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Knowledge towards prevention and control of Salmonella Typhi infection among patients above twenty years seeking healthcare at Kisubi Hospital. A cross-sectional study.

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Abstract

Background:

Salmonella Typhi, the causative agent of typhoid fever, remains a significant public health challenge in Uganda, posing a threat to the well-being of the population. There is growing concern about patients' understanding of antibiotic resistance, with potential implications for the development of more virulent and resistant Salmonella strains. This study aimed at assessing knowledge towards prevention and control measures of Salmonella Typhi infection among patients above twenty years seeking healthcare at Kisubi Hospital.

Methodology:

The study adopted a cross-sectional study design, and a sample size of 44 was used. Primary data was collected from procurement officers and staff from the accounts/ finance department using both questionnaires and an interview guide. Secondary data were mainly obtained from annual reports, manuals, the PPDA Act, 2003, policy guidelines, and journals, among others. The data analysis was done using regression and correlation models to test the predetermined hypotheses of this study.

Results:

54.8% of the participants had a tertiary level of education, 38 (52.0%) of the participants were male, 35.2% of the participants were students. 71.2% of participants had heard of the infection, its transmission, and hygiene practices, 41.1% had a thought about antibiotics being effective in treating all types of Salmonella, 31.6% were aware of the vaccine for the infection, while 68.4% had no idea, 83.6% had never received the vaccine due to ignorance.

Conclusion:

There is more need to inform people about the infection, as it's depicted in the study; few people are aware of the disease.

Recommendations:

The village health team, with local leaders, should emphasize hand washing after visiting the latrine and before eating found this will reduce the transmission of Salmonella typhi.

Keywords: *Knowledge on Salmonella Typhi, Patients above 20 years, prevention and control of Salmonella typhi, Kisubi Hospital.*
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Background.

Salmonella Typhi, the causative agent of typhoid fever, remains a significant public health challenge in Uganda, posing a threat to the well-being of the population. According to the World Health Organization, Uganda is one of the countries with a high burden of typhoid fever, with an estimated 41,000 cases and 1,200 deaths per year. (Mirembe et al., 2021)The outbreak of typhoid fever in Uganda is driven by poor sanitation, unsafe water sources, and increasing antimicrobial resistance. Despite efforts to control and prevent the spread of this bacterium, the consequences of untreated or poorly managed typhoid fever include high morbidity rates, increased healthcare burdens, economic losses, and the potential for outbreaks with severe societal implications.

The current methods of diagnosis, treatment, and prevention are inadequate, costly, and inaccessible for many people. There is also a lack of comprehensive data on its prevalence, predisposing factors, and patients' knowledge on the prevention and control measures of Salmonella among patients above twenty years seeking healthcare at Kisubi Hospital in Wakiso district.

The problem is compounded by limited surveillance systems, and addressing this gap in knowledge is imperative to enhance public health preparedness, strengthen surveillance systems, and implement appropriate control measures to mitigate the impact of Salmonella Typhi on the

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health of the Ugandan population. Therefore, this study aims to identify the factors associated with the prevalence of Salmonella Typhi among patients above twenty years seeking healthcare at Kisubi Hospital in Wakiso District, Central Uganda. Providing a foundation for evidence-based interventions and policy recommendations to curtail the spread of this infectious agent and improve overall public health outcomes. This study sought to provide valuable insights that can inform public health strategies for the prevention and control of the disease in Uganda. This study aimed at assessing knowledge towards prevention and control measures of Salmonella Typhi infection among patients above twenty years seeking healthcare at Kisubi Hospital.

Methodology.

Study design

The study employed a descriptive cross-sectional design involving quantitative data collection methods. This study design was to enable obtaining data in the short time available for the study.

Study area

This study was conducted from Kisubi Hospital, located in Katabi sub-county, Busiro County, Wakiso District, 24km along Kampala-Entebbe Highway. Wakiso District lies in the Central Region of the country, bordering Nakaseke District and Luweero District to the north, Mukono District to the east, Kalangala District in Lake Victoria to the south, Mpigi District to the southwest, and Mityana District to the northwest. Wakiso, where the district headquarters are located, lies approximately 20 kilometers (12 mi) by road northwest of Kampala, the capital of Uganda and the largest city in the country. The coordinates of the district are:00 24N, 32 29E.

Study population

The study comprised males and Females above 20 years of age attending OPD services at Kisubi hospital.

Inclusion criteria

The study population included patients who attended the outpatient medical services between the study periods of January 2024 and March 2024 with clinical signs and symptoms of typhoid. A data collection form was filled out to obtain the patient's clinical history and biodata.

Patients who were suspected of having typhoid fever were sent to the laboratory by their physician for the Widal test and enrolled in the study when they clearly consented.

Exclusion criteria

Those Clients who had been on antibiotic treatment for their symptoms for two weeks and intended to come to the hospital were not included in the study.

Sample size determination

The sample size was determined using Kish and Leslie's (1965) sample size determination formula. (Kish, 1965);

$$N = \frac{z^2 \text{pq}}{d^2}$$

Where

q = (1-p)

N=Sample size

p=Prevalence taken to be 5%

Z=the score (1.96) on the normal standard curve corresponding to 95% confidence interval,

d=Permissible error term 5%

Therefore, $N = \frac{(1.96)^2 (0.05) (0.95)}{(0.05)^2}$

$$N = \frac{0.182476}{0.0025}$$

$= 72.9$

N=73

Therefore, the sample size 'N' =73 participants

Sampling technique

The study employed both random and non-random sampling techniques. Purposive sampling involves the selection of study units because they possess characteristics relevant to the study.

A simple random sampling technique was employed to select participants to include in the study since it gave an equal chance to all members of the population to be selected. The technique was chosen to eliminate individual bias in the selection of participants to include in the study.

The respondents were obtained from the OPD. The researcher often visited the OPD, and the respondents were randomly chosen and interviewed each time, until the required sample size was obtained. Prepared 100 pieces of paper and coded them while folded. Placed them in a container and mixed before random selection. The number picked was checked against the participants' and noted down. The process was then repeated without replacement until a maximum of 73 had been selected randomly.

Data collection methods.

Data was collected from various sources, including hospitals, clinics, and laboratories, where patients with suspected or confirmed Salmonella Typhi infection are diagnosed and treated.

Clinical assessments were used to assess for specific symptoms of Salmonella. Collection of blood samples was

done, and the test results for both rapid and culture diagnoses were given to the participants within the acceptable turnaround time. Data was collected through: Review of medical records, Interviews with patients or caregivers, and Laboratory reports.

Data collection tools

An interviewer administered a structured questionnaire, involving closed-ended questions, to assess for predisposing factors to Salmonella.

For clinical assessment, a notebook was used to record clinical observations for each patient. Data was collected manually and then recorded in the record book designed for the study. For every entry, the patient‘s study number, age, sex, and test results were assigned and stamped. Raw data was represented using tables, bar graphs, and pie charts, with the help of the Microsoft Excel software program.

Data collection procedure

On receiving consent from the respondents, those willing to participate in the study were interviewed for clinical assessments, and later, samples were collected.

Sample collection

Venous blood specimen was collected in a red top vacutainer tube and was sent to the clinical laboratory for the Salmonella rapid diagnostic test. The blood sample was allowed to clot, then centrifuged to obtain serum, and the positive samples were sent to the microbiology laboratory for Salmonella Culture for the diagnosis of Salmonella *Typhi*.

Laboratory analysis

Salmonella rapid diagnostic test

Principle.

It is an immunochromatographic test which uses a combination of antibody binding proteins conjugated with colloidal gold dye particles and antigens to Salmonella, which are bound to the membrane solid phase. The patient’s sample and buffer are applied to the sample pad. If Salmonella antibodies are present in the patient’s sample, they bind to the gold-conjugated antibody-binding protein and form immune-complex antibodies that migrate to the immobilized antigens in the patient's test area, producing a red or pink line. The absence of salmonella, no antibodies are present, and no red or pink line. The sample continues to migrate along the test slide and produces a red or pink line at the control area.

Quality control

To ensure data quality, the following measures were taken: Training of data collectors, Use of standardized data collection forms, Regular data quality checks, Standard operating procedure was followed during sample collection and during testing. The sample containers were labeled clearly with the patient’s laboratory number so that the results correlate accurately to the right patient from whom the samples were obtained. The study used a parallel check by different technicians to control the results obtained.

Data management, analysis, and presentation

Data Security: Data was stored securely to protect patient confidentiality and comply with data protection regulations. Data analysis commenced after the completion of data collection and was expected to be completed within a specified timeframe (3 months), and the analyzed data was presented using graphs, pie charts, and tables. Data analysis: Data was collected and processed manually through coding, editing, and tallying by the researcher, and then tables, graphs, and pie charts were created to present the findings. The data gathered was then analyzed using SPSS (Statistical Package for Social Sciences), and the results were presented using appropriate tables and graphs.

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Results.

Table 1: Shows demographic data of respondents (N=73).

Age	**Frequency**	**Percentage (%)**
21-30 years	39	53.4
31-40 years	25	34.3
40 and above	9	12.3
Total	**73**	**100**
Gender	**Frequency**	**Percentage (%)**
Females	38	52.0
Males	35	48.0
Total	**73**	**100**
Occupation	**Frequency**	**Percentage (%)**
Student	26	35.6
Unemployed	24	32.9
Self employed	17	23.3
Government employee	6	8.2
Total	**73**	**100**
Religion	**Frequency**	**Percentage (%)**
Catholics	27	37.0
Muslims	15	20.5
Anglican	18	24.7
Born Again	13	17.8
Total	**73**	**100**
Education level	**Frequency**	**Percentage (%)**
Less than primary	4	5.5
Primary	9	12.3
Secondary	20	27.4
Tertiary	40	54.8
Total	**73**	**100**

Table 1 shows that 53.4% of respondents were between the ages of 21-30 years, 34.3 percent were between the ages of 31 and 40 years, and 12.3% were 40 years and above. These findings indicate that the lowest observed ages are those of 40years and above. However, individuals aged 21-30 years were found to be the most.

The results of the study indicated that among the respondents reached out to, 38 (52.0%) were male, while

35(48.0%) were female. This indicated that females dominated the hospital.

The results indicated that respondents had varying levels of education, including 5.5 percent with less than a primary level, 12.3 percent with a primary level of education, 27.4 percent with a secondary level of education, and 54.8 percent with a tertiary level of education. The greatest percent was observed to be those with a tertiary level of education, followed by those with a secondary level, and the lowest percent was observed to be at less than a primary level.

The findings of the results in the table indicate that 27(37.0%) of respondents were Catholics, 15(20.5%) of the respondents were moles and the findings of the study indicated that the majority of the respondents were Catholics.

Patient's knowledge of prevention and control measures for Salmonella.

Table 2: Patients' knowledge of prevention and control measures for Salmonella.

Variable	Number examined	Percentage (%)
Have you heard of Salmonella, about its transmission, and hygiene practices?		
Yes	52	71.2
No	21	28.8
Do you think antibiotics are effective in treating all types of Salmonella?		
Yes	30	41.1
No	43	58.9
Are you aware that there is a vaccine available for preventing Salmonella infections?		
Yes	23	31.6
No	50	68.4
Have you received the vaccine before?		
Yes	12	16.4
No	61	83.6

Table 2 indicates that 71.2% of participants had heard of the infection, its transmission, and hygiene practices, while the rest had no idea. 41.1% had a thought about antibiotics being effective in treating all types of Salmonella, while the rest were not sure, and others didn't know anything.

31.6% were aware of the vaccine for the infection, while 68.4% had no idea, 83.6% had never received the vaccine due to ignorance, and 16.4% only had received the vaccine.

Discussion of results.

Patients 'Knowledge Level on Prevention and Control Measures of Salmonella.

71.2% of participants had heard of the infection, its transmission, and hygiene practices, while the rest had no idea, and others were not sure. Recent research ((Billah & Rahman, 2024) has indicated gaps in patients' knowledge concerning the sources and modes of Salmonella transmission. Identifying and addressing these knowledge gaps is essential for implementing effective preventive measures. Awareness of Salmonella and its Transmission Studies consistently highlight a lack of general awareness among patients about Salmonella and its modes of transmission. (Stull et al., 2015), found that a considerable percentage of patients diagnosed with Salmonella infections were unaware of the bacterium's sources, including contaminated food, water, and direct contact with infected individuals. This knowledge gap poses a significant challenge to effective prevention strategies.

41.1% had a thought about antibiotics being effective in treating all types of Salmonella, while the rest were not sure, and others didn't know anything. (García, 2020) noted that Patients' knowledge of antibiotics and their appropriate use is another key factor in Salmonella prevention. Similarly (Brown et al., 2021)explored patients' misconceptions about

the role of antibiotics in treating Salmonella infections. The study emphasized the importance of addressing these misconceptions to prevent inappropriate antibiotic use and the development of antibiotic-resistant strains.

31.6% were aware of the vaccine for the infection, while 34.2% had no idea, and 34.2% still were not sure about the vaccine. 83.6% had never received the vaccine due to ignorance, and 16.4% only had received the vaccine. Recent work underscored the significance of vaccination awareness among patients. The study explored factors influencing vaccine uptake and suggested strategies for improving vaccination rates to control Salmonella infections. While Salmonella vaccines exist, their uptake remains low, partly due to a lack of patient awareness. Studies (Tang et al., 2015), Anderson & Kendall, 2017)indicate that patients may not be well-informed about the availability and benefits of Salmonella vaccines, contributing to suboptimal immunization rates.

Conclusion.

There is more need to inform people about the infection, as it's depicted in the study, few people are aware of the disease.

Study limitations

The study was conducted alongside semester activities; the limited time affected the response rate, as the sample size for the study was not realized.

Recommendations.

The village health team, with local leaders, should emphasize hand washing after visiting the latrine and before eating found this will reduce the transmission of Salmonella typhi.

Washing hands thoroughly with soap and eating food that is properly prepared.

Drinking water from a safe and clean source.

Acknowledgement

I take this opportune time to thank God for the grace that he has granted unto me in coming up with this research report; all the glory goes back to him. I do recognize His contributions, which have enabled this study to reach its current stage. I would love to appreciate my Family members and friends for their support and prayers to encourage me along this academic path of mine.

List of abbreviations

MDR:	Multi-drug resistance
HTC:	Health Tutor's College
MOES:	Ministry of Education and Sports
MOH:	Ministry of Health
NGO:	Non-government Organisation
WHO:	World Health Organisation?

Source of funding.

This study was not funded.

Conflict of interest.

The authors declare no conflict of interest.

Availability of data.

Data used in this study are available upon request from the corresponding author.

Ethical Approval.

An introductory letter was obtained from the HTC research ethics committee, which was presented to the medical director of Kisubi hospital seeking permission to carry out this study in the facility.

Informed consent.

The purpose of the study was fully explained to the participants, and informed consent was sought. Information obtained was treated with utmost confidentiality. To ensure anonymity, codes instead of names were used in order to track data from respondents. The code assigned to the respondent was recorded on the questionnaire. Informed consent was obtained from all participants or their legally authorized representatives. Patient confidentiality was maintained throughout the study.

Authors contribution.

PO designed the study, conducted data collection, cleaned and analyzed data, and drafted the manuscript. SK supervised all stages of the study from conceptualization of the topic to manuscript writing and submission.

Author's biography.

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