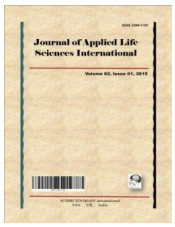

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Prevalence of Typhoid Fever among Different Socio-demographic Groups in Ondo State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors OEA and BEB designed the study, author OEA wrote the protocol and first draft of the manuscript. Author OFO managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: Study aimed at determining how age, sex, marital status, domestic water source and occupation affect the prevalence of typhoid fever disease in three hospitals in Ondo State, Nigeria.
Study Design: The study adopted a descriptive approach to assess how certain socio-demographic factors could influence typhoid fever distribution amidst representative presumptively diagnosed typhoid fever patients attending the selected hospitals under study.
Place and Duration of the Study: The study was conducted in three hospitals in Ondo State, between February and May, 2013.
Methodology: Informed consent was sought in clinically suspected cases of typhoid fever and approval for the study was obtained from the Ethics Committee of the Ondo State Ministry of Health and the Federal Medical Centre, Owo, Ondo State, Nigeria. Multiple choice Questionnaires were administered to five hundred and twenty (520) patients who sought medical attention for typhoid fever from the listed hospitals. Analyses of the questionnaires were carried out based on the socio-demographic variables considered in its design.
Results: Highest occurrence of typhoid fever was observed among males of age group 10- 25 years and the least with patients between age group 61 and 80 years in the three hospitals. As for the influence of occupation, male civil servants recorded the highest occurrence in the hospitals

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while artisans recorded the least. The influence of marital status revealed the highest occurrence in the single males while the married females had the least.
Conclusion: Socio-demographic factors such as age, sex, marital status, source of domestic water supply and occupation influenced the distribution pattern of typhoid fever among the populace in Ondo State.

Keywords: Socio-demographic; typhoid; consent; ethics; questionnaire.

1. INTRODUCTION

Typhoid fever caused by *Salmonella enterica* serovar Typhi (*S. typhi*) remains a major health problem globally. It affects about 21.7 million people, with 217,000 deaths occurring worldwide on an annual basis [1]. Transmission of the bacterium is mainly through ingestion of faecal contaminated food and water [2]. Typhoid and paratyphoid germs are passed in the faeces and urine of infected people. The infection is contracted after eating food or drinking beverages that have been handled by an infected person.

The disease is characterized by prolonged fever, bacterial replication in the reticulo-endothelial system (RES) and significant inflammation of the lymphoid organs of the small intestine [3]. In developing countries, typhoid fever causes at least 5% of all deaths, with markedly different rates where typhoid fever is endemic. The reasons for these differences in disease severity are not known but may be related to differences in health care facilities, host immune responses, genetic factors in the strains of *Salmonella enterica* serovar Typhi circulating in areas of endemicity [4]. The thrust of the study was to assess the possible influence of selected socio-demographic factors which often predispose people to infections on typhoid fever disease frequency in the studied areas.

2. MATERIALS AND METHODS

2.1 Ethical Clearance

Informed consent was sought from clinically suspected typhoid cases and approval for the study was obtained from the Ethics committee of the Ondo State Ministry of Health and the Federal Medical Centre, Owo, Ondo State, Nigeria. Confidentiality was maintained in accordance with standards of medical practice.

2.2 Study Population

2.2.1 Akure

Akure is a traditional, Yoruba, Nigerian city which existed long before the advent of British colonial rule in Nigeria. The city is located within Ondo State in the South Western Nigeria. It lies approximately on latitude 70º 151 min North of the Equator and longitude 50º 151 min East of the Greenwich Meridian. Akure is a medium-sized urban centre and it is located approximately 700 kilometers South-West of Abuja, the Federal Capital of Nigeria. It is situated within the tropical rain forest region of Nigeria where rainfall is high throughout the year. The population of the city in 1996 was 269,207 as estimated by the National Population Commission (NPC). At present the city has over 380,000 people.

2.2.2 Owo

Owo is the headquarters of Owo Local Government Area of Ondo State. It is located about 45 kilometers East of Akure, the Ondo State Capital. Owo lies on latitude 7º 15' North of the Equator and longitude 5º 35' East of Greenwich Meridian. It is about 150 metres above the sea level. It has a land area of about 636km sq, with a population of 157,181 (NPC, 1991). By the year 2006, the population was put at 196,729 (NPC, 2006) while her population is at present put at 203, 381.

2.3 Sampling Areas

2.3.1 State specialist hospital Akure

The hospital offers health services to Akure inhabitants as well as her neighboring communities. It enjoys high patronage due to the reduced cost at which health services are rendered being a state owned health facility. The hospital was selected for the study as a representative government hospital within Akure due to its high patronage.

2.3.2 Don Bosco clinic, Akure

Don Bosco Clinic is a private hospital that is renowned for her quality service delivery at a moderate cost. It enjoys large patronage from both within and without Ondo State due to its quality service delivery and strategic location hence its choice as a study area.

2.3.3 Federal medical centre, Owo

The Federal Medical Centre, Owo is a Federal government owned hospital with state-of-the-art equipment and well trained medical personnel. It offers referral services to other hospitals in Ondo State and provides health services to most communities in the southern senatorial district of the State.

2.4 Questionnaire Administration

Multiple choice structured questionnaires were administered to the presumptive diagnosed typhoid fever patients at the three selected hospitals. Analyses of the questionnaires were thereafter carried out based on age, sex, marital status, occupation and sources of domestic water.

2.5 Statistical Analysis

Data obtained were analyzed using Standard Package for Social Sciences (SPSS) version sixteen (16).

3. RESULTS

3.1 Influence of Sex and Age Group on Typhoid Fever Prevalence in the Study Areas

Table 1 shows the effect of sex (gender) and age group on typhoid fever prevalence in the study areas. At the DBC, highest occurrence 29 (11.16%) was observed in males of age group 10-25 while the least occurrence 10 (4.00%) was observed in females of 61 to 80 years of age. At the State Specialist's Hospital, Akure, highest occurrence 14 (8.23%) was observed in males of age group 10-25 while the least occurrence 3 (3.00%) was observed in females of 61 to 80 years of age while at the Federal Medical Centre, Owo, highest occurrence 29 (17.06) was observed in males of age group 41-60 while the least 10 (41.67%) was observed in females of age group 10-25

Fig. 1 Map of Ondo State in the National Settings.

3.2 Influence of Marital Status on Typhoid Fever Prevalence in the Study Areas

Table 2 shows the influence of marital status on typhoid fever prevalence in the study areas. At the Don Bosco Clinic, out of the 250 sampled patients, 103 patients (41.20%) were married while 147 (58.80%) were unmarried. There were 57 males (44.67%) and 46 females (43.54%) in the married category while there were 83 (56.40%) and 64 females (43.50%) in the unmarried category. The influence of marital status on the typhoid fever prevalence in State Specialists' Hospital Akure is also shown in Table 2. Out of the 100 sampled patients, 48% were married while 52% were unmarried. 54.16% of the married groups were males while 45.84% were females. As for the unmarried ones, 63.46% were males while 36.54% were females. At the Federal Medical Centre, Owo, 54.71% were married while 45.29% were unmarried. Out of the married group, 55.91% were males while 44.09% were females. As for the unmarried ones, 55.84% were males while 44.16% were females.

3.3 Influence of Water Source on Typhoid Fever Prevalence in the Study Areas

Table 3 shows the influence of water source on typhoid fever prevalence the study areas. At Don Bosco Clinic, 125 patients (50%) sourced their water from well, 6 (2.40%) sourced from rain, 89 patients (35.60%) sourced from borehole and 3 (1.20%) patients sourced their water from stream. Twenty seven (10.80%) however sourced their water from other undisclosed source (s). The assessment of the influence of water source on typhoid fever prevalence in State Specialist Hospital, Akure revealed that patients who sourced their water from well had the highest frequency (76%) while the least frequency (3%) was obtained from patients with undisclosed water source(s). At the Federal Medical Center Owo, patients who sourced their water from well had the highest frequency 98 (57.64%) while the least frequency 4 (2.35%) was observed in patients with undisclosed water source (s).

3.4 Influence of Occupation on Typhoid Fever Prevalence in the Study Areas

The effect of patients' occupation on typhoid fever prevalence in the study areas is depicted by Table 4. Highest frequency (41.20%) was observed in civil servants while the least frequency (7.20%) was observed with the

artisans at Don Bosco Clinic. At the State Specialist Hospital Akure, highest frequency (38%) was observed with Civil servants while farmers showed the least occurrence rate (12%) while at the Federal Medical Center, Owo, highest frequency (43.53%) was observed in Civil servants while artisans showed the least occurrence rate (10.59%).

Table 1. Influence of sex and age group on typhoid fever prevalence in the study areas

Age group	Hospitals	Frequency (%)	Male (%)	Female (%)
0-9	DBC	38(15.20)	22(7.60)	16(4.40)
	SSHA	20(20.00)	13(5.00)	7(7.00)
	FMC	20(11.76)	11(7.06)	9(2.94)
10-25	DBC	50(29.41)	29(11.16)	21(8.40)
	SSHA	23(23.00)	14(8.23)	13(8.00)
	FMC	33(19.41)	22(12.94)	10(41.67)
26-40	DBC	79(31.60)	25(10.00)	54(21.60)
	SSHA	24(24.00)	10(5.20)	14(58.33)
	FMC	28(16.47)	11(7.06)	14(18.91)
41-60	DBC	45(18.00)	22(8.80)	23(9.20)
	SSHA	24(24.00)	10(41.67)	14(58.33)
	FMC	52(30.58)	29(17.06)	23(17.56)
	DBC	38(15.20)	28(11.20)	10(4.00)
61-80	SSHA	9(9.00)	6(6.00)	3(3.00)
	FMC	37(21.76)	22(12.94)	15(8.82)

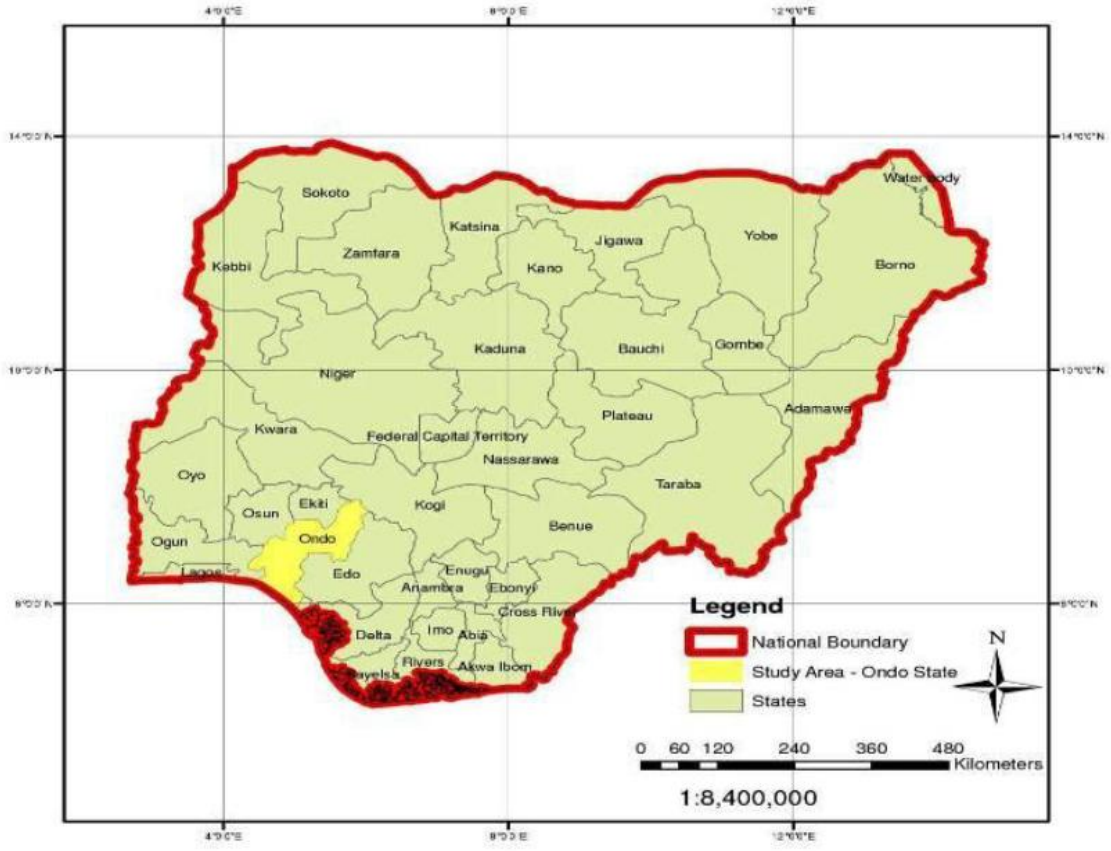

Fig. 1. Map of Nigeria showing Ondo State
Source: Ondo State Ministry of Lands and Housing, Akure (2010)

Table 2. Influence of marital status on typhoid fever prevalence in the study areas

Status	Hospitals	Tested	Male (%)	Female (%)
Married	DBC	103(41.20)	57(55.33)	46(44.67)
	SSHA	48(48.00)	26(54.16)	22(45.84)
	FMC	93(54.71)	52(55.91)	41(44.09)
Single	DBC	147(58.80)	83(56.40)	64(43.54)
	SSHA	52(52.00)	33(63.46)	19(36.54)
	FMC	77(45.29)	43(55.84)	34(44.16)

Table 3. Influence of water source on typhoid fever patients in the study areas

Hospital	Water source	Number (%)
FMC	Well	98 (57.64)
	Rain	10 (5.88)
	Borehole	49 (28.82)
	Stream	9 (5.2)
	Others	4 (2.35)
DBC	Well	125 (50.00)
	Rain	6 (2.40)
	Borehole	89 (35.60)
	Stream	3 (1.20)
	Others	27 (10.80)
SSHA	Well	76 (76.00)
	Rain	2 (2.00)
	Borehole	15 (15.00)
	Stream	4 (4.00)
	Others	3 (3.00)

Table 4. Influence of occupation on typhoid fever patients in the study areas

Hospitals	Occupation	Number (%)
DBC	Civil servants	103 (41.20)
	Farmers	23 (9.20)
	Artisans	18 (7.20)
	Traders	39 (15.60)
	Students	67 (26.80)
SSHA	Civil servants	38 (38.00)
	Farmers	12 (12.00)
	Artisans	13 (13.00)
	Traders	19 (19.00)
	Students	18 (18.00)
FMC	Civil servants	74 (43.53)
	Farmers	23 (13.53)
	Artisans	18 (10.59)
	Traders	34 (20.00)
	Students	21 (12.36)

4. DISCUSSION

Enteric fever has continued to pose a serious threat to Public health especially in economically poor countries where level of hygiene is below standards and sanitary conditions are poor [5,6]. In Nigeria specifically, enteric fever constitutes a great socio-medical problem being responsible for many cases of pyrexia of unknown origin Akinyemi et al. [7]. Analyses of the questionnaires administered to the presumptive typhoid fever patients at the three hospitals under study revealed the influence of the socio-demographic factors such as sex, age, marital status, occupation and domestic water source on presumptive typhoid fever cases reported in the hospitals. Highest occurrence was observed in the male sex in the three hospitals for most of the

age groups. This could be traced to the daily living habits of the individuals in question. The distribution pattern of the infections seems uncertain in Nigeria and appears to show geographical variation. Earlier Studies by [6] and [8] showed that typhoid fever is more prevalent in males than females but Zailani et al. [9] found no influence of age, sex and social class on the distribution pattern of *S. typhi* and *S. paratyphi* in Ile-Ife, south western Nigeria.

Males are often known to pose a care-free attitude to the hygienic condition of the foods they eat or the environment where such is prepared. Age group 10-25 is the most vulnerable in this regard and this could be due to poor hygienic practices commonly associated with individuals within the age range specifically in the areas under study. Male individuals within this age group in the area under study mostly constitute the habit of eating hawked food, and patronizing restaurants and eateries where basic hygienic practices are most times compromised during food preparation. Males within this age bracket usually work outside their homes and may eat hawked foods that are liable to contamination. Females in the studied area are often times more hygiene conscious than their male counterpart hence the low infection rate observed in them.

Culturally, in the area under consideration, females are saddled with cooking duties at home and will only on rare occasions eat hawked food or patronize eateries like their male counterparts. However, a very high frequency of infection is still being reported among females especially the teenage girls. This could be due to the fact that teenage girls who perform most of the house chores are the ones who fetch water from polluted water bodies like wells and streams thus making them highly vulnerable to the infection. Studies have shown that eateries and public eating places are the commonest means of typhoid fever spread [8]. As for the influence of marital status on the disease prevalence in the study areas, unmarried individuals in the study population recorded a higher frequency. This development could be traced to the living habits of this group of individuals. Being unmarried, they have unrestricted liberty to eat hawked food and patronize restaurants and eateries, most of which encourage chain transmission of typhoid fever infection. Reverse is the case for the married group as marriage demands makes it mandatory for a sizeable number of them to cook in their homes paying close attention to basic hygienic practices. Assessment of the possible influence of water source on typhoid fever prevalence in the study area reveals that higher percentage of those questioned sourced their water from wells. Although, a direct link between well water and typhoid fever infection may be difficult to establish, possible feacal contamination of most well water could be a major contributory factor to the high infection frequency [10]. A survey of the study areas show that most of the wells are dug close to the soak away and septic tanks and this must have encouraged the seepage of human waste which is a proven means of transmission of the infection agent into the water source [11]. Aside this, most wells in the area where people source their drinking and cooking water from are those where access by people who want to fetch water is unrestricted, as such, possible contamination of such water is inevitable. In most of the communities, inadequate water supply is a serious socio-economic problem and has caused the inhabitants to resort to untreated well water for domestic water supplies. Polluted and untreated water supplies are responsible for water-borne infections such as enteric fevers [12]. In the areas studied, treated pipe-borne water is scarce and waste disposal systems are poor. Good toilet facilities are also lacking in most houses and nearby bushes are usually used for defecation. Typhoid infections predominated in patients whose source of drinking and domestic water supply was well. Constructing covers for wells may thus prevent pollution of the well water. The high occurrence rate of typhoid fever observed among civil servants could be traced to their living habits. It is noticeable that most civil servants especially in the areas under study patronize nearby eateries for their lunch while some buy hawked foods most of which are not hygienically prepared. Though individuals with other occupations indulge in same act, the rate seems higher in the civil servants.

5. CONCLUSION

Socio-demographic factors such as age, sex, marital status, occupation and sources of domestic water play important role in prevalence of Typhoid fever among people in Ondo State, Nigeria. Enlightenment programmes on basic rules of hygiene should be encouraged among the people. Public health agencies should base plans for control of the disease on the predisposing factors revealed by this study. The information obtained in this study may be useful

in rapid diagnosis and treatment of enteric fevers, and in planning the infection intervention programs in the area. These results may also be useful to public health agencies in planning infectious disease prevention and control strategies. Treated sources of domestic and drinking water are very important in areas where these facilities are lacking and enlightenment programs on basic rules of hygiene for semi-urban and rural communities of economically poor nations should be encouraged so as to limit the transmission of faecal-orally transmitted infections.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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