





PREVALENCE AND DEMOGRAPHIC CORRELATES OF TYPHOID FEVER AMONG ADULTS TREATED IN HEALTH CENTRES IN DEGEMA COMMUNITY, RIVER STATE, NIGERIA

Joy C. Samuel* and Chinemerem Eleke

Department of Child Health, Africa Centre of Excellence in Public Health and Toxicological Research

*Corresponding author: joyrishsam@gmail.com;

| Article History | Abstract |
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| Received: 11 August 2024 Accepted: 22 September 2024 Published: 24 October 2024 | Typhoid fever remains a significant health issue in Nigeria. This study examined the prevalence of typhoid fever and its correlates among adults who obtained services in the Degema community of Rivers State, Nigeria. The study employed a retrospective design involving multiple healthcare facilities to examine 783 medical records. A systematic sampling method was used to select the records for analysis. Data was collected using a data extraction form. Descriptive and inferential statistical approaches were applied to the data at a significance of $p < 0.05$. The findings indicated a 57% prevalence of typhoid fever. A significant association was found between the occurrence of typhoid fever and age ($p = 0.003$) such that the prevalence increased with age and was highest among individuals aged 69 to 78 years (Prevalence Ratio = 0.64). There was a significant association between educational attainment and the prevalence of typhoid fever ($p = 0.003$), with secondary school-educated persons having the highest prevalence (PR = 0.60). A significant association was observed between occupation and the prevalence of typhoid fever ($p < 0.001$), particularly among artisans (PR = 0.71). In conclusion, there was elevated typhoid fever prevalence among adults who obtained services at healthcare facilities within Degema Local Government Area, with age, occupation, and education level acting as correlates for its occurrence. Public health nurses should prioritize educating artisans, older individuals and those lacking higher education on preventing typhoid fever. |
|  | <p>Keywords: <i>Typhoid fever, prevalence, public health, Nigeria</i></p> <p>License: CC BY 4.0*</p>  <p>Open Access article.</p> |

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Introduction

Typhoid fever is a health problem in many developing countries (Barac et al., 2018). It is caused by the *Salmonella Typhi* bacteria and is endemic in parts of Africa, Asia and South America (Achonduh-Atijegbe et al., 2016). There are approximately five hundred and forty cases of typhoid fever per hundred thousand persons (Kumari & Agarwal, 2016) leading to an estimated thirty-three million cases each year and around two hundred and sixteen thousand fatalities in regions where the disease is prevalent (Mohammed et al., 2020). The primary mode of transmission for typhoid fever is through the consumption of contaminated food and water

(Pam et al., 2018). Symptoms of the illness include fever, decreased appetite, abdominal pain, nausea and vomiting.

The diagnosis of typhoid fever primarily relies on blood tests. Nonetheless, in areas where typhoid is prevalent, medical laboratory services are not readily available. This often results in delays in accurately identifying the disease (Marchello et al., 2020). In such regions healthcare providers frequently resort to the less reliable Widal test, which detects antibodies in the serum (Adogo et al., 2015). These diagnostic challenges combined with limited access to healthcare and prolonged waiting times increase the vulnerability of individuals to the disease.

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As individuals become older, their immune systems encounter physiological demands that render them more susceptible to diseases like typhoid fever. Factors such as hazards associated with work, lifestyle choices, and exposure to environmental agents can compromise the body's defenses (Marchello et al. 2020). Moreover, the expensive cost of healthcare complicates the accessibility to medical and nursing services (Omoya & Atobatele 2017). When not promptly and properly addressed, typhoid fever can lead to serious complications or even death.

The spread of typhoid fever is influenced by factors like age, health condition, and access to water, hygiene, and sanitation facilities (Essa et al., 2019). In areas where the disease is common, previous studies have reported prevalence rates of 62 - 83% among adults in rural communities (Kumari & Agarwal 2016). The high prevalence underscores the importance of prioritizing prevention efforts in endemic regions such as Africa.

Typhoid fever remains a public health concern in Nigeria with over 80% of *Salmonella Typhi* strains showing resistance to treatments (Akinyemi et al., 2018). This brings up worries about the impact of typhoid fever in the country as the illness can result in serious complications such, as intestinal perforation and meningitis which could potentially lead to fatalities (Kumari & Agarwal 2016; Akinyemi et al., 2018). The recommendation from the World Health Organization suggests getting vaccinated for typhoid fever and enhancing living conditions by improving access to water and ensuring food safety and proper sanitation practices through initiatives like WASH (Water Sanitation and Hygiene), Dudeja et al. 2022. Though there have been advancements in reducing instances of typhoid in regions like South America and Southeast Asia; West Africa continues to encounter challenges in combating this health concern (Als et al., 2018). For instance, Nigeria has not yet fully carried out efforts, for typhoid fever vaccination. A significant portion of the population remains at risk for the disease in this scenario. To make matters worse, in Nigeria where resources are scarce and typhoid fever diagnosis heavily relies on the Widal agglutination test which is known to be unreliable and lacking precision, for identifying and treating typhoid fever (Deksisssa & Gebremedhin, 2019). This highlights the importance of moving from merely treating the illness towards putting preventive measures in place to combat it effectively. Studying the patterns of typhoid fever occurrence in different regions of a country is essential for creating effective programs to combat the disease. This study investigated typhoid fever prevalence and its associated factors among adults who obtained services in the Degema community of Rivers State, Nigeria.

Methodology

Study area

The study area involved three health centres in Degema Local Government Area, Rivers State. The facilities are in Degema Town, Obuama, and Usokun, Rivers State within the Niger Delta region of southern Nigeria. The primary health facilities all have 5 beds each. They offer community health, public health, obstetric and midwifery services. They serve about 25,000 persons in Degema community.

Study design

A retrospective design using medical records was employed for this study.

Population and Sampling

The population was individuals who obtained services in the primary health facilities in the year 2021. Systematic random sampling was utilized in selecting facility-based medical records. Exactly 216 medical records were selected from each of the three facilities (n = 783). The study included individuals above 18 years, individuals who had a Widal laboratory test reported in the case note, individuals with complete demographic information that includes age, address, educational level, and occupation. The exclusion criteria for this study were: residence outside Degema Local Government Area and referral from any of the selected health centres to another of the selected health centres. Data regarding demographic data and typhoid status were extracted using the data extraction from the facilitybased medical records.

Data analysis

Categorical and discrete-interval data were collected. Categorical data from occupation and level of education were summarized using descriptive statistical tools such as frequency and percentage. Interval data from age was summarized using mean, standard deviation, frequency and percentage. The test of statistical association of variables was done using Chi-square and Relative Risk Inferential Statistics at a 0.05 level of significance. All statistical analysis was done with the aid of Statistical Products and Service Solutions software SPSS version 25 (IBM Chicago, USA).

Ethical Consideration

Ethical approval was obtained from the University of Port Harcourt Institutional Review Board with approval number UPH/CEREMAD/REC/MM85/028. All selected medical records were kept anonymous throughout the period of data collection. All collected data were protected and used only for the approved academic purpose.

Results

A total of 783 facility based medical records were analyzed.

Table 1: Demographic profile of the adults treated in Health Centres in Degema n=783

| Variables | f | % |
|-----------|-----|------|
| Age | | |
| 19-28 | 167 | 21.3 |

| | | |
|----------------------------------|-----|------|
| 29-38 | 114 | 14.6 |
| 39-48 | 96 | 12.3 |
| 49-58 | 112 | 14.3 |
| 59-68 | 136 | 17.4 |
| 69-78 | 158 | 20.2 |
| Occupation | | |
| Civil servant | 112 | 14.3 |
| Trader | 443 | 56.6 |
| Artisan | 228 | 29.1 |
| Highest Educational level | | |
| Primary | 288 | 36.8 |
| Secondary | 413 | 52.7 |
| Tertiary | 82 | 10.5 |

f = frequency, % = percentage

A majority (21.3%) of the study subjects were aged 19-28 years, while the minority were aged 39-48 years. They were mostly traders (56.6%) and had secondary school education (52.7%).

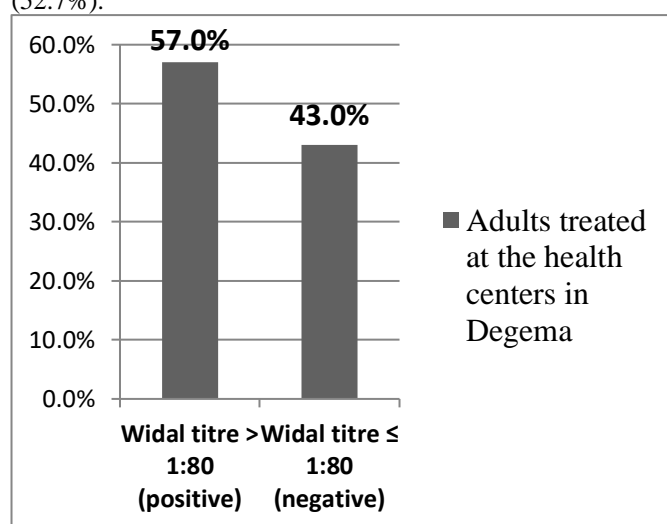


Figure 1: Prevalence of typhoid fever among adults treated in Degema Health centers

About 57% of the adults treated in health centres in the Degema Local Government Area had positive Widal titre, hence the prevalence of typhoid fever was 57%.

Table 2: Association between typhoid fever prevalence and age among adults n = 783

| Variab les | Typhoi d Fever Status | | Degre e of freed om | Chi squa re | P val ue | Prevale nce Ratio (PR) |
|---------------|-----------------------------|----|------------------------------|-------------------|----------------|---------------------------------|
| | + | - | | | | |
| Age | | | 5 | 18.1 | 0.0 | |
| | | | | 8 | 03 | |
| 19-28 | 97 | 70 | | | | 0.58 |
| 29-38 | 46 | 68 | | | | 0.40 |
| 39-48 | 51 | 45 | | | | 0.53 |
| 49-58 | 68 | 44 | | | | 0.61 |
| 59-68 | 83 | 53 | | | | 0.61 |
| 69-78 | 10 | 57 | | | | 0.64 |

| | | |
|--------------|-----------|-----------|
| Total | 44 | 33 |
| | 6 | 7 |

p value < 0.05 = significant, PR = prevalence ratio

There was a significant association between typhoid fever prevalence and age (chi = 18.18, df = 5, p = 0.003). The prevalence of typhoid fever increased with age and was highest among persons aged 69-78 years (PR = 0.64) and lowest among 29-38-year-olds (PR = 0.40).

Table 3: Association between typhoid fever prevalence and educational level n = 783

| Variabl es | Typhoid Fever Status | | Degre e of freedo m | Chi squa re | P | PR |
|-----------------------|----------------------------|------------|------------------------------|-------------------|------|-----|
| | + | - | | | | |
| Educati on | | | 2 | 11.86 | 0.00 | |
| | | | | | 3 | |
| Primary | 162. | 126. | | | | 0.5 |
| | 0 | 0 | | | | 6 |
| Seconda ry | 251 | 162 | | | | 0.6 |
| | | | | | | 0 |
| Tertiary | 33 | 49 | | | | 0.4 |
| | | | | | | 0 |
| Total | 446 | 337 | | | | |

p value < 0.05 = significant, PR = prevalence ratio

There was a significant association between the educational level attained and typhoid fever prevalence (chi = 11.86, df = 2, p = 0.003). Study subjects with secondary school education (PR = 0.60) and primary school education (PR = 0.56) had a higher prevalence of typhoid fever than those with tertiary education (PR = 0.40).

Table 3: Association between typhoid fever prevalence and educational level n = 783

| Variabl es | Typhoid Fever Status | | Degre e of freedo m | Chi squa re | P | PR |
|------------------------|----------------------------|------------|------------------------------|-------------------|------|-----|
| | + | - | | | | |
| Occupat ion | | | 2 | 36.9 | <0.0 | |
| | | | | 0 | 01 | |
| Civil servant | 41 | 71 | | | | 0.3 |
| | | | | | | 7 |
| Trader | 244 | 199 | | | | 0.5 |
| | .0 | .0 | | | | 5 |
| Artisan | 161 | 67 | | | | 0.7 |
| | .0 | | | | | 1 |
| Total | 446 | 337 | | | | |

p value < 0.05 = significant, PR = prevalence ratio

There was a significant association between occupation and typhoid fever prevalence (chi = 36.90, df = 2, p = < 0.001). Artisans had the highest prevalence (PR 0.71)

while civil servants had the lowest prevalence (PR = 0.37).

The synthesis of these studies presents a cohesive narrative, emphasizing the critical role of healthcare access and expenditure, socio-economic factors, and detailed contextual considerations in shaping life expectancy among males in sub-Saharan Africa. This collective understanding underscores the need for tailored, multi-dimensional interventions to improve health outcomes in the region.

Discussion

The prevalence of typhoid fever was 57%. This finding could be as a result of limited access to chlorinated or treated township water supply. This finding was higher than was reported in an Ethiopian study by Mulu et al. (2021) who reported that the prevalence of typhoid fever at at Injibara General Hospital in Northwest Ethiopia was 25.7%. The discrepancy in findings could be related to the design utilized in the study. The Ethiopian study was a mono-facility whereas this study utilized the multi-facility design. The finding did not support the findings reported in a Nigerian study by Mohammed et al. (2020) that found the prevalence of typhoid at 10.5% among adults attending a primary healthcare facility in Nigeria. The discrepancy in findings could be related to the sample size utilized in the study. The Nigerian study utilized 429 adults, while this study examined 783 facility-based case notes. Additionally, this finding was very close to the value reported in another Nigerian study by Kwala and Asika (2020) who reported a prevalence of 66.8% among adults attending a specialist hospital in Yola, Adamawa State. The proximity in the findings is linked to the idea that this study and that reported by Kwala and Asika (2020) utilized Widal test results for estimating typhoid fever prevalence. The findings of this study also supported Deksissa and Gebremedhin (2019), who reported a prevalence of 52.6%. This finding suggests that the prevalence of typhoid fever is high among adults treated in health centres in Degema community.

A significant association between typhoid fever prevalence and age was found ($p = 0.003$) as typhoid fever increased with age and was highest among persons aged 69-78 years. This finding could be attributed to the natural human immune system that weakens as age increases. The findings of this study supported Deksissa and Gebremedhin (2019) who reported a significant association between typhoid fever seroprevalence and age ($p = 0.001$). The similarity in findings could be linked to the level of significance set in the study. Furthermore, this study and that reported by Deksissa and Gebremedhin (2019) analyzed collected data at a 5% level of significance and a 95% confidence interval. However, this finding was in line with the findings

reported in a Nigerian study by Pam et al., (2018) that found age to be positively associated with typhoid fever prevalence ($p = 0.001$). The similarity in findings could be linked to the inclusion characteristics of the sample. This study and the report of Pam et al., (2018) similarly examined study subjects older than 18 years of age. More so, the findings of this study corroborate with an Indian study by Kumari and Agarwal (2016) that reported that age was a significant predictor of typhoid fever prevalence ($p = 0.04$). The similarity in these findings could be linked to the statistical methods utilized in the study. The findings of this study are similar to those of Kumari and Agarwal (2016), who utilized the non-parametric statistical methods of data analysis. This finding suggests that typhoid fever prevalence is more common in older persons than in younger persons.

There was a significant association between the educational level attained and typhoid fever prevalence ($p = 0.003$), as the prevalence was less among subjects with tertiary education. This finding could be due to the financial status that comes with education. More educated persons may be financially able to afford bottled water. This finding corroborates the findings of an Ethiopian study by Mulu et al. (2021) that reported that educational level was a significant predictor of typhoid fever prevalence ($p = 0.005$). The similarity in findings could be linked to the design utilized in the study. A cross-sectional design was applied in this study by Mulu et al. (2021). Furthermore, this finding was not in line with the results of a Nigerian study by Kwala and Asika (2020) that reported no significant association between typhoid prevalence and educational level. The discrepancy in findings could be linked to the sampling method utilized. This study also utilized systematic sampling to enroll case notes collected over a year, whereas Kwala and Asika (2020) examined a random selection of persons within a snap shot in time. This finding was also out of sync with the results of a multi-facility Nigerian study by Adogo et al., (2015) that reported no significant association between typhoid prevalence and educational level. This finding suggests that as people gain more education, the prevalence of typhoid fever falls. Perhaps they learn to prevent the condition more.

Artisans had the highest prevalence while civil servants had the lowest. This finding could be attributed to the idea that artisans often have lower economic status and hence less able to afford treated or bottled water. This finding was dissimilar to the results of an Ethiopian study by Mulu et al., (2021), who reported that occupation was not related to typhoid fever prevalence. The dissimilarity could be linked to the differences in sampling methods utilized in the study. This study utilized systematic random sampling, whereas the Ethiopian study utilized convenience sampliConvenience sampling methods do not offer an equal chance of selection to all members of the target population, hence imposing a fair chance of

type 1 error. Additionally, the findings of this study were not in line with a Nigerian study by Omoya and Atobatele (2017) who reported no association between typhoid prevalence and occupation. The dissimilarity in findings could be linked to the area of the study. This study was conducted in the rural area, while the study by Omoya and Atobatele (2017) was conducted in the Urban part of a Mega City (Lagos). Furthermore, the findings of this study did not support the results of another Nigerian study by Rine et al., (2013) that reported no relationship between occupation and typhoid prevalence. This finding suggests that rural-based artisans are more exposed to typhoid fever-causing pathogens (*Salmonella spp.*).

Conclusion

There is a high prevalence of typhoid fever among adults who obtained services in health facilities in Degema Local Government Area. Age, occupation, and educational level are correlates of typhoid fever prevalence.

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NA

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Competing Interest

None to declare. The authors have no affiliation with any organization with a direct or indirect financial interest in the subject matter discussed in the manuscript.

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