

Factors Related To The Occurrence Of Typhoid Fever At Sawah Lebar Health Center In Bengkulu City

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ABSTRACT

Typhoid fever is a major health problem in both developed and developing countries. Indonesia, with its tropical climate, makes tropical diseases easily spread. The prevalence of typhoid fever is increasing, with 8.5 million people infected and 10.2 million people infected. In Indonesia, the prevalence of typhoid fever also increases annually. Data from 2022 recorded 736,000 typhoid fever patients in Indonesia. Data from 2023 recorded approximately 645,000 typhoid fever patients in Indonesia. Estimated data for 2024 indicate a trend of cases remaining high, at approximately 690,000 cases. This research is a quantitative study with a cross-sectional design. The sample used was accidental sampling over a one-week period. Data were analyzed using the Chi-square test. The results of the study showed that almost most of the respondents had a risky age, namely 52 people (53%), most of the respondents had good knowledge, namely 35 people (36.1%), and most of the respondents had a history of typhoid fever, namely 45 people (46.4%) and almost all of the respondents had the habit of eating outside the home, namely 58 people (59.8%). There was a significant correlation in the age variable ($p\text{-value} = 0.002 < \alpha 0.05$), there was a significant correlation in the Knowledge variable ($p\text{-value} = 0.005 < \alpha 0.05$), there was a significant correlation in the typhoid fever history variable ($p\text{-value} = 0.005 < \alpha 0.05$). There was no correlation between the variable of eating out habits ($p\text{-value} = 1.000 < \alpha 0.05$). The health center is expected to coordinate more frequently with health authorities to monitor and improve surveys and provide education. The community is also expected to be actively involved in participating in typhoid fever prevention activities at Sawah Lebar Health Center.

INTRODUCTION

Typhoid fever is one of the major health problems in developed and developing countries. Indonesia is a tropical country, so tropical diseases can easily spread. (Silvah et al., 2024). Typhoid fever was first recognised as an infectious disease caused by bacillus (salmonella) in 1880 in the United States. The first typhoid fever outbreak in the United States occurred in 1907, caused by Mary Mallin, who was known as a healthy typhoid carrier and nicknamed 'Typhoid Mary'. This disease has a long history in epidemiology, is highly contagious, and can affect many people, potentially leading to

According to data from the World Health Organisation (WHO), the prevalence of typhoid fever has been increasing since 2020, with 8.5 million people infected, and data from 2021 showing that there were 10.2 million people infected. Meanwhile, data from 2022 recorded 10.7 million people infected with typhoid fever. The increase in cases is dominated by low-income countries, most commonly found in Southeast Asia and southern Africa, and most commonly found in tropical countries with poor sanitation, difficult access to clean water, and densely populated settlements such as Bangladesh, China, India, Indonesia, Laos, Nepal, and Pakistan (WHO, 2024). In Indonesia, the prevalence of typhoid fever has also increased every year. Data from 2022 recorded 736,000 typhoid fever patients in Indonesia. Data from 2023 recorded approximately 645,000 typhoid fever patients in Indonesia. This number is based on national projections from regional data. Estimated data for 2024 shows a continuing high number of cases, with an estimated 690,000 cases of typhoid fever nationwide. This figure is supported by recurring seasonal trends and an increase in the number of high-high clusters recorded in densely populated areas. Indonesia is one of the countries contributing to this figure (Indonesian Ministry of Health, 2024).

Based on the 2022 report, official data on the number of typhoid fever cases in Bengkulu Province has not been publicly released by the Provincial Health Office. However, estimates based on previous data indicate that the number of cases could reach more than 2,000 in one year. As in previous years, the official cumulative data for 2023 has not yet been released publicly. Nevertheless, reports from community health centres and hospitals through the SKDR indicate that typhoid cases remain high. It is estimated that the number of cases will be in the range of 2,200–2,500 during 2023 based on epidemiological trends and projections. Based on a report from the Bengkulu Provincial Health Office for 2024, the total number of typhoid fever cases throughout 2024 was 2,579 (Bengkulu Provincial Health Office, 2024).

Based on the report, the number of typhoid fever cases reported by the Bengkulu City Health Office in 2022 reached 456 cases. Of this total, there were 215 cases in males and 241 cases in

females. In 2023, there were 460 cases, consisting of 209 cases in males and 251 cases in females. Although the data for 2024 as a whole has not been officially published by the Bengkulu City Health Office, information from the Bengkulu City Health Office shows that as of April 2024, there were 729 cases of typhoid fever spread throughout the province. Considering the trends and proportions from previous years, it is estimated that the number of typhoid fever cases in Bengkulu City in 2024 will range from 460 to 525 cases (Bengkulu City Health Office, 2024). The incidence of typhoid fever is influenced by various interrelated factors. In general, these factors can be classified into several main groups, namely socio-economic factors and health service factors (Basuki, 2021). Environmental factors such as poor sanitation, population density, and contaminated water sources are also major contributors to the transmission of typhoid fever. Behavioural factors include hand washing habits, consumption of food from outside the home, and drinking unboiled water. Poor clean and healthy living behaviours (PHBS) significantly increase the risk of contracting typhoid bacteria (Oktaviani, 2020).

In addition, factors that can cause typhoid fever include individual factors, one of which is age. Age is a very important indicator in determining an individual's susceptibility to infectious diseases, including typhoid fever. Anatomically and physiologically, age is closely related to the condition of the body's immune system. At a young age, the immune system is not yet fully developed, so it cannot provide optimal protection against pathogenic bacteria such as *Salmonella typhi*. Conversely, in old age, degenerative processes occur that result in a decline in the function of vital organs and the body's defence system, making individuals more susceptible to infection (Kusmiati & Meti, 2022).

Research conducted by Mustamin et al. (2022) found a relationship between age and the incidence of typhoid fever (p-value 0.000). Research conducted by Rahayu & Prasetyo (2020) found a relationship between age and the incidence of typhoid fever (p-value 0.017). Research conducted by Masyrofah et al. (2023) found a relationship between age and the incidence of typhoid fever (p-value 0.001). Research conducted by Yugo & Sri Bangun (2020) found a relationship between age and the incidence of typhoid fever (p-value 0.025). Research conducted by Bunga Sevia Mitha et al. (2023) also stated that there is a relationship between age and typhoid fever (p-value 0.004).

Another factor that causes typhoid fever is knowledge, which plays a very important role in shaping individual behaviour and attitudes, as reflected in individuals' experiences and interactions with their environment (Bakhtiar et al., 2020). One of the most important factors in the high incidence of typhoid fever is the level of public knowledge about this disease. Knowledge is the foundation for shaping individual attitudes and behaviour, especially in the context of disease prevention. People who have a good understanding of the causes, transmission, symptoms, and preventive measures for typhoid fever tend to live a healthier lifestyle than those who lack this understanding (Tariq et al., 2020).

Research conducted by Ghassani & Putra (2021) shows a relationship between knowledge and the incidence of typhoid fever (p-value 0.026). Research conducted by Manalu & Rantung (2021) shows a relationship between knowledge and the incidence of typhoid fever (p-value 0.038). Research conducted by Dewi Lestari (2021) shows that there is a relationship between knowledge and the incidence of typhoid fever (p-value 0.003). Research conducted by Fachrizal et al. (2022) shows that there is a relationship between knowledge and the incidence of typhoid fever (p-value 0.003). Research conducted by Yulianti et al. (2024) shows that there is a relationship between knowledge and the incidence of typhoid fever (p-value 0.001). Another factor that causes typhoid is a history of typhoid fever. A history of typhoid fever is closely related to an individual's immune status. Suboptimal immunity can lead to a decrease in the body's defence mechanisms in children, thereby increasing their susceptibility to infection and disease development, including typhoid fever. The health of the digestive system, especially the intestines, plays an important role in the formation of the body's immunity, with an estimated 80% of the immune system being formed in this organ (Sjahrian, 2019).

Research conducted by Manalu & Rantung (2021) shows a relationship between a history of fever and the incidence of typhoid fever (p-value 0.00). Research conducted by Yugo & Sri Bangun (2020) shows a relationship between a history of fever and the incidence of typhoid fever (p-value 0.028). Research conducted by Mustofa et al. (2020) shows a relationship between a history of fever and the incidence of typhoid fever (p-value 0.028). Research conducted by Siregar (2023) shows a relationship between a history of fever and the incidence of typhoid fever (p-value 0.007). Research conducted by Dewi (2020) shows a relationship between a history of fever and the incidence of typhoid fever (p-value 0.000). The habit of buying food outside the home is one of the risk factors for typhoid fever. Typhoid fever can be transmitted when someone consumes food in a public place. When eating outside or in public places, there are usually many flies flying around and even landing on food. Therefore, if the food is consumed by healthy people, it can increase the risk of contracting typhoid fever. Poor food sanitation can trigger health problems (Verliani et al., 2022). Research conducted by Annisa et al., (2022) found a relationship between the habit of eating outside the home and the incidence of typhoid fever (p-value 0.000). Research conducted by Rahmat Bakhtiar et al. (2020) found a

correlation between eating out and the incidence of typhoid fever (p-value 0.000). Research conducted by Verliani et al. (2022) found a relationship between the habit of eating outside the home and the incidence of typhoid fever (p-value 0.006). Research conducted by Robin Butarbutar (2024) found a relationship between the habit of eating outside the home and the incidence of typhoid fever (p-value 0.017). Research conducted by Eka Novia et al. (2021) found a relationship between the habit of eating outside the home and the incidence of typhoid fever (p-value 0.001). Based on data from the Bengkulu City Health Office for 2022-2024, it was found that the four health centres that handled the most cases of typhoid fever were the Sawah Lebar Health Centre with 45 cases, the Betungan Health Centre with 42 cases, the Lingkar Barat Health Centre with 39 cases, and the Sukamerindu Health Centre with 36 cases.

Sawah Lebar Community Health Centre is located in an area dominated by residential areas with high population density, significant trading activities, and high community mobility. These conditions are closely related to the variable studied, namely age, where the majority of the population is of productive age and often engages in activities outside the home. On the other hand, although this area is located in an urban area, many people still have limited knowledge, especially regarding disease prevention. In addition, several individuals are known to have a history of recurrent typhoid fever, indicating the possibility of incomplete treatment or an environment that does not support prevention efforts. Typhoid fever is one of the diseases that remains a major focus in various regions, including the Sawah Lebar Community Health Centre. The researchers conducted an initial secondary data survey based on data from 2022-2024, with a total of 45 cases (including outpatients and inpatients). In 2024, there were 18 cases (showing a 6% increase compared to the same period in 2023). Case criteria based on age indicate that the most vulnerable group is 15–44 years old, with a total of 35 cases.

A preliminary survey was conducted on 10 respondents who were outpatients at the Sawah Lebar Community Health Centre. Of the 10 respondents surveyed, 6 currently have typhoid fever, while the other 4 do not. Of the 6 respondents who have typhoid, 5 of them have a history of having typhoid before. Most respondents who currently have typhoid have a low or moderate level of knowledge, while respondents with good knowledge tend not to have typhoid. In terms of age, most respondents were in the early to middle adult age category (20–44 years old). The survey results show a pattern that typhoid fever is more prevalent in individuals who have low knowledge about typhoid fever and a history of having had typhoid fever before. This preliminary survey will serve as the basis for further research to determine the significant relationship between these variables.

RESEARCH METHODS

This research method is quantitative research using a cross-sectional design, which is research that measures independent and dependent variables simultaneously and at the same time and in a single measurement. This is in line with the research objective, which is to determine the factors associated with the incidence of typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City.

RESULTS

Univariate Analysis

Table 1 Frequency Distribution of Respondents' Ages at the Sawah Lebar Community Health Centre in Bengkulu City.

No	Age	Frequency	Percentage (%)
1	At risk	52	53,6
2	Not at risk	45	46,4
Total		97	100

Table 1 above shows that of the 97 respondents, the majority (52 people, or 53.6%) were of an age group considered to be at risk at the Sawah Lebar Community Health Centre in Bengkulu City. Table 2 Frequency Distribution of Respondents' Knowledge at the Sawah Lebar Community Health Centre, Bengkulu City.

Table 2 Frequency Distribution of Respondents' Knowledge at Sawah Lebar Public Health Center, Bengkulu City.

No	Knowledge	Frequency	Percentage (%)
1	Poor	7	7,2
2	Fair	55	56,7
3		35	36,1
	Good	97	100

Table 2 above shows that out of 97 respondents, a small number (7 or 7.2%) had insufficient knowledge at the Sawah Lebar Community Health Centre, Bengkulu City.

Table 3 Frequency Distribution of Respondents' History of Typhoid Fever at the Sawah Lebar Community Health Centre in Bengkulu City.

No	History of Typhoid Fever	Frequency	Percentage (%)
1	Yes	45	46,4
2	No	52	53,6
	Total	97	100

Table 3 above shows that out of 97 respondents, the majority of respondents had a history of typhoid fever, namely 45 people (46.4%) at the Sawah Lebar Community Health Centre in Bengkulu City.

Table 4 Frequency Distribution of Eating Habits Outside the Home Among Respondents at the Sawah Lebar Community Health Centre in Bengkulu City.

No	Eating Out Habits	Frequency	Percentage (%)
1	Good	39	40,2
2	Not so good	58	59,8
	Total	97	100

Table 4 above shows that out of 97 respondents, almost all respondents had good eating habits outside the home, with 39 people (40.2%) at the Sawah Lebar Community Health Centre in Bengkulu City.

Table 5 Distribution of Typhoid Fever Incidence Among Respondents at the Sawah Lebar Community Health Centre in Bengkulu City.

No	Typhoid cases	Frequency	Percentage (%)
1	Yes, Typhoid	22	22,7
2	No Typhoid	75	77,3
	Total	97	100

Table 5 above shows that out of 97 respondents, a small proportion of respondents experienced typhoid fever, with 22 people (22.7%) at the Sawah Lebar Community Health Centre in Bengkulu City.

Bivariate Analysis

Table 6 Relationship between Age and Typhoid Fever Incidence at the Sawah Lebar Community Health Centre in Bengkulu City.

Health Centre in Bengkulu City.								
Age	Dengue fever outbreak				Total		χ^2	p
	Typhoid		No Typhoid					
	n	%	n	%	n	%		
At risk	5	9,6	47	90,3	52	100	9.364	0,002
Not at risk	17	37,8	28	62,2	45	100		
Total	22	22.7	75	77.3	97	100		

Based on Table 6, it is known that out of 52 respondents of risk age, 5 respondents (9.6%) experienced typhoid fever and 47 respondents (90.3%) did not experience typhoid fever. Of the 45 respondents who were not at risk, 17 respondents (37.8%) experienced typhoid fever and 28 respondents (62.2%) did not experience typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City. The results of this Chi-Square test (Continuity Correction) analysis showed that the p-value was 0.002, which is less than $p < 0.05$, indicating that there is a significant relationship between age and the incidence of typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City.

Table 7 Relationship between knowledge and the incidence of typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City

Community Health Centre in Dengkara City								
Knowledge	Typhoid cases				Total		χ^2	p
	Typhoid		No Typhoid					
	n	%	n	%	n	%		
Poor	2	28,6	5	71,4	7	100	10,471	0,005
Fair	6	10,9	49	89,1	55	100		
Good	14	66,7	21	100	21	100		
Total	22	22.7	75	77.3	97	100		

Based on Table 7, it can be seen that of the 7 respondents with insufficient knowledge, 2 respondents (28.6%) had typhoid fever and 5 respondents (71.4%) did not have typhoid fever. Of the 55 respondents with adequate knowledge, 6 respondents (10.9%) had typhoid fever and 49 respondents (89.1%) did not have typhoid fever. Of the 21 respondents with good knowledge, 14 respondents (66.7%) had typhoid fever and 21 respondents (100%) did not have typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City. The results of the Chi-Square test (Pearson Chi-Square) analysis showed that the p-value was 0.005, which is less than $p < 0.05$, indicating a significant relationship between knowledge and the incidence of typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City.

Table 8 Relationship between history of typhoid fever and incidence of typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City

History of Typhoid Fever	Typhoid cases				Total		χ^2	p
	Typhoid		No Typhoid					
	n	%	n	%	n	%		
Yes	19	42,2	26	57,8	45	100	16,260	0,000
No	3	5,7	49	94,2	52	100		
Total	22	22.7	75	77.3	97	100		

Based on Table.8, it is known that of the 45 respondents who had a history of typhoid fever, 19 respondents (42.2%) experienced typhoid fever and 26 respondents (57.8%) did not experience typhoid fever. Of the 52 respondents who did not have a history of typhoid fever, 3 respondents (5.7%) experienced typhoid fever and 49 respondents (94.2%) did not experience typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City.

The results of the Chi-Square test (Continuity Correction) analysis based on Table 5.8 show that the p-value = 0.000, which is less than $\alpha = 0.05$, indicating a significant relationship between a history of typhoid fever and the occurrence of typhoid fever at the Sawah Lebar Health Centre in Bengkulu City.

Table 9 Relationship between the habit of eating outside the home and the incidence of typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City

Eating Habits	Out	Typhoid cases				Total		χ^2	p
		Typhoid		No Typhoid					
		n	%	n	%	n	%		
Not so Good		13	22,4	45	77,6	58	100	0,000	1.000
Good		9	23,1	30	76,9	39	100		
Total		22	22,7	75	77,3	97	100		

Based on Table 9, it is known that of the 58 respondents with poor eating habits outside the home, 13 respondents (22.4%) experienced typhoid fever and 45 respondents (77.6%) did not experience typhoid fever. Of the 39 respondents with good eating habits outside the home, 9 respondents (23.1%) experienced typhoid fever and 30 respondents (76.9%) did not experience typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City. The results of the Chi-Square test (Continuity Correction) analysis based on Table 5.9 show that the p -value = 1.000, which is greater than $\alpha = 0.05$, indicating no significant relationship between the habit of eating outside the home and the incidence of typhoid fever at the Sawah Lebar Health Centre in Bengkulu City.

DISCUSSION

Age Frequency Distribution of Respondents at the Sawah Lebar Community Health Centre in Bengkulu City

The results of this study indicate that of the 97 respondents, 52 people (53.6%) were in the high-risk age group (<20 years) due to their frequent consumption of junk food, lack of discipline in maintaining hygiene, and poor immune systems, making them susceptible to diseases, especially typhoid fever, as well as an unbalanced nutritional intake. Meanwhile, those aged >40 years are at risk due to their naturally weakened immune systems and frequent congenital or hereditary diseases such as hypertension, diabetes, and others that worsen their immune systems and decrease organ function, making them susceptible to typhoid fever.

Of the 97 respondents, 45 people (46.4%) were not at risk, aged 20-40 years, as they maintained a healthy diet and were selective in choosing food and drinks that were guaranteed to be clean. They also had better health awareness, for example, they were accustomed to washing their hands before eating, choosing clean drinking water, and frequently checking their health when they had physical complaints.

According to Notoatmodjo (2021), as we age, physiological changes occur that can affect an individual's immune system. In early to middle adulthood, the immune system tends to be stable, but environmental exposure, eating habits, and lifestyle can increase the risk of disease. Younger age groups, especially children and adolescents, are more susceptible to typhoid fever because at that age, outdoor activities tend to be high, including consumption of food and beverages outside the home where hygiene is not guaranteed. In addition, awareness of clean and healthy living behaviours is sometimes not optimal, so the risk of exposure to *Salmonella typhi* bacteria is high.

The results of this study are in line with the research by Waryantoro & Candra (2024), which shows that this study also found that typhoid fever occurs more frequently in the 18–44 age group, with 25 respondents (89.2%), compared to respondents aged >45 years. Meanwhile, typhoid fever was more prevalent among those aged > 45 years, with 27 respondents (65.8%) compared to those aged 18–44 years. Based on the analysis results, a P value of $0.000 < \alpha = 0.05$ was obtained, thus it can be concluded that there is a relationship between age and an increase in typhoid fever.

Frequency Distribution of Respondents' Knowledge at the Sawah Lebar Community Health Centre in Bengkulu City

The results showed that out of 97 respondents, 7 respondents (7.2%) had insufficient knowledge, and 55 respondents (56.7%) had adequate knowledge. Based on the findings at the health centre, respondents with insufficient and adequate knowledge did not understand what typhoid fever is, what its symptoms are, and the signs of typhoid fever itself. Thirty-five respondents (36.1%) were well-informed. Based on the findings in the field, many well-informed respondents already knew the symptoms of diabetes mellitus, the signs of typhoid fever, and how to prevent it. Knowledge is the result of curiosity and occurs after humans perceive certain objects. This perception occurs through the five senses, namely sight, hearing, smell, taste, and touch. Most of the information people receive comes through their eyes and ears (Notoatmodjo, 2021). The results of this study are in line with the research conducted by Dwi et al. (2024), which concluded that 18 respondents (60.0%) out of 30 respondents had sufficient knowledge about the causes of typhoid fever. In addition, 23 respondents (76.7%) demonstrated sufficient understanding of the signs and symptoms of this disease. In terms of prevention, 17 respondents (56.7%) had sufficient knowledge, while 23 respondents (76.7%) demonstrated a good understanding of typhoid fever treatment.

Frequency Distribution of Typhoid Fever History Among Respondents at Sawah Lebar Public Health Center, Bengkulu City

The results of this study indicate that of the 97 respondents, almost half had a history of typhoid fever, with 45 people (46.4%) admitting to having experienced typhoid fever before. From the field results, almost all respondents stated that they experienced similar symptoms of typhoid fever more than once, but often did not complete the treatment course. This is consistent with the conditions in the field, where almost all people choose to stop taking medication when the symptoms start to improve, thereby increasing the risk of recurrence of typhoid fever at the Sawah Lebar Community Health Centre in Bengkulu City. The majority of respondents did not have a history of typhoid fever, totalling 52 people or (53.6%). From the field results, respondents admitted that they rarely experienced serious health complaints. If there were mild symptoms such as fever or digestive disorders, they generally improved quickly without special treatment. The family history factor for typhoid fever was obtained mostly from the respondents' family members. This occurs due to genetic inheritance. The presence of a family history factor in certain families will also cause the family to be at risk of suffering from typhoid fever (Sjahrian, 2019). Based on the results of field research conducted by Inda Chely Sagita et al. (2023), it was found that 77 respondents (77.0%), which was more than the respondents who did not have a history of contact with typhoid fever patients, namely 23 respondents (23.0%).

Frequency Distribution of Eating-Out Habits Among Respondents at Sawah Lebar Public Health Center, Bengkulu City

The results of this study show that out of 97 respondents, most respondents had poor eating-out habits, totaling 58 people (59.8%), in which the majority reported that they more frequently purchased food from food stalls, canteens, or street vendors rather than cooking at home. Out of 39 respondents (40.2%) who had good eating-out habits, several respondents stated that they preferred choosing food stalls or restaurants considered cleaner and more trustworthy.

Eating habits include the motivation, choices, and methods individuals use to obtain food. The practice of consuming food outside the home, such as buying from food stalls, occurs at least three times per week. Eating outside indicates the consumption of food or drinks not prepared at home, which results in a lack of awareness about the processes used by food handlers in preparing raw ingredients into ready-to-eat meals (Pramitasari, 2023). This study's findings are consistent with research by Yulianti et al. (2024), which also showed that among 36 respondents, 19 had poor eating habits and 17 had good eating habits.

Frequency Distribution of Typhoid Fever Incidence Among Respondents at Sawah Lebar Public Health Center, Bengkulu City

The study conducted at Sawah Lebar Public Health Center, Bengkulu City, found that out of 97 respondents, a small proportion—22 respondents (22.7%)—experienced typhoid fever. During the study, this condition indicated the continued risk of disease transmission within the community, which may be influenced by factors such as high-risk age groups, previous health history, unhealthy eating patterns, and frequent consumption of low-hygiene food from outside the home. This suggests that this group requires greater attention in preventive efforts and in promoting clean and healthy living behavior.

Meanwhile, 75 respondents (77.3%) did not experience typhoid fever. This shows that the majority of the community already practices good preventive behaviors, such as maintaining food cleanliness, using clean water, and improving immunity through healthy lifestyles. However, these conditions still need to be maintained and improved to continue reducing the incidence of typhoid fever in the community.

Typhoid fever, also known as typhoid, is an acute febrile illness caused by *Salmonella typhi* infection. This disease affects the stomach and intestines and can be transmitted directly or indirectly. Direct transmission occurs from person to person, while indirect transmission occurs through contaminated food, drinks, or animals as intermediaries (Ministry of Health RI, 2023). This study does not align with research conducted by Hayun (2019), which reported that among 87 respondents experiencing typhoid fever, there were 38 respondents (43.7%), which was fewer than those who did not experience typhoid fever, totaling 49 respondents (56.3%).

The Relationship Between Age and the Incidence of Typhoid Fever at Sawah Lebar Public Health Center, Bengkulu City

Based on the research results, among 52 respondents in the at-risk age group, 47 respondents (90.3%) did not experience typhoid fever. This is because age is one of the risk factors, but it does not always directly influence the occurrence of the disease. Some respondents, although included in the at-risk age group, may still have strong immune systems that enable them to fight off *Salmonella typhi*.

infection. Therefore, it can be concluded that at-risk age does not always correlate with typhoid fever incidence, as other factors also play a significant role in disease prevention.

Meanwhile, among 45 respondents who were not in the at-risk age group, 17 respondents (37.8%) experienced typhoid fever. This may be influenced by other factors, such as lack of knowledge about typhoid prevention, as well as the possibility of previous typhoid episodes that were not properly treated, increasing vulnerability to reinfection. This indicates that even individuals in the non-risk age group are not entirely free from the possibility of illness, and still need to adopt clean and healthy living behaviors and remain aware of proper dietary habits and environmental hygiene.

To determine the relationship between age and the incidence of typhoid fever, the Chi-Square test (Continuity Correction) was used. With a p-value of $0.002 < 0.05$, there is a significant relationship between age and typhoid fever incidence at Sawah Lebar Public Health Center, Bengkulu City. This means that the more respondents fall into at-risk age groups (<20 and >40 years), the higher the likelihood of experiencing typhoid fever. Conversely, respondents in the non-risk age group (20–40 years) have a lower likelihood of experiencing typhoid fever.

Age is the duration of an individual's life from birth to death. The prevalence of typhoid fever is highest among individuals aged 3–19 years because during this period, they tend to engage in more activities and often pay less attention to their dietary habits. Among adults, there is also a higher risk of typhoid fever, caused by behaviors such as poor hand hygiene, frequent consumption of food or beverages from outside the home with uncertain cleanliness, and exposure to possibly unhygienic work environments (Wuryantoro et al., 2024).

These research findings are consistent with a study conducted by Galuh et al. (2019) titled "Factors Influencing the Incidence of Typhoid Fever Among Patients at Tugurejo Regional Hospital, Semarang," which found that age is associated with increased typhoid fever incidence, proven by a Chi-Square test with a p-value of $0.001 < 0.05$. The findings also align with research by Rahmawati, R.R. (2020), titled "Risk Factors Affecting Typhoid Fever Incidence in the Working Area of Binakal Public Health Center, Bondowoso Regency," which reported a p-value of 0.040.

Relationship Between Knowledge and the Incidence of Typhoid Fever at Sawah Lebar Public Health Center, Bengkulu City

Based on the results of the study, it can be seen that among 7 respondents with low knowledge, 5 respondents (71.4%) did not experience typhoid fever. This is because even with low knowledge, they still applied clean and healthy living behaviors, such as washing hands regularly, boiling drinking water, and consuming home-cooked meals. In addition, a supportive living environment, strong immunity due to productive age, and good nutritional status also contributed to preventing infection. Thus, low knowledge does not always correlate directly with disease incidence, as there are other factors that can protect individuals from the risk of infection.

Furthermore, among 55 respondents with moderate knowledge, 6 respondents (10.9%) experienced typhoid fever. This occurred because although they had adequate understanding of the disease, it was not comprehensive. Limited knowledge led to errors in prevention, such as knowing the importance of food hygiene but not understanding the correct methods. This limited understanding made them more vulnerable to engaging in risky behaviors unintentionally.

Meanwhile, among 21 respondents with good knowledge, 14 respondents (66.7%) experienced typhoid fever. This happened because in-depth knowledge does not always align with daily preventive practices. Even if someone has good understanding of typhoid transmission and prevention, they may still lack discipline in applying it.

The Chi-Square test analysis showed a p-value of 0.005, which is less than $\alpha = 0.05$, indicating a relationship with typhoid fever incidence at Sawah Lebar Public Health Center, Bengkulu City. This means the lower the respondent's level of knowledge, the higher the risk of experiencing typhoid fever. Conversely, the better the respondent's level of knowledge, the lower the risk of experiencing typhoid fever.

Knowledge is the result of understanding acquired by a person after perceiving a particular object. This perception occurs through the human senses: sight, hearing, smell, taste, and touch. Naturally, during the observation process leading to knowledge formation, this is strongly influenced by attention and perception toward the object. Most knowledge is obtained through the sense of hearing (ears) and the sense of sight (eyes) (Nuryanto, 2021).

The results of this study align with research conducted by Desli Sumarni (2021), which showed that the significance test of the relationship between knowledge and typhoid fever care produced a p-value of $0.046 < (0.05)$, meaning there is a significant relationship between knowledge and typhoid fever care. This result indicates that many respondents performed poor self-care for typhoid fever due to their lack of understanding of the illness.

The results of this study are also consistent with research by Bellji & Wulandari (2023), explaining that there is a significant relationship between knowledge level and preventive behavior of typhoid fever, with a p-value of $0.000 < 0.05$. The strength of the relationship between the two variables was 0.511, indicating a strong and positive relationship, meaning the higher the students' knowledge, the better their preventive behavior against typhoid fever.

Relationship Between History of Typhoid Fever and the Incidence of Typhoid Fever at Sawah Lebar Public Health Center, Bengkulu City

Based on the study results, among 45 respondents with a history of typhoid fever, 26 respondents (57.8%) did not experience typhoid fever. This is because they received complete treatment during their previous illness, allowing *Salmonella typhi* infection to be fully eradicated and preventing recurrence. Additionally, past illness experience encouraged respondents to be more cautious and maintain clean and healthy living behaviors. Often, their bodies had also developed partial immunity from the previous infection, which protected them from reinfection.

Among 52 respondents without a history of typhoid fever, 3 respondents (5.7%) experienced typhoid fever. This is because their bodies had not been previously exposed and therefore did not have specific immunity against *Salmonella typhi*. Moreover, respondents without a history of typhoid generally lacked high awareness of the disease, leading to suboptimal preventive actions. Combined with decreased immunity due to poor nutrition, fatigue, or comorbidities, the likelihood of infection becomes greater.

The analysis of the relationship between a history of typhoid fever and the incidence of typhoid fever using the Chi-Square test (Continuity Correction) showed a p-value of 0.000, which is less than $\alpha = 0.05$, indicating a significant relationship between typhoid history and typhoid incidence at Sawah Lebar Public Health Center. This means the higher the risk level, the greater the likelihood of experiencing typhoid fever. Conversely, the lower the risk level, the smaller the likelihood of experiencing typhoid fever.

A previous history of infection is a predisposing factor influencing the recurrence of diseases, including typhoid. This is related to the carrier state condition, where bacteria remain in the gallbladder or intestines even after clinical symptoms disappear. Therefore, a history of typhoid fever can be a significant risk factor for new cases (Ananingsih, 2019).

These findings are consistent with Dewi (2020), who showed a relationship between family history of typhoid fever and the incidence of typhoid fever, with a p-value of 0.000. The study indicated that respondents had family members who suffered from typhoid fever within the past 3 months to 1 year. The findings also align with research by Dewi Ratna Sari (2020), which showed a relationship between family history of typhoid fever and typhoid fever incidence, with an OR = 2.24. Although rare, typhoid transmission within families can occur because an individual may become a typhoid carrier without showing symptoms, allowing transmission.

Relationship Between the Habit of Eating Outside the Home and the Incidence of Typhoid Fever at Sawah Lebar Public Health Center, Bengkulu City

Based on the study results, among 58 respondents with poor habits of eating outside the home, 45 respondents (77.6%) did not experience typhoid fever. This may be due to other protective factors, such as choosing relatively hygienic food vendors, consuming freshly cooked or hot food, or maintaining good personal hygiene such as handwashing. Additionally, strong immunity, adequate nutritional status, and productive age can help prevent infection despite exposure. A clean home environment with good sanitation and clean water also reduces risk.

Among 39 respondents with good habits of eating outside the home, 9 respondents (23.1%) experienced typhoid fever. This may be caused by other factors, such as an unhealthy environment, contaminated drinking water, or contact with *Salmonella typhi* carriers. Furthermore, decreased immunity due to fatigue, lack of sleep, or underlying illnesses can increase susceptibility even if eating habits are considered good.

Based on the Chi-Square test analysis (Continuity Correction), the p-value obtained was 1.000, which is greater than $\alpha = 0.05$, indicating no relationship between eating habits and the incidence of typhoid fever at Sawah Lebar Public Health Center. This means the more frequent and poorer the habits of eating outside the home, the greater the chance of experiencing typhoid fever. Conversely, the less frequent or better the eating habits, the smaller the chance of experiencing typhoid fever.

Eating or snacking outside the home is a risk factor for typhoid infection. The risk increases with greater frequency of eating outside. Eating outside, especially among school-aged children, represents one of the risk factors for typhoid fever. Transmission can occur when someone consumes food served by individuals who have typhoid fever or are asymptomatic carriers (Bakhtiar et al., 2020).

These findings are not consistent with Harefa et al. (2022), whose bivariate analysis using the Fisher Exact test produced a p-value of 0.000 ($P < 0.05$), indicating a significant relationship between the habit of eating outside the home and typhoid fever. This shows that the better the eating habits outside the home, the lower the risk of typhoid fever.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Based on the results of the study on the factors associated with the incidence of typhoid fever at Sawah Lebar Public Health Center, Bengkulu City, the following conclusions can be drawn:

1. The majority of respondents (53.6%) were in the at-risk age group for the incidence of typhoid fever at Sawah Lebar Public Health Center, Bengkulu City.
2. Almost half of the respondents (36.1%) had good knowledge at Sawah Lebar Public Health Center, Bengkulu City.
3. The majority of respondents (46.4%) had a history of typhoid fever at Sawah Lebar Public Health Center, Bengkulu City.
4. Almost half of the respondents (40.2%) had good habits of eating outside the home at Sawah Lebar Public Health Center, Bengkulu City.
5. A small proportion of respondents (22.7%) experienced typhoid fever at Sawah Lebar Public Health Center, Bengkulu City.
6. There was a significant relationship between age and the incidence of typhoid fever at Sawah Lebar Public Health Center, Bengkulu City.
7. There was a significant relationship between knowledge and the incidence of typhoid fever at Sawah Lebar Public Health Center, Bengkulu City.
8. There was a significant relationship between history of typhoid fever and the incidence of typhoid fever at Sawah Lebar Public Health Center, Bengkulu City.
9. There was no significant relationship between the habit of eating outside the home and the incidence of typhoid fever at Sawah Lebar Public Health Center, Bengkulu City.

Recommendation

Based on the results of the study that has been conducted, the researcher provides the following suggestions to several relevant parties:

1. For the Health Office
It is expected that the Health Office can coordinate with health workers at the public health center to provide counseling or health education regarding the causes of typhoid fever and its prevention.
2. For Sawah Lebar Public Health Center, Bengkulu City
It is expected that the health center can optimize preventive and promotive programs related to factors associated with the incidence of typhoid fever, and it is also expected that typhoid fever patients maintain clean and healthy living behaviors.
3. For the Community
It is expected that the community can improve their knowledge about the prevention of typhoid fever and actively participate in health education activities conducted by the public health center or local health institutions to strengthen understanding and awareness of infectious diseases.
4. For Future Researchers
The results of this study can be used as a reference for further research by using variables that were not examined in this study, as well as improved research methods and larger sample sizes.

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