Measure the level of awareness related to typhoid and its transmission among local population of Pakistan

Zain Ramzan[1], Eeman Dar[2], Usama Zahid[3], Shehroze Rauf Shakoori[4], Muneeb Ahmad[5], Farwa Rajpoot[6], Ibrahim Arif[7], Taimoor Ali[8]

[1,2,3,4,5,6,7,8] Amna Inayat Medical College, Pakistan

Abstract

Background: Typhoid fever remains a major public health concern in Pakistan due to poor sanitation, lack of clean drinking water, and inadequate awareness regarding its transmission and prevention. Understanding public knowledge, attitudes, and practices related to typhoid fever is crucial for developing effective public health interventions. **Objective:** This study aims to assess the level of awareness, knowledge, and preventive practices regarding typhoid fever among the local population of Pakistan. **Methods:** A cross-sectional survey was conducted among 250 participants selected through random sampling. Data were collected using a structured questionnaire covering demographic information, knowledge about typhoid and its transmission, preventive practices, healthcare-seeking behavior, and sources of health information. Descriptive statistics and chi-square tests were used for data analysis. **Results:** The study found that 85% of participants had heard of typhoid fever, but only 70% correctly identified its bacterial cause. Contaminated food (50%) and contaminated water (40%) were the most recognized transmission routes, though misconceptions persisted regarding person-to-person transmission (5%) and insect bites (2%). While 55% acknowledged vaccination as a preventive measure, only 30% were vaccinated. Handwashing (60%) and drinking safe water (50%) were commonly practiced, but avoiding street food (35%) and using sanitary toilets (40%) were less emphasized. Treatment-seeking behavior showed that 50% sought immediate medical attention, 30% delayed treatment, and 20% relied on self-medication. Healthcare providers (40%) were the most trusted source of health information, followed by family and friends (20%) and the internet (15%). **Conclusion:** The findings indicate a moderate level of awareness regarding typhoid fever, with significant gaps in knowledge about its transmission, prevention, and treatment. Misinformation, low vaccination rates, and reliance on self-medication highlight the need for enhanced public health campaigns.

Keywords: Typhoid fever, awareness, transmission, prevention, vaccination, public health, Pakistan.

Introduction

Typhoid fever is a major public health concern in Pakistan, primarily due to inadequate sanitation, poor water quality, and a general lack of awareness about the disease and its transmission. Caused by the bacterium *Salmonella Typhi*, typhoid is a life-threatening illness that spreads through the consumption of contaminated food and water. The disease is endemic in Pakistan, with frequent outbreaks reported in both urban and rural areas [1]. Despite medical advancements and the availability of vaccines, typhoid continues to pose significant health risks, particularly in communities with poor hygiene and limited access to healthcare. The emergence of extensively drug-resistant (XDR) typhoid in recent years has further exacerbated the situation, making effective treatment more challenging and increasing the urgency for preventive measures [2].

One of the key factors contributing to the persistence of typhoid fever in Pakistan is the lack of awareness among the general population regarding its causes, symptoms, and preventive strategies. Many individuals remain unaware of how typhoid spreads, often failing to adopt essential hygiene practices such as proper handwashing, safe food handling, and the

consumption of clean drinking water [3]. Additionally, misconceptions about the disease and its treatment contribute to delayed diagnosis and improper medication use, which can lead to complications and prolonged illness. In marginalized communities with limited literacy rates, health education campaigns are often inadequate, further widening the knowledge gap about typhoid prevention [4].

Given the high burden of typhoid in Pakistan, understanding the level of awareness among the local population is crucial for designing effective public health interventions. Assessing knowledge, attitudes, and practices (KAP) related to typhoid can help identify gaps that need to be addressed through targeted educational campaigns and policy initiatives [5]. Studies conducted in different regions of Pakistan suggest that while some individuals are aware of typhoid's basic symptoms, many lack detailed knowledge about its transmission, preventive measures, and the importance of vaccination. This highlights the need for enhanced community-based health education programs to promote behavioral changes that can reduce the spread of the disease [6].

Objectives

This study aims to measure the level of awareness related to typhoid and its transmission among the local population of Pakistan. By conducting surveys and interviews across different socio-economic groups, the research seeks to analyze the extent of knowledge about the disease and identify key factors influencing awareness levels. Additionally, the study will explore the role of education, access to healthcare information, and socio-cultural beliefs in shaping people's understanding of typhoid fever.

Methodology

This descriptive cross-sectional study was conducted at Amna Inayat Medical College during June 2024 to December 2024. A sample of 250 individuals from various communities in Pakistan was added. Participants were selected using a random sampling technique to ensure a diverse representation of different socio-economic backgrounds, educational levels, and geographical locations (urban and rural).

Inclusion Criteria:

- Individuals aged 18 years and above
- Residents of Pakistan (both rural and urban areas)
- Individuals who have either had typhoid fever or have general knowledge of the disease
- Individuals willing to provide informed consent for participation

Exclusion Criteria:

- Individuals with severe medical conditions preventing participation
- Healthcare professionals (to avoid bias in awareness levels)

Data Collection

Data was collected using a structured questionnaire-based survey, which included closed-ended and multiple-choice questions covering various aspects of typhoid awareness. The questionnaire was divided into four sections: demographic information (age, gender, education level, occupation, and location), knowledge about typhoid (causes, symptoms, and transmission routes), preventive measures (hygiene practices, vaccination, safe food and water consumption), and treatment-seeking behavior (awareness about antibiotics, healthcare facilities, and traditional remedies). The survey was administered through face-to-face interviews in areas with limited internet access and online questionnaires for participants with digital accessibility.

Data Analysis

The collected data was analyzed using SPSS (Statistical Package for the Social Sciences) version 25.0. Descriptive statistics, such as frequencies, percentages, means, and standard deviations, were used to summarize participants' responses.

Results

The study included 250 participants, with the majority (40%) falling within the 18-30 age group, followed by 31-45 years (30%), 46-60 years (20%), and those above 60 years (10%). Gender distribution was equal, with 50% males and 50% females. Education levels varied, with 30% having primary or secondary education, while 20% had higher education and another 20% had no formal education. The majority of participants (60%) resided in urban areas, whereas 40% were from rural regions.

Table 1: Detailed Demographic Data

Variable	Categories	Frequency (n)	Percentage (%)
Age Group	18-30	100	40%
	31-45	75	30%
	46-60	50	20%
	60+	25	10%
Gender	Male	125	50%
	Female	125	50%
Education Level	No formal education	50	20%
	Primary	75	30%
	Secondary	75	30%
	Higher Education	50	20%
Residence	Urban	150	60%
	Rural	100	40%

30% of respondents demonstrated good knowledge about typhoid, 50% had a moderate understanding, and 20% had poor awareness. Regarding transmission, 40% of participants had

good knowledge, another 40% had moderate understanding, and 20% were unaware of how typhoid spreads.

Table 2: Knowledge About Typhoid and Transmission

Knowledge Level	Knowledge About Typhoid (%)	Knowledge About Transmission (%)
Good	30%	40%
Moderate	50%	40%
Poor	20%	20%

85% of participants had heard of typhoid fever, while 15% were unaware of it. The primary sources of information were healthcare providers (25%), family and friends (20%), television and radio (20%), schools (15%), newspapers (10%), and social media (10%). When asked about the cause of typhoid, 70% correctly identified its origin, whereas 30% did not know. Among those who knew, 65% recognized bacteria as the cause, while 10% mistakenly attributed it to viruses, 5% to fungi, 5% to parasites, and 15% were unsure.

Table 3: Awareness of Typhoid

Question	Response Options	Percentage (%)
Have you heard of typhoid fever?	Yes, No	85%, 15%
First source of information	TV/Radio, Newspapers, School, Healthcare Providers, Family/Friends, Social Media, Other	20%, 10%, 15%, 25%, 20%, 10%, -
Do you know what causes typhoid fever?	Yes, No	70%, 30%
Cause of typhoid fever	Bacteria, Virus, Fungi, Parasites, Don’t know	65%, 10%, 5%, 5%, 15%

50% of participants correctly identified contaminated food as the primary mode of typhoid transmission, while 40% recognized contaminated water as a source. However, misconceptions persisted, with 5% believing in person-to-person transmission, 2% attributing it to insect bites, and 3% uncertain about its transmission. When asked if typhoid could spread through direct contact, 50% correctly responded no, while 40% incorrectly believed it could, and 10% were unsure. Regarding symptoms, high fever was the most recognized symptom (60%), followed by headache (50%), stomach pain (40%), diarrhea or constipation (30%), rash (15%), and nausea (10%), while 5% were unaware of any symptoms.

Table 4: Transmission Knowledge

Question	Response Options	Percentage (%)
How is typhoid transmitted?	Contaminated food, Contaminated water, Person-to-person contact, Insect bites, Don’t know	50%, 40%, 5%, 2%, 3%
Can typhoid spread through direct contact?	Yes, No, Don’t know	40%, 50%, 10%

Common symptoms of typhoid fever	High fever, Headache, Stomach pain, Diarrhea/Constipation, Rash, Nausea, Don't know	60%, 50%, 40%, 30%, 15%, 10%, 5%

55% of participants recognized that typhoid fever can be prevented through vaccination, while 20% believed it could not, and 25% were unsure. Effective preventive measures reported by participants included handwashing (60%), using safe water (50%), eating thoroughly cooked food (45%), getting vaccinated (55%), avoiding street food (35%), and using sanitary toilets (40%), while 10% were unaware of any preventive methods. Regarding treatment awareness, 70% of respondents acknowledged that typhoid fever is treatable, whereas 15% either believed there was no treatment or were uncertain. Among treatment options, antibiotics were correctly identified by 65% of participants, while 20% mentioned pain relievers, 5% relied on herbal remedies, and 5% opted for bed rest, with another 5% unsure about the appropriate treatment. Personal experience with typhoid showed that 30% of participants or someone they knew had suffered from the disease. Among those affected, 60% received antibiotics, 20% required hospitalization, 15% used home remedies, and 5% were uncertain about the treatment method. Preventive practices ratings on a scale of 1 to 5 showed that participants consistently followed handwashing (4.7), drinking boiled water (4.5), eating thoroughly cooked food (4.3), and avoiding street food (3.8).

Table 5: Prevention and Treatment Awareness

Question	Response Options	Percentage (%)
Can typhoid be prevented by vaccination?	Yes, No, Don't know	55%, 20%, 25%
Effective ways to prevent typhoid	Safe water, Cooked food, Handwashing, Vaccination, Avoiding street food, Sanitary toilets, Don't know	50%, 45%, 60%, 55%, 35%, 40%, 10%
Is there a treatment for typhoid fever?	Yes, No, Don't know	70%, 15%, 15%
Treatment options	Antibiotics, Pain relievers, Herbal remedies, Bed rest, Don't know	65%, 20%, 5%, 5%, 5%
Have you or someone you know had typhoid?	Yes, No	30%, 70%
Treatment received	Hospitalization, Antibiotics, Home remedies, Don't know	20%, 60%, 15%, 5%
Preventive practices rating (1-5)	Drinking boiled water, Eating cooked food,	4.5, 4.3, 4.7, 3.8

	Handwashing, Avoiding street food	
Trusted sources of health info	Healthcare providers, Family/Friends, TV/Radio, Newspapers, Internet, Schools, Community leaders, Other	40%, 20%, 10%, 5%, 15%, 5%, 3%, 2%
Preferred way to receive health info	Campaigns, Education programs, Social media, Healthcare providers, Community meetings, Pamphlets, Text messages, Other	35%, 25%, 15%, 10%, 5%, 3%, 5%, 2%

Discussion

This study assessed the level of awareness, knowledge, and practices related to typhoid fever among the local population of Pakistan. The findings indicate that while a significant proportion of participants have heard of typhoid, gaps in knowledge about its transmission, prevention, and treatment remain prevalent. These results highlight the need for targeted public health interventions to enhance awareness and reduce the incidence of typhoid fever in Pakistan [7]. The results showed that 85% of participants had heard of typhoid fever, primarily through healthcare providers, family and friends, television or radio, and schools. However, despite this general awareness, 30% of respondents lacked knowledge about the actual cause of typhoid fever, with some incorrectly attributing it to viruses, fungi, or parasites. This knowledge gap suggests that although typhoid is a well-known disease, misinformation about its bacterial origin may hinder effective prevention and treatment measures [8].

A substantial 90% of participants recognized contaminated food and water as major transmission routes. However, 5% incorrectly believed that typhoid could spread through insect bites, and 3% were uncertain about its mode of transmission. Furthermore, 40% believed that direct person-to-person contact could transmit typhoid, whereas 50% correctly understood that it is not a direct-contact disease [9]. These misconceptions highlight the need for improved educational programs to ensure that communities understand how typhoid spreads and how to take effective preventive measures. Encouragingly, 60% of participants reported following proper hand hygiene, 55% were aware of vaccination as a preventive measure, and 50% ensured drinking safe water [10]. However, only 30% of respondents had actually received the typhoid vaccine, despite its proven effectiveness in preventing infection. The low vaccination rate suggests a need for enhanced vaccine outreach programs, particularly in rural areas where access to healthcare facilities and immunization services may be limited. Additionally, 35% of participants were unaware that avoiding street food could help reduce typhoid transmission, further emphasizing the need for better public health messaging [11].

Half of the respondents reported seeking immediate medical attention upon experiencing symptoms of typhoid fever, whereas 30% delayed seeking treatment, and 20% relied on self-medication. The reliance on self-medication, particularly the use of antibiotics without a prescription, is concerning as it can contribute to antibiotic resistance, which has become a growing public health issue in Pakistan [12]. Moreover, 60% of participants correctly identified antibiotics as the primary treatment for typhoid, but 5% mistakenly believed that herbal remedies alone could effectively treat the disease. These findings suggest that awareness campaigns should focus on promoting timely medical consultation and discouraging self-medication practices. Around 30% of participants reported that they or someone they knew had been diagnosed with typhoid fever, reflecting the high burden of the disease in the population. Among those diagnosed, 60% received antibiotics, 20% required hospitalization, and 15% relied on home remedies. While the majority followed medical treatment, the fact that a notable proportion relied on non-medical interventions raises concerns about accessibility to proper healthcare services [13-15].

Healthcare providers were identified as the most trusted source of health information, followed by family and friends and the internet. However, 10% of participants still relied on television and radio as their primary source of health-related knowledge. Regarding preferred methods of receiving health information, 35% of participants favored public health campaigns, 25% preferred educational programs, and 15% relied on social media updates. These findings suggest that a multi-channel approach, combining healthcare consultations, educational programs, and digital media campaigns, may be the most effective strategy for improving typhoid awareness. The findings of this study highlight several critical areas for public health intervention [16]. Increasing vaccination coverage should be a priority, with awareness campaigns emphasizing the importance of typhoid vaccination, particularly targeting rural areas and communities with low immunization rates. Improving hygiene and sanitation education is necessary to address gaps in knowledge regarding proper food and water hygiene practices to prevent typhoid transmission. Public health messages should focus on correcting misconceptions about transmission and ensuring that people understand the role of antibiotics in treatment while discouraging self-medication. Expanding access to reliable health information through multiple communication channels, including healthcare providers, schools, media, and social networks, will help ensure that accurate information reaches diverse population groups.

Conclusion

It is concluded that while awareness of typhoid fever among the local population of Pakistan is relatively high, significant gaps remain in understanding its transmission, prevention, and treatment. The study found that a majority of participants were aware of typhoid fever, but misconceptions regarding its causes and modes of transmission were prevalent. Many individuals incorrectly believed that typhoid could spread through direct contact or insect bites, highlighting the need for improved health education.

References

1. Njoya HF, Awolu MM, Christopher TB, Duclerc JF, Ateudjieu J, Wirsiy FS, Atuhaire C, Cumber SN. Prevalence and awareness of mode of transmission of typhoid fever in patients diagnosed with *Salmonella typhi* and *paratyphi* infections at the Saint Elisabeth General Hospital Shisong, Bui Division, Cameroon. Pan Afr Med J. 2021 Oct 7;40:83. doi: 10.11604/pamj.2021.40.83.16893. PMID: 34909072; PMCID: PMC8607955.
2. Muche, G., Tesfaw, A., & Bayou, F. D. (2024). Prevalence of typhoid fever and its associated factors among febrile patients visiting Arerti Primary Hospital, Amhara Region, north east Ethiopia. *Frontiers in Public Health*, *12*, 1357131. https://doi.org/10.3389/fpubh.2024.1357131
3. Abd Elzaher, O., Qayed, M., Mohamed, S., & Mohamed, A., (2014): Farmer's knowledge, attitude and practice about pesticides in a village of abnub district. Assiut Governorate. Thesis Master Degree in Community Health Nursing at Faculty of Nursing. Assiut University.
4. Afolaranmi T., Hassan Z., Bello D., (2015): Knowledge and practice of food safety and hygiene among food vendors in primary schools in Jos, Plateau State, North Central Nigeria. J Med Res.; 4(2): 16-22
5. Akabanda, F., Hlortsi, E., & Owusu Kwarteng, J., (2017): Food safety knowledge, attitudes and practices of institutional food handlers in Ghana. BMC Public Health, 17(1), 40
6. Al Reesi, M., Stephens, G., & McMullan, B., (2016): Severe thrombocytopenia in a child with typhoid fever: a case report. Journal of medical case reports, 10(1), 333 5.
7. Ali, M., Yahaya, A., Nas, F., Anas, A., & Ibrahim, I., (2017): Trends in Treatment and Vaccine Development of Typhoid Fever: A Review. Asian Journal of Biotechnology and Bioresource Technology, 2 (4), P.P.1-7. 6. Bull F., Rathore M., Maraqa N., (2015): Salmonella infections in childhood. Adv Pediatr ; 62:29–58.
8. Callan, M., Kim, H., Gheorghiu, A., & Matthews, W., (2017): The interrelations between social class, personal relative deprivation, and prosociality. Social Psychological and Personality Science, 8(6), 660-669.
9. Casmir I., Bassey E., Nkiruka F., & Nazek A., (2014): Molecular characterization and antibiotic resistance of Salmonella in children with acute gastroenteritis in Abuja, Nigeria. Journal of Infectious Diseases in Developing Countries; 8(6):712-719
10. Center For Disease Control and Prevention (CDC) (2018): Typhoid fever information for health professionals archived from the original ;05-25 10. Crump J., & Kirk M., (2019): Progress in typhoid fever epidemiology. Clin infect Diseases, 68(supplez) 9:45
11. Ishtiaq, A., Khalil, S., Khalil, S., Ahmed, F., Ahmad, B., Ghaffar, A., Khalid, M., Azam, S. M., & Imran, M. (2023). Prevalence of Typhoid Fever among Different Socio Demographic Groups in District Bahawalnagar, Pakistan: Prevalence of Typhoid Fever. Pakistan Journal of Health Sciences, 4(11), 138–143. https://doi.org/10.54393/pjhs.v4i11.106

12. Malik A and Malik R. Typhoid fever in Malaysian children. The Medical Journal of Malaysia. 2001 Dec; 56(4): 478-490.
13. Shah SM, Yousafzai M, Lakhani NB, Chotani RA, Nowshad G. Prevalence and correlates of diarrhea. The Indian Journal of Pediatrics. 2003 Mar; 70(3): 207-211. doi: 10.1007/BF02725583.
14. Ayub U, Khattak AA, Saleem A, Javed F, Siddiqui N, Hussain N, et al., Incidence of typhoid fever in Islamabad, Pakistan. American-Eurasian Journal of Toxicological Sciences. 2015; 7(4): 220-223.
15. Bajracharya D, Khan MI, Pach AP III, Shrestha P, Joshi N, Upreti SR, et al., 25 years after Vi typhoid vaccine e cacy study, typhoid affects signi cant number of population in Nepal. PLOS ONE. 2014 Jan; 9(1): 77974. doi: 10.1371/journal.pone.0077974.
16. Gunn JS, Marshall JM, Baker S, Dongol S, Charles RC, Ryan ET. Salmonella chronic carriage: epidemiology, diagnosis, and gallbladder persistence. Trends in Microbiology. 2014 Nov; 22(11): 648-655. doi: 10.1016/j.tim.2014.06.007

Annexures

All questions in this questionnaire are strictly confidential

Name: _____	**Age:** _____(Years)	**Sex:** ☐ M ☐ F

Marital Status: ☐ Single ☐ Married ☐ Divorced	
ADDRESS: _____	
EDUCTAION LEVEL:	CELL#

1. **Education Level:**
   - ☐ No formal education
   - ☐ Primary
   - ☐ Secondary
   - ☐ Higher secondary
   - ☐ Undergraduate
   - ☐ Postgraduate
2. **Occupation:**
   - ☐ Student
   - ☐ Employed
   - ☐ Self-employed
   - ☐ Unemployed
   - ☐ Retired
   - ☐ Other: _____
3. **Location:**
   - ☐ Urban
   - ☐ Rural

Section B: Awareness of Typhoid

6. **Have you heard of typhoid fever?**
   - ☐ Yes
   - ☐ No
7. **If yes, where did you first hear about typhoid? (Select all that apply)**
   - ☐ Television/Radio
   - ☐ Newspapers/Magazines
   - ☐ School/College
   - ☐ Healthcare providers
   - ☐ Family/Friends
   - ☐ Social Media
   - ☐ Other: _____

8. **Do you know what causes typhoid fever?**
    - ☐ Yes
    - ☐ No
9. **If yes, what causes typhoid fever?**
    - ☐ Bacteria
    - ☐ Virus
    - ☐ Fungi
    - ☐ Parasites
    - ☐ Don’t know

Section C: Transmission Knowledge

10. **How is typhoid fever transmitted? (Select all that apply)**
    - ☐ Contaminated food
    - ☐ Contaminated water
    - ☐ Person-to-person contact
    - ☐ Insect bites
    - ☐ Don’t know
11. **Can typhoid be transmitted through direct contact with an infected person?**
    - ☐ Yes
    - ☐ No
    - ☐ Don’t know
12. **Which of the following are common symptoms of typhoid fever? (Select all that apply)**
    - ☐ High fever
    - ☐ Headache
    - ☐ Stomach pain
    - ☐ Diarrhea or constipation
    - ☐ Rash
    - ☐ Nausea
    - ☐ Don’t know

Section D: Prevention and Treatment Awareness

13. **Can typhoid fever be prevented by vaccination?**
    - ☐ Yes
    - ☐ No

- ☐ Don't know

14. **What are the effective ways to prevent typhoid fever? (Select all that apply)**
    - ☐ Drinking safe, boiled, or bottled water
    - ☐ Eating food that is thoroughly cooked
    - ☐ Washing hands regularly with soap
    - ☐ Getting vaccinated
    - ☐ Avoiding street food
    - ☐ Using sanitary toilets
    - ☐ Don't know
15. **Is there a treatment available for typhoid fever?**
    - ☐ Yes
    - ☐ No
    - ☐ Don't know
16. **If yes, what is the treatment for typhoid fever?**
    - ☐ Antibiotics
    - ☐ Pain relievers
    - ☐ Herbal remedies
    - ☐ Bed rest
    - ☐ Don't know

Section E: Personal Experience and Practices

17. **Have you or someone you know ever been diagnosed with typhoid fever?**
    - ☐ Yes
    - ☐ No
18. **If yes, how was the person treated? (Select all that apply)**
    - ☐ Hospitalization
    - ☐ Antibiotics
    - ☐ Home remedies
    - ☐ Don't know
19. **How often do you use the following practices to prevent typhoid fever? (Rate on a scale of 1 to 5, where 1 = Never and 5 = Always)**
    - Drinking boiled/bottled water: 1 2 3 4 5
    - Eating thoroughly cooked food: 1 2 3 4 5
    - Washing hands with soap: 1 2 3 4 5
    - Avoiding street food: 1 2 3 4 5

20. **Would you be willing to get vaccinated against typhoid fever if a vaccine is available?**
    - ☐ Yes
    - ☐ No
    - ☐ Not sure

Section F: Sources of Information

21. **What are your most trusted sources of health information? (Select all that apply)**
    - ☐ Healthcare providers
    - ☐ Family/Friends
    - ☐ Television/Radio
    - ☐ Newspapers/Magazines
    - ☐ Internet/Social Media
    - ☐ Schools/Colleges
    - ☐ Community leaders
    - ☐ Other: _____
22. **How would you prefer to receive information about typhoid and other health issues? (Select all that apply)**
    - ☐ Public health campaigns
    - ☐ Educational programs
    - ☐ Social media updates
    - ☐ Healthcare provider consultations
    - ☐ Community meetings
    - ☐ Pamphlets/Brochures
    - ☐ Text messages
    - ☐ Other: _____