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Typhoid Fever and Associated Factors among Patients Attending Kyabugimbi Health Center IV Bushenyi District, In Western Uganda

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ABSTRACT

Typhoid fever remains a significant public health concern in Uganda, particularly in rural areas where access to clean water and sanitation facilities may be limited. Understanding the prevalence and associated factors of typhoid fever can inform targeted interventions to mitigate its impact on public health. This cross-sectional study was conducted at Kyabugimbi Health Center IV (HCIV) in Bushenyi District, Western Uganda. A structured questionnaire was administered to patients attending the health center, collecting demographic information and potential risk factors associated with typhoid fever. Blood samples were collected and tested for the presence of Salmonella Typhi antigen using Widal test. A total of 1400 patients participated in the study, with an average age of 1-40 years. The prevalence of typhoid fever among patients attending Kyabugimbi HCIV was found to be 27.15%. Factors significantly associated with typhoid fever included Poor hand washing practices and poor preparation of drinking water in communities were significantly associated with increased typhoid fever, indicating the importance of access to clean water, sanitation facilities, and hygiene practices in preventing the transmission of the disease. The findings of this study highlight the continued burden of typhoid fever in rural areas of Uganda and underscore the importance of targeted interventions to improve access to clean water, sanitation facilities, and hygiene education. Public health efforts should focus on addressing these factors to reduce the incidence and impact of typhoid fever in the region.

Keywords: Typhoid Fever; Prevalence; Associated Factors; Patients, Kyabugimbi; Bushenyi District

INTRODUCTION

Typhoid fever is a global health problem causing great suffering in developing countries where unhealthy living conditions prevail. Also known as enteric fever, this potentially fatal multi- systemic disease is caused by several serotypes of Salmonella Enterica including S. Typhi and S. Paratyphoid. Untreated or sub optimally treated typhoid fever may lead to perforation of the terminal ileum. The complication requires surgical management and is still associated with considerable morbidity and mortality [1]. Enteric fever also known as typhoid fever is a water borne disease transmitted via the fecal- oral route and is contracted by the consumption of water or food stuffs contaminated by salmonella typhi or typhi bacillus or by urine from an infected person or carrier[2]. Typhoid fever is an illness caused by bacterium Salmonella. It is common worldwide, transmitted by ingestions of food or water contaminated with feaces from an infected person. Without treatment, the illness may, last for 3 to 4 weeks and death rates range between 12% and 30% [3]. Following ingestion, the bacteria spread from the intestine via the bloodstream to the intestinal lymph nodes, liver, and spleen via the blood where they multiply. Salmonella may directly infect the gallbladder through the hepatic duct or spread to other areas of the body through the bloodstream. Early symptoms are generalized and include fever, malaise and abdominal pain [3]. Globally, by the year 2010 it was suggested that an approximation of 21.5 million infections and 200,000 deaths were reported each year as a result of typhoid fever. Typhoid is predominantly in School age children and young adults, it is therefore is a public health problem globally[4]. In populations without access to safe water and basic sanitation, typhoid fever vaccination can help reduce inequity by delivering a safe, effective and cost -effective way to control typhoid fever and can ultimately complement safe water and sanitation intervention (CDC) 2010 Typhoid Fever has in Southern, Central and Southeast Asia had an outstanding number of cases (>100 per 100,000) and while the fatality rate has been attributed to cultural, social and environmental factors. The occurrence of typhoid fever is associated with poor quality of life, inadequate provision of safe drinking water and sanitation as major causes [5]. Asia has had 274 cases per 100,000 persons and recorded the highest incidence of typhoid fever cases worldwide, especially in Southeast Asian Countries and on the Indian Subcontinent. Studies in Asian countries site annual incidence rates of the blood culture confirmed typhoid cases to 180-494/100,000 of those between the ages of 5-15 years, rates of more than 100/100,000 are considered high. In the urban slum of Dhaka, the incidence of typhoid fever was 390/100,000 of the population [4]. In sub-Saharan Africa 50 cases per 100,000 of persons with typhoid fever are recorded annually [6]. In Africa 400,000 cases occur annually with an incidence of 50 per 100,000 persons per year, on the other hand there has not been sufficient data published from Sub–Sahara Africa to substantiate the burden of typhoid. Countries such as Nigeria, Ethiopia, South Africa, Zimbabwe, Democratic Republic of Congo, Kenya and Tanzania among others have had reports of typhoid fever [7]. Furthermore, the emergence of multi-drug resistant strains of S. Typhi

and S. Paratyphi makes treatment increasingly difficult. Given the morbidity and mortality and considering the reduced effectiveness of commonly used antibiotics there is an increasing urgency to control the disease and its complications [8]. In Uganda, according to the Ministry of health [9], the most common typhoid fever outbreaks occurred in 2008 with the highest numbers registered in districts of Kampala, Kalangala and Kasese respectively, consequently different parts of the country have had reports of the infection.. Between January and June 2015,a large typhoid outbreak occurred in Kampala with 102,230 suspected cases and during the outbreak, area surgeons reported a surge in cases of typhoid intestinal perforation.[10]. In Bushenyi district, typhoid fever was highly prevalent among patients between (10-29) years old attending clinics in the district and the spread depended on age, sex, socio-economic status and seasons [9]. Typhoid fever is common infection in many developing countries where sanitation and water supply is inadequate. [10]. Typhoid is reported to have a high morbidity and mortality rate among different age groups with several complications. Uganda which is one of the developing countries, outbreaks of typhoid fever occurred in 2008 with the highest numbers registered in districts of Kampala, Kalangala and Kasese. Consequently, different parts of the country have had the infection[9]. Between January and June 2015, a large outbreak of typhoid occurred in Kampala with 102,230 suspected cases and during the outbreak, area surgeons reported a surge in cases of typhoid intestinal perforation.[10]. In Kasese district, a large outbreak of typhoid occurred through 2008-2009 and it continued throughout 2011 to the neighboring district of Bundibugyo [11]. With support from WHO and other partners such as CDC, UNICEF, Red cross and others, the country is implementing control measures and case management is ongoing. Surveillance has been improved and the situation is being monitored to provide evidence-based guidance for decision making. Unsafe water sources have been closed and a work plan to address the outbreak is under finalization. Safe water is being provided in the affected locations and intensive social mobilization is ongoing to inform the population on expected behaviors[12]. Many studies referred to in this study, were focusing mainly on major Hospitals and urban settings leaving out health facilities in rural settings, this study therefore will be conducted at kyabugimbi HCIV in Bushenyi District Which is a rural health-based facility to assess typhoid fever and associated risk factors among patients attending the facility. The aim of this study is to assess typhoid and associated factors among patients attending Kyabugimbi HCIV in Bushenyi District.

METHODOLOGY

Study Design

A cross sectional study was carried out to assess typhoid fever and associated factors among patients attending patients attending kyabugimbi HCIV in Bushenyi District.

Area of Study

Kyabugimbi HCIV is situated in Kakyerere Division, Kyabugimbi town council Igara east, Bushenyi District, it is 15km away from the main highway of Bushenyi Ishaka Municipality along Mbarara –Kasese Road in Western Uganda. The facility has several departments which include OPD, mental health clinic ophthalmology, anc, maternity ward, paed, male and female wards etc, the hospital has a capacity of about 40 beds.

Study Population

KHCIV serves a population of about 1400 people per month, from districts of Ankole sub- region and the neighboring areas but the target population for the study Was patients attending OPD from February 2021 to May 2021

Sample Size Determination

All patients attending OPD at KHCIV were selected according to Krejcie and Morgan [13, 14] (Appendix V), for a population (N) of 1400average monthly OPD attendance, the sample size for the given population (S) is 302 respondents.

Sampling Method

Simple random sampling method was used in this study.

Inclusion Criteria

All Patients that will attend OPD at KHCIV and consent were included in this study.

Exclusion criteria

i. All Patients who will not consent for the study will be excluded.
ii. Patients who will be severely ill and needs urgent medical attention were excluded from the study.

Ethical considerations

i. An introductory letter was obtained from the FCM/D, then permission Was obtained from the medical officer in charge of KHCIV before collecting data.
ii. All results obtained were treated with utmost confidentiality by ensuring that only authorized people have access to them.

RESULTS

The age group with most respondents was 13-18 years (30.13), followed by 26-39 (27.81%), >/=40 (22.85),0-12(10.26%) and lastly 19-25 (8.94%). Most were female 170 (56.29%), and 132 (43.71%) were males. Peasants/unemployed had the highest number with 161 (53.40%), followed by self-employed 96(31.74%), then employed 45(14.86%). Majority were single 149(49.33) followed by married 141(46.69), then widowed 8(2.54%) and least were divorced 4(1.44). 111 (36.75%) had tertiary education, 78 (25.82%) had secondary, 68(22.51%) had primary whereas 45 (14.90%) never had any level of formal education. Moslem where 66(21.85), Catholic 142(47.02%), Protestant were 68(22.52%) and 26(8.61%) were Pentecostals. Only 277 (91.72%) had pit latrine/toilet

in their homes whereas 25(8.28) never had. 34 (11.31%) of the respondents had history of Typhoid fever whereas 268(87.98) never had history of typhoid. 168 (55.63%) had ever had health education about Typhoid fever whereas 134(44.37) had never received any health education about typhoid as shown in table 1 below:

Table 1: Social-demographic and clinical characteristics of the study population

Variable	Frequency (n)	Percentages (%)
Age (years)		
0-12	31	10.26
13-18	91	30.13
19-25	27	8.94
26-39	84	27.81
>/=40	69	22.85
Sex		
Male	132	43.71
Female	170	56.29
Occupation		
Self employed	96	31.74
Peasant /un employed	161	53.40
Employed	45	14.86
Marital status		
Married	141	46.69
Single	149	49.33
Divorced	4	1.44
Widowed	8	2.58
Education		
None	45	14.90
Primary	68	22.51
Secondary	78	25.82
Tertiary	111	36.75
Religion		
Moslem	66	21.85
Catholic	142	47.02
Protestant	68	22.52
Pentecostal	26	8.61
Possession of a pit latrine		
No	25	8.28
Yes	277	91.72
History of typhoid over past 2 months		
No	268	87.98
Yes	34	11.31
Received any health education on typhoid		
No	134	44.37
Yes	168	55.63

Prevalence of Typhoid Fever in KHC1V -Bushenyi District.

All the 302 respondents suspected of typhoid, had typhoid test and this representation was used as the measure of occurrence of the disease. 220 (72.85%) respondents had negative test results while 82 (27.15%) had seropositive typhoid results as represented in the figure below.

Table 2: Sero-prevalence of typhoid fever in KHCIV -Bushenyi district

Typhoid Test	Frequency (n)	Percentages (%)
Positive	82	27.15
Negative	220	72.85
Total	**302**	**100**

The Analysis of Factors in Terms of the Test Results of Typhoid

Respondents with both non-reactive 220 (72.85%) and Reactive 82 (27.15%) test results were compared as shown in table 3 below. The study results showed that female had the highest positive typhoid test 44(25.88%) than in males 40(30.30%), age group of 13-18 years had the highest positive results 24(26.37%), and least 11(15.94%) in >/=40 years as seen in table 3 below. Those that never had any health education about typhoid had 35.84% occurrences of positive test as compared to their counterparts at only 16.07%. As in table 3 below. Furthermore, looking at the source of drinking water, typhoid fever was highest 63.41% in those respondents that use un protected wells, 26.09% in rain water, 26.58% from protected springs, and least from tap water at 11.03%. Then, when it came to preparation of drinking water, of the 7 respondents that reported to have never prepared drinking water, 5(71.43%) had typhoid disease, sieving method were 60.87%, water guard were 14.29% and boiling at 12.04% had the least typhoid cases. Respondents (2) that never used toilets, 1(50%) had typhoid, and only 26.83% among those that have toilets shown in table 3 below. Alternative places for defecation were also looked at in this study, where 19(47.50%) who used the field as compared to only 4(23.53) that only use toilets/latrine were found typhoid positive. Some don't use toilets and they have varying reasons, 133 reported that when the toilet is dirty, will not use it, but 17(12.78%) of these were found sick of typhoid. In this study still, 77(40.11%) of those that always wash their hands after visiting the toilets had the disease, but the highest was 66.67% among those that don't wash hands after using the toilet. Of the 35 that sometimes wash hands before eating, 24(68.57%) contracted typhoid. All respondents reported at least once to wash fruits and vegetables before eating, those 203 that Sometimes did 129(63.54%) had typhoid and only 34.34% were positive among those that wash them always. 35(60.34%) eating from food stalls/restaurants were sick of typhoid followed by the 84(41.58%) that do use them sometimes and least 4(9.53%) among those that never eat in food stalls or restaurants. Of 255 respondents Covering leftover food Always, 144(56.47%) were sick and those that never had a slightly high percentage 57.14% of typhoid cases. The study showed further that 44.12% that Suffered from typhoid in the previous 2 months had typhoid and only 26.12% of those without previous exposure were found typhoid positive. Use of flavored ice/juice was found a risk when 67.65 of the patients were positive, yet only 30.43% that never used such juices were positive of typhoid. Disposal of rubbish and refuse was as well analyzed, those reported to be using Dust bin Rubbish pit, farm/garden, Stream/pond/river/lake and were tested positive of typhoid were 44.72%, 24.72%, 60.00% and 25.00% respectively. All these areas shown in table 3 below.

Table 3: Factors and their association with typhoid test results

Variable	Typhoid test N=302	
	Positive n (%)	**Negative n (%)**
Age (years)		
0-12	5 (16.13)	26 (83.87)
13-18	24(26.37)	67(73.63)
19-25	12(44.44)	15(55.56)
26-39	23 (27.38)	61 (72.62)
≥40	11 (15.94)	58 (84.06)
Sex		
Male	40 (30.30)	92(69.70)
Female	44 (25.88)	126(74.12)
Ever had any Health education about Typhoid		
Yes	27(16.07)	141(83.93)
No	48(35.84)	86(64.16)
Source of drinking water		
Protected spring	21(26.58)	58(73.42)
Tap Water	15(11.03)	121(88.97)
Rain water	12(26.09)	34(73.91)
Un protected well	26(63.41)	15(36.59)
Preparation of drinking water		
Boiling	26(12.04)	190(87.96)
Sieving	14(60.87)	9(39.13)
Use of water guard	8(14.29)	48(85.71)
None	5(71.43)	2(28.57)
Use of latrine/toilet		
Always	77(26.83)	210(73.17)
Sometimes	7(14.29)	6(85.71)
Never	1(50.00)	1(50.00)
Alternative places for defecating		
Field	19(47.50)	21(52.50)
Pond/river/canal	4(23.53)	13(76.47)
Cat method	24(30.77)	54(69.23)
Only toilet/latrine	11(4.49)	234(95.51)
Reason that hinders using a latrine/toilet		
Dirty	17(12.78)	116(87.23)
Far away	22(28.21)	56(71.79)
Lack of water	22(24.72)	67(75.28)
Family tradition	2(100)	0(00.00)
Washing hands with soap after visiting a toilet/latrine		
Always	77(40.11)	112(59.89)
Sometimes	20(18.35)	89(81.65)
Never	4(66.67)	2(33.33)
Hand washing before and after eating		
Always	46(17.23)	221(82.77)
Sometimes	24(68.57)	11(31.43)
Never	0.00	0.00

Washing of fruits and vegetables before eating them		
Always	34(34.34)	65(65.66)
Sometimes	129(63.54)	74(36.45)
Never	0.00	0.00
Eating from food stalls/restaurants		
Always	35(60.34)	23(39.66)
Sometimes	84(41.58)	118(58.42)
Never	4(9.53)	38(90.48)
Covering of leftover food		
Always	144(56.47)	111(43.53)
Sometimes	16(40.00)	24(60.00)
Never	4(57.14)	3(42.86)
Suffered from typhoid in the previous 2 months		
Yes	15 (44.12)	19(55.88)
No	70 (26.12)	198 (73.88)
Use of flavored ice/juice		
Always	46(67.65)	22(32.35)
Sometimes	90(47.87)	98(52.13)
Never	14(30.43)	32(69.57)
Dispose of rubbish/house refuse		
Dust bin	89(44.72)	110(55.28)
Rubbish pit	22(24.72)	67(75.28)
Farm/garden	6(60.00)	4(40.00)
Stream/pond/river/lake	1(25.00)	3(75.00)

DISCUSSION

The 302 respondents suspected of typhoid had typhoid test and this representation was used as the measure of occurrence of the disease. 220 (72.85%) respondents had negative test results while 82 (27.15) had seropositive typhoid results. This study thus shows a typhoid prevalence of 27.15% at KHCIV. This was close to 26.5% reported recently [15]. However slightly lower than 36.6% prevalence among febrile patients aged (10-29 years old) attending clinics in Bushenyi District. [15]. Other studies, shows that 84(87.50%) patients had typhoid fever based on clinical examination and serological test results (widal test)(Mgs, n.d.) and 34.57% in slam Kenya [16] this shows a relatively lower prevalence of typhoid fever in the study area as compared other reported areas. The study results showed that females had the highest positive typhoid test 44(25.88) than in [3, 17]. This can be attributed to tiredness of every day's casual work that when they get thirsty, may not mind the kind of water they drink, and many may end up not washing their hands after visiting the latrine/toilet. The age group of 13-18 years had the highest typhoid positive results that is 24 (26.37%). Like in several other studies, findings showed that age determined the prevalence of typhoid and its patterns. It was observed that prevalence of enteric fever was high among the patients of school going age group (66.67%) (Mgs, n.d.), we can justify this by the fact that at that developmental stage of 13years, the children's eating behavior makes them susceptible to typhoid. Peasants/unemployed respondents had the highest number with 161 (53.40%)just like in the other studies where such class of people were 1.39 times more likely to be infected with the disease, although this was not statistically significant [18]. However this was a bit higher as compared to 35.4% in a study done in Northwest Ethiopia [19] and almost similar to 65% in a study done in Maina slum, Nyahururu Municipality[20]. Nevertheless, results from Mount Kenya University, showed that there was no significant difference between suffering and occupation status for whatever the status of employment one was, typhoid would still strike if control measures were not taken [20], Respondents that never had any health education about typhoid had 35.84% occurrences of typhoid fever as compared to their counter parts at only 16.07%. Moreover, Certain microorganisms such as blue-green algae,

Cryptosporidium, or Staphylococcus [21], were reportedly isolated from contaminated water. Furthermore, a study in Kasese District showed that typhoid was dependent on the drinking water sources where 64% used untreated tap water, 13% used rivers, 7% used bore holes, 5% used streams. However only 4% were reported to have used wells [22]. Preparation of drinking water; of the 7 respondents that reported to have never prepared drinking water, 5(71.43%) had typhoid disease, sieving method were 60.87%, water guard were 14.29% and boiling at 12.04% had the least typhoid cases. This is in line with the results from a study done in semi urban area of Bangladesh, where high prevalence (56%) of Typhoid fever was observed among the patients habituated with supply water without boiling followed by supply water with boiling (20) and tube well water (8). Positive and significant relationship was found- between the source and preparation of drinking water with prevalence of Typhoid fever in several studies [23]. During this study, I found out a rare occurrence in this developing world, where 2 respondents never used toilets/latrines on cultural grounds. This however differed from other study findings. Therefore, time has to be taken in trying to counsel them. Also, public health stockholders need to clear this of such cultural teachings. Of these (2) that never used toilets, 1(50%) had typhoid, and only 26.83% among those that always use toilets/latrines. Fecal pathogens therefore are frequently transferred to the water borne sewage system, through flush toilets and pit latrines subsequently contaminating surface and ground water [24]. Thus, we need to health educate the community the proper care of their toilets and latrines. Using them may be ok, but the care to keep them clean and avoidance of sewage contamination is of paramount importance [23]. Hand washing before and after eating; only 24(68.57%) that sometimes do contracted typhoid. It was found out in this study that 17.23% of those who wash hands always before and after eating had typhoid. This is related to other study findings where, disposal of rubbish and refuse was as well analyzed, those reported to be using Dust bin Rubbish pit, farm/garden, Stream/pond/river/lake and were tested positive of typhoid were 44.72%, 24.72%, 60.00% and 25.00% respectively. Therefore, each home must practice appropriate methods of rubbish disposal. Also, household refuse can be a real threat to health if proper arrangements are not made for its disposal. Therefore, rubbish and household refuse should be properly disposed of.

CONCLUSION

Data from this study of 302 respondents showed 27.15% general prevalence of typhoid fever in KHCIV- Bushenyi District of which was 25.88% among female and 30.30% in males. The highest prevalence was among the age group 13-18 years (26.37%). Poor hand washing practices and poor preparation of drinking water in communities were significantly associated with increased typhoid fever. People who had previously suffered from typhoid fever had a reoccurrence of the disease (44.12%).

REFERENCES

1. Pujar K., A., A.C., A., H.K., R., H.C., S., K.S, G., K.R., S.: Mortality in Typhoid Intestinal Perforation–A Declining Trend. J. Clin. Diagn. Res. JCDR. 7, 1946–1948 (2013). https://doi.org/10.7860/JCDR/2013/6632.3366
2. Khanam, F., Darton, T.C., Ross, A.G.P., Zaman, K., Pollard, A.J., Clemens, J.D., Qadri, F.: Case Report: Typhoid Fever Complicated by Ileal Perforation in an Urban Slum of Dhaka, Bangladesh. Am. J. Trop. Med. Hyg. 104, 1755–1757 (2021). https://doi.org/10.4269/ajtmh.20-1448
3. Asogwa, F. C., Ugwu, O. P. P., Alum, E. U., Egwu, C. O., Edwin, N. Hygienic and Sanitary Assessment of Street Food Vendors in Selected Towns of Enugu North District of Nigeria. *American-Eurasian Journal of Scientific Research*,**10** (1): 22-26. (2015). DOI: 10.5829/idosi.aejsr.2015.10.1.1145.
4. Zheng, X., Wang, Y., Gong, W., Cai, Q., Li, J., Wu, J.: Detection of Escherichia coli, Pseudomonas aeruginosa, Salmonella paratyphoid B, and Shigella dysentery in live Bacillus licheniformis products using propidium monoazide-real-time-quantitative polymerase chain reaction. Front. Microbiol. 13, 996794 (2022). https://doi.org/10.3389/fmicb.2022.996794
5. Alum, E.U., Uti, D.E., Agah, V.M., Orji, O.U., Ezeani, N.N., Ugwu, O.P.C., Bawa, I., Omang, W.A., Itodo, M.O.: Physico-chemical and bacteriological analysis of water used for drinking and other domestic purposes in Amaozara Ozizza, Afikpo North, Ebonyi State, Nigeria. Niger. J. Biochem. Mol. Biol. 38, 1–8 (2023). https://doi.org/10.2659/njbmb.2023.151.
6. Keddy, K.H., Smith, A.M., Sooka, A., Tau, N.P., Ngomane, H.M.P., Radhakrishnan, A., Als, D., Benson, F.G.: The Burden of Typhoid Fever in South Africa: The Potential Impact of Selected Interventions. Am. J. Trop. Med. Hyg. 99, 55–63 (2018). https://doi.org/10.4269/ajtmh.18-0182
7. Kim, J.-H., Choi, J., Kim, C., Pak, G.D., Parajulee, P., Haselbeck, A., Park, S.E., Mogasale, V., Jeon, H.J., Browne, A.J., Owusu-Dabo, E., Rakotozandrindrainy, R., Bassiahi, A.S., Teferi, M., Lunguya-Metila, O., Dolecek, C., Pitzer, V.E., Crump, J.A., Hay, S.I., Marks, F.: Mapping the incidence rate of typhoid fever in sub-

Saharan Africa. PLoS Negl. Trop. Dis. 18, e0011902 (2024). https://doi.org/10.1371/journal.pntd.0011902
8. Kaljee, L.M., Pach, A., Garrett, D., Bajracharya, D., Karki, K., Khan, I.: Social and Economic Burden Associated with Typhoid Fever in Kathmandu and Surrounding Areas: A Qualitative Study. J. Infect. Dis. 218, S243–S249 (2018). https://doi.org/10.1093/infdis/jix122
9. Risk factors associated with typhoid intestinal perforations during a large outbreak of typhoid, Kampala Uganda, 2015 - UNIPH, https://uniph.go.ug/risk-factors-associated-with-typhoid-intestinal-perforations-during-a-large-outbreak-of-typhoid-kampala-uganda-2015/, (2016)
10. Bulage, L., Masiira, B., Ario, A.R., Matovu, J.K.B., Nsubuga, P., Kaharuza, F., Nankabirwa, V., Routh, J., Zhu, B.-P.: Modifiable risk factors for typhoid intestinal perforations during a large outbreak of typhoid fever, Kampala Uganda, 2015. BMC Infect. Dis. 17, 641 (2017). https://doi.org/10.1186/s12879-017-2720-2
11. Ota, S., Maki, Y., Mori, K., Hamamoto, T., Kurokawa, A., Ishihara, M., Yamamoto, T., Imai, K., Misawa, K., Yuki, A., Fujikura, Y., Maeda, T., Kawana, A.: Diagnosis of imported Ugandan typhoid fever based on local outbreak information: A case report. J. Infect. Chemother. 22, 770–773 (2016). https://doi.org/10.1016/j.jiac.2016.05.004
12. Saha, T., Arisoyin, A.E., Bollu, B., Ashok, T., Babu, A., Issani, A., Jhaveri, S., Avanthika, C.: Enteric Fever: Diagnostic Challenges and the Importance of Early Intervention. Cureus. 15, (2023). https://doi.org/10.7759/cureus.41831
13. Bukhari, S.A.R.: Sample Size Determination Using Krejcie and Morgan Table. (2021). https://doi.org/10.13140/RG.2.2.11445.19687
14. qhaireenizzati, A.: Sample Size Determination Using Krejcie and Morgan Table, https://qhaireenizzati.wordpress.com/2017/10/05/sample-size-determination-using-krejcie-and-morgan-table/, (2017)
15. Shaikh, O.A., Asghar, Z., Aftab, R.M., Amin, S., Shaikh, G., Nashwan, A.J.: Antimicrobial resistant strains of Salmonella typhi: The role of illicit antibiotics sales, misuse, and self-medication practices in Pakistan. J. Infect. Public Health. 16, 1591–1597 (2023). https://doi.org/10.1016/j.jiph.2023.08.003
16. Andualem, G., Abebe, T., Kebede, N., Gebre-Selassie, S., Mihret, A., Alemayehu, H.: A comparative study of Widal test with blood culture in the diagnosis of typhoid fever in febrile patients. BMC Res. Notes. 7, 653 (2014). https://doi.org/10.1186/1756-0500-7-653
17. Ndako, J.A., Dojumo, V.T., Akinwumi, J.A., Fajobi, V.O., Owolabi, A.O., Olatinsu, O.: Changes in some haematological parameters in typhoid fever patients attending Landmark University Medical Center, Omuaran-Nigeria. Heliyon. 6, e04002 (2020). https://doi.org/10.1016/j.heliyon.2020.e04002
18. Walters, M.S., Routh, J., Mikoleit, M., Kadivane, S., Ouma, C., Mubiru, D., Mbusa, B., Murangi, A., Ejoku, E., Rwantangle, A., Kule, U., Lule, J., Garrett, N., Halpin, J., Maxwell, N., Kagirita, A., Mulabya, F., Makumbi, I., Freeman, M., Joyce, K., Hill, V., Downing, R., Mintz, E.: Shifts in Geographic Distribution and Antimicrobial Resistance during a Prolonged Typhoid Fever Outbreak — Bundibugyo and Kasese Districts, Uganda, 2009–2011. PLoS Negl. Trop. Dis. 8, e2726 (2014). https://doi.org/10.1371/journal.pntd.0002726
19. Dewan, A.M., Corner, R., Hashizume, M., Ongee, E.T.: Typhoid Fever and Its Association with Environmental Factors in the Dhaka Metropolitan Area of Bangladesh: A Spatial and Time-Series Approach. PLoS Negl. Trop. Dis. 7, e1998 (2013). https://doi.org/10.1371/journal.pntd.0001998
20. Kasiano, P., Kavai, S., Kiiru, S., Nyerere, A., Kariuki, S.: Typhoidal salmonella disease in Mukuru informal settlement, Nairobi Kenya; carriage, diversity, and antimicrobial resistant genes. PLOS ONE. 19, e0298635 (2024). https://doi.org/10.1371/journal.pone.0298635
21. Falohun, O.O., Ayinmode, A.B., Adejinmi, J.O.: Molecular characterisation of Cryptosporidium isolates from rivers, water treatment plants and abattoirs in Ibadan, Nigeria. Comp. Immunol. Microbiol. Infect. Dis. 74, 101577 (2021). https://doi.org/10.1016/j.cimid.2020.101577
22. Novak Babič, M., Gostinčar, C., Gunde-Cimerman, N.: Microorganisms populating the water-related indoor biome. Appl. Microbiol. Biotechnol. 104, 6443–6462 (2020). https://doi.org/10.1007/s00253-020-10719-4
23. Meiring, J.E., Khanam, F., Basnyat, B., Charles, R.C., Crump, J.A., Debellut, F., Holt, K.E., Kariuki, S., Mugisha, E., Neuzil, K.M., Parry, C.M., Pitzer, V.E., Pollard, A.J., Qadri, F., Gordon, M.A.: Typhoid fever. Nat. Rev. Dis. Primer. 9, 1–18 (2023). https://doi.org/10.1038/s41572-023-00480-z
24. Factors of Typhoid Fever: An Examination of the Causes, Effects, and Developments Regarding Enteric Fever, https://www.lakeforest.edu/news/factors-of-typhoid-fever-an-examination-of-the-causes-effects-and-developments-regarding-enteric-fever

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