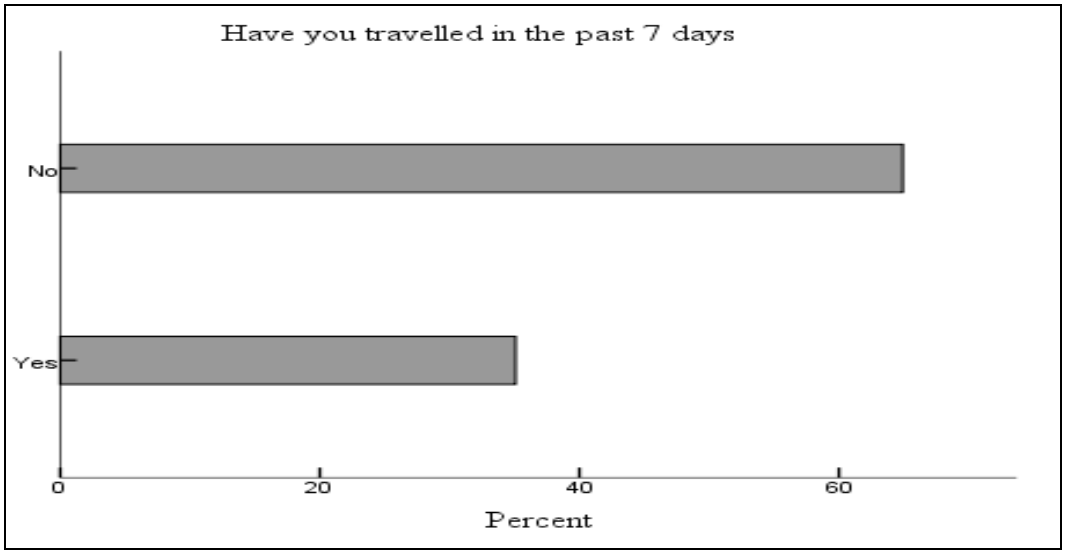

Fig. 4: Travel history of respondents before onset of symptoms

Furthermore, (34) 59.6% consumed food purchased from street vendors and (23) 40.4% claimed they did not consume street vended foods. Maximum number of stools in a 24 h period for the (34), who consumed street vended foods reported were 14.7%, 41.2% and 44.1% for 3, 4-6 and >6 number of stools respectively. Those, who did not consume street vended foods, Out of the 23 individuals, who did not consume street vended foods, but had symptoms of travelers' disease, 21.7%, 34.8% and 43.5% also self-reported 3, 4-6 and >6 number of stools respectively (Fig. 5, 6a and 6b).

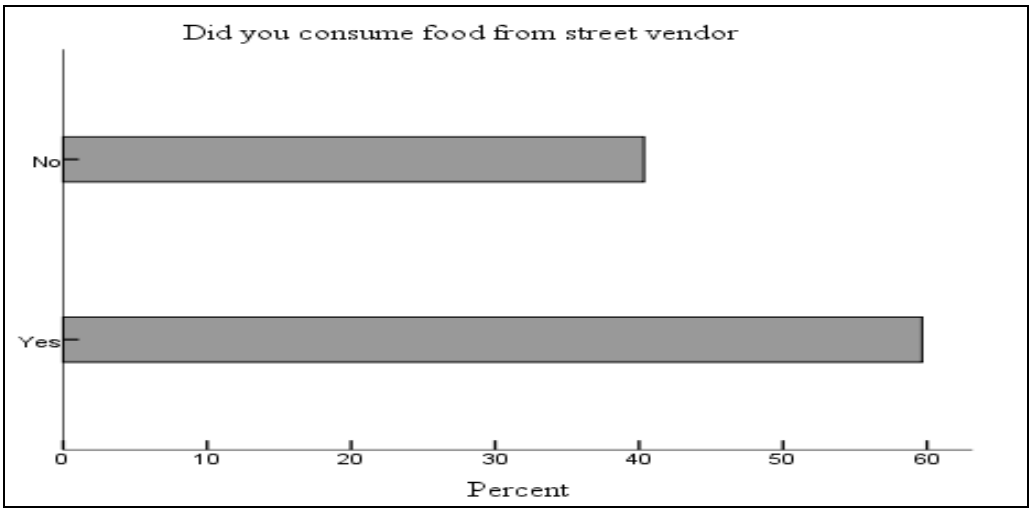

Fig. 5: Eating habit of respondents with travelers' disease symptoms

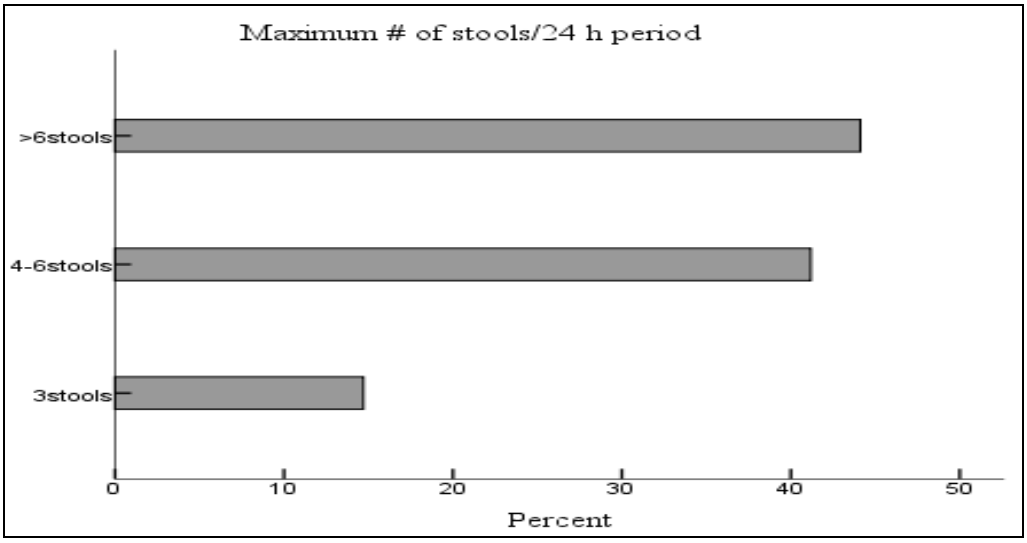

Fig. 6a: Maximum number of stool/24 h reported by respondents who consumed street vended foods

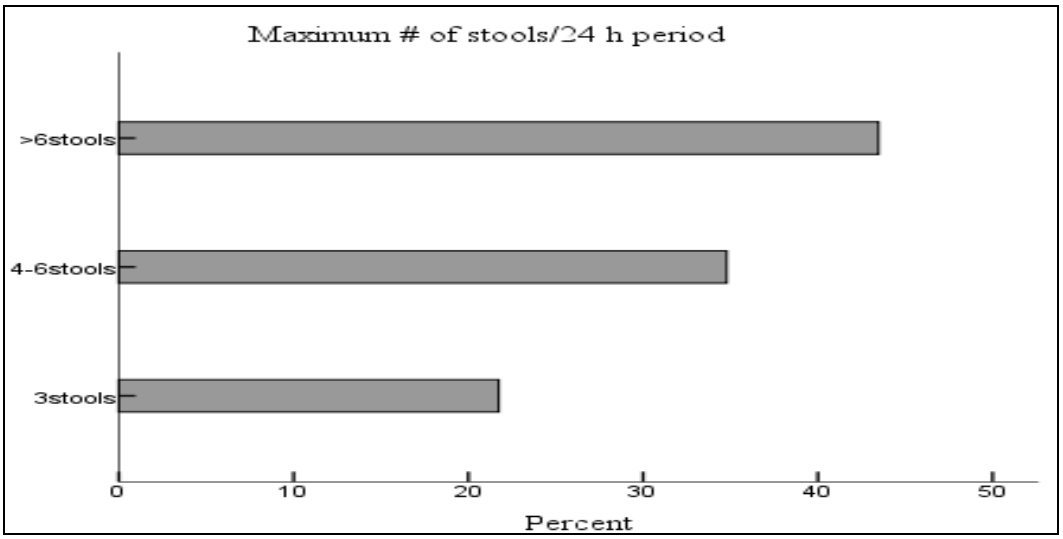

Fig. 6b: Maximum number of stool/24 h reported by respondents who did not consume street vended foods

From Fig. 6, 40.4% of respondents did not consume street vended foods and claimed not to have eaten the food items listed. Therefore, the food vehicle could not be determined. Data not included. The frequencies of the type of food consumed are presented in Table 2. Some of the most common food and beverage consumed are moin-moin (35.1%); iyan/eba/amala/lafu (24.6%); watermelon (24.6%); rice (21.1%) and satchet (35.1%) and bottled (22.8%) water.

Table 2: Frequency of respondents who consumed food and beverage

Food item consumed	N =Yes (%)	Frequency of respondents who consumed food and beverage N = No (%)
Food		
Yoghurt	9 (26.5)	25 (73.5)
Wara/Fura/Nono milk	8 (14.0)	49 (86.0)
Egg/Egg buns	10 (17.2)	47 (82.5)
Meat pie/Fish pie	9 (15.8)	48 (84.2)
Carrot	4 (7.0)	53 (93.0)
Paw Paw	3 (5.2)	54 (93.1)

Pine-apple	9 (15.8)	48 (82.8)
Watermelon	14 (24.6)	43 (75.4)
Chicken/Turkey	4 (7.0)	53 (93.0)
Goat meat/Beef	3 (5.3)	54 (94.7)
Roasted Fish	6 (10.5)	51 (89.5)
Suya	4 (7.0)	53 (93.0)
Iyan/Eba/Amala/Lafu	14 (24.6)	43(74.1)
Rice	12 (21.1)	45 (78.9)
Moin-Moin	20 (35.1)	37 (64.9)
Beverage		
Municipal tap water	6 (10.5)	51 (87.9)
Private well water	9 (15.8)	48 (84.2)
River/Pond/Stream	3 (5.2)	54 (94.7)
Bottled water	13 (22.8)	44 (77.2)
Satchet water	20 (35.1)	37 (64.9)
Kunu	3 (5.3)	54(94.7)
Sobo/Zobo	5 (8.8)	52 (91.2)
Pito	2 (3.5)	55 (96.5)

A spearman *rho* correlation coefficient was calculated for the relationship between having symptoms of travelers' disease, consumption of food from street vendors and the food items with higher frequencies of consumption (Table 3).

Table: 3. Spearman correlation (ρ) between symptoms of travelers' disease, consumption of street food and type of food (N=57)

	Are you having symptoms of vomiting and diar-rhoea	**Did you consume food from street vendor**	**Iyan /Eba /Amala /Lafu**	**Rice**	**Moin-Moin**	**Satchet water**	**Water-melon**
Are you having symptoms of vomit-ing and di-arrhea	ρ = 1000	ρ=.357** Sig .06	ρ=.102 Sig .449	ρ =.193 Sig .150	ρ=.175 Sig .194	ρ =.175 Sig .194	ρ =.102 Sig .449
Did you consume food from street ven-dor	ρ=.357** Sig .06	ρ = 1000	ρ=.303* Sig .022	ρ=.337* Sig .010	ρ=.530** Sig .00	ρ=.455** Sig .00	ρ =.386** Sig .003

*, ** = Correlation is significant at the 0.05 and 0.01 level (2-tailed)

A strong correlation was found between having symptoms of travelers' disease and consumption of street vended foods (ρ=.357**, p=0.06). Further analysis showed that consumption of street food and the food item were also significantly strong (Table 3).

Table 4 is the cross tabulation results between travelers' disease symptoms, consumption of street food and maximum number of stools. More people 15 out of 57 who consumed street foods and having symptoms of travelers' disease had >6 stools/24 h, compared to 9 respondents out of 57 who did not consume street food.

Table 4. Cross tabulation of symptoms of vomiting and diarrhoea, consume food from street vendor and maximum # of stools/24 h period

Did you consume food from street vendor			Are you having any symptoms of vomiting and diarrhoea			Total
			Yes	No	Don't know	
Yes	Maximum # of stools/24 h period	3stools	5	0		5
		4-6stools	13	1		14
		>6stools	15	0		15
	Total		33	1		34
No	Maximum # of stools/24 h period	3stools	2		3	5
		4-6stools	6		2	8
		>6stools	9		1	10
	Total		17		6	23
Total	Maximum # of stools/24 h period	3stools	7	0	3	10
		4-6stools	19	1	2	22
		>6stools	24	0	1	25
	Total		50	1	6	57

Other symptoms experienced and self- reported by respondents are presented in Fig. 7. Most respondents (75.4%) complained of abdominal cramps, (59.6%) had fever and about 10.5% reported bloody diarrhoea.

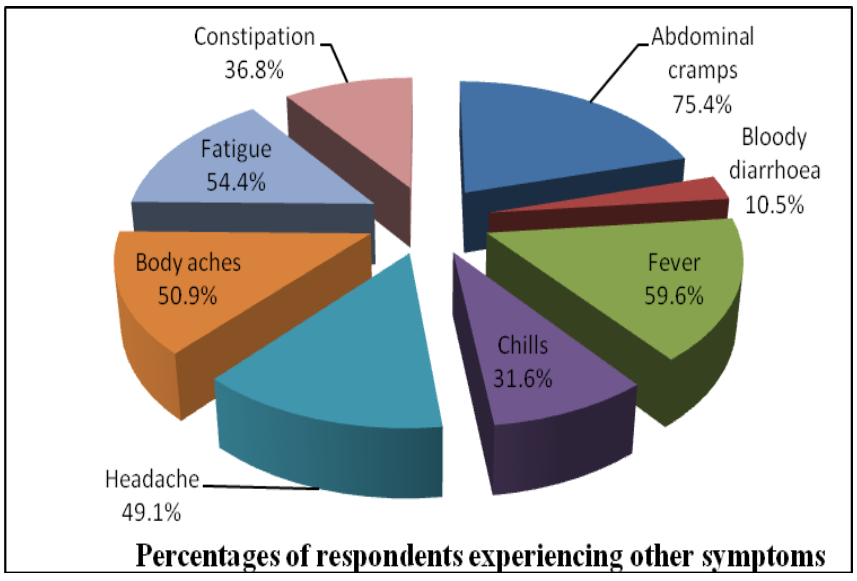

Fig. 7: Other symptoms self-reported by respondents with travelers' disease

When asked if respondents were taking medication to treat the symptoms at home, several responses were conveyed as listed in Table 5.

Table 5: Various methods of home treatment and frequency of respondents

Method of home treatment	Frequency	Percentage
Water drip	2	3.5
Ibucap	1	1.8
Celucite	1	1.8
Amalar	2	3.5
Flagyl	3	5.3
Teething syrup	1	1.8
Paracetamol	7	12.3
Anti-malaria	2	3.5
Ciprofloxacin	2	3.5
Amoxycycline	4	7.0
Mist Mag	3	5.3
Metronidazole	1	1.8
Vomirex syrup	1	1.8
Chloramphenicol	1	1.8
Local herb (Agbo)	1	1.8

When asked if anyone else was experiencing symptoms in their household, 15.8% said yes (Fig. 8), while 82.5% indicated that no one else was experiencing symptoms. About 80.7% of respondents said they are aware of food borne hazards in food (Fig. 9).

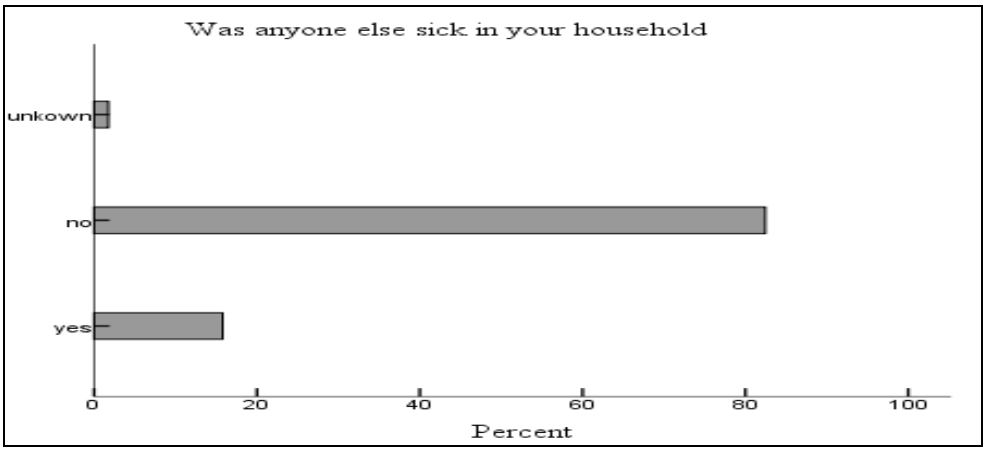

Fig. 8: Other members of household with symptoms

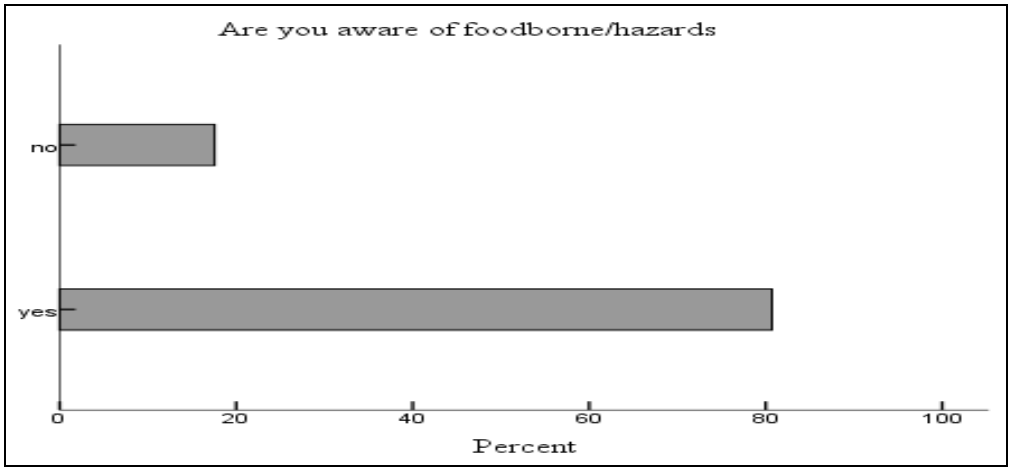

Fig. 9: Awareness of hazards in foods

One of limitations was the time of the commencement of study, since it was during the religious fasting period, most people eat very early at home and many other activities such as travelling and snacking is eliminated during the day at the workplace. Also study was carried out during the dry season. However, it has been demonstrated that attack rates of traveler's diarrhoea are highest during the summer months and in rainy seasons [10,11].Groups of individuals at the greater risk of diarrhoea and vomiting from contaminated food and water include young, old, pregnant and the immuno-compromised. The largest group of people presenting for travelers' disease symptoms from this study is aged 20-40 years (36.8%), followed by children under the age of 5(22.8%). Epidemiological evidence has shown that diarrhoea is a major problem, with children under the age of five years, experiencing at least one episode every fortnight [12]. Furthermore, foods such as moin-moin, amala/iyan/eba/lafu, rice, watermelon and satchet water are high risk foods and prone to contamination. Sources of potential hazards in food are unclean processing equipment, untreated water, mishandling by food preparers and vendors [2,13] and much more. According to [13], even if cooking temperatures reached levels capable of destroying many vegetative forms of foodborne pathogens, a marked concentration of microorganisms may persist in the food after cooking. Additionally, indigenous materials such as polythene bags, leaves and old newspaper used for packaging food undoubtedly contribute to the contamination of the said food. It is also not unusual that many individuals suffering from food borne disease or travelers' disease do not initially seek medical attention but try home remedies first. Most of the individuals would visit government run hospitals rather than private clinics because of the economic status. It was therefore believed that the diarrhoea and vomiting cases presenting to government hospitals would be more than in privately run clinics.

CONCLUSION

This study concludes that travelers' disease (diarrhoea and vomiting) is a persistent and has high prevalence in Osun State, Nigeria. Also, that there are strong relationships between consumption of high risk foods such as moin-moin, amala/eba and rice and having symptoms of traveler's disease. Street food preparers and vendors need to be trained in proper food handling techniques, as most of them handle food and money simultaneously. Since the consumer has no way of knowing if the food is contaminated, the food safety arm of public health needs to improve.

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