Microbiological Assessment of Street Foods: Detection of *Staphylococcus aureus* and *Salmonella spp* Using Selective Culture Methods

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Abstract: Food safety remains a major public health concern due to the risk of contamination by pathogenic microorganisms. Street food, which is widely consumed, has a high potential for microbiological contamination due to inadequate hygiene and sanitation practices. This study aimed to detect and estimate the presence of presumptive *Staphylococcus aureus* and presumptive *Salmonella spp*. in street food samples. A quantitative descriptive laboratory approach was employed using the spread plate method on selective media, namely Mannitol Salt Agar (MSA) and Sorbitol MacConkey Agar (SMAC). Ten types of street food samples were analyzed using serial dilutions (10^{-1}, 10^{-2}, and 10^{-3}) with duplicate treatments. The results showed that most samples exhibited high levels of microbial contamination, with Total Plate Count (TPC) values ranging from 0 to 2.16×10^6 CFU/g. Several samples exceeded the maximum microbial contamination limit of 10^4 CFU/g established by the Food and Drug Supervisory Agency (BPOM). The presence of colonies morphologically identified as presumptive *Staphylococcus aureus* and presumptive *Salmonella spp*. indicates potential contamination by pathogenic bacteria. These findings suggest that street food may pose a risk to public health if hygiene and sanitation practices are not properly maintained. Therefore, improved food handling practices and monitoring are necessary to ensure food safety.

Keywords: Food Safety, Street Food, *Staphylococcus aureus*, *Salmonella spp*., Total Plate Count, Microbial Contamination

INTRODUCTION

Food is a fundamental human necessity that plays an important role in maintaining health, supporting growth, and replacing damaged body cells (Kasingku, 2023). In addition to providing benefits, food can also become a source of health problems if contaminated by physical, chemical, or microbiological agents. Based on the Law of the Republic of Indonesia Number 7 of 1996, food is defined as anything originating from biological sources and water, whether processed or unprocessed, intended as food or beverage for human consumption, including food additives and materials used in processing (Al-Farida, 2021; Borghini and Piras, 2019; Kokkoris and Stavrova, 2021; Surayyo, 2021; Anderson and Barcinas, 2024; Chinea, Suarez and Hernandez, 2020; Heidjen, Molder, Jager and Mulder, 2021).

Food safety is a major concern due to the risk of contamination by pathogenic microorganisms. Food not only provides nutrients for humans but can also serve as a

medium that supports microbial growth. Poor hygiene and sanitation practices during food processing, storage, and serving can increase the risk of contamination, potentially leading to food poisoning and foodborne diseases (Farid, Romadi, Witono, 2018; Szalonka *et al.,* 2021; O'hara and Gibney, 2021; Artanti, Dewanti and Dharmawati, 2022; Lambert, Chivers, and Farringdon, 2019; Gaspar *et al*., 2024; Vashtianada, Setiarini and Sartika, 2023; Mariaotti *et al*., 2021; Wahl *et al*., 2017; Ni *et al*., 2024).

Cases of foodborne diseases are often associated with low levels of hygiene, such as the use of non-hygienic equipment and exposure to contaminated environments, including dust and air pollution. These conditions support the growth of microorganisms that can cause physical and chemical changes in food, rendering it unfit for consumption (Marcela *et al*., 2024; Anderson and Barcinas, 2024; Aljamila, Najim and Alabbasy, 2021; Guptaa and Chaudharyb, 2022; Bouchriti *et al*., 2021; Mshelia, Osman and Misni, 2022; Basaran, 2021).

Among various pathogenic microorganisms, *Staphylococcus aureus* and *Salmonella typhimurium* are bacteria commonly found in food and have the potential to cause health disorders. These bacteria can produce toxins that lead to gastrointestinal disturbances such as diarrhea, nausea, and vomiting (Iqbal *et al*., 2022; Manetu, M'masi and Recha, 2021; Cathleen, Soelaeman, and Liena, 2023; Arifin *et al*., 2022; Kyu, 2025; Demissie, 2021; Pahmi and Endah, 2019; Riantina *et al*., 2024). The presence of these bacteria in food is strongly influenced by environmental conditions, handling practices, and levels of cleanliness.

Food materials are highly susceptible to contamination by microorganisms originating from the surrounding environment, such as *Salmonella sp.*, *Staphylococcus aureus*, *Escherichia coli*, molds, and yeasts. Under favorable environmental conditions, these microorganisms can grow rapidly and cause food spoilage (Sari, 2024; Dobrowolska and Prusak, 2019; Gong *et al*., 2024; Rembischevski and Caldas, 2020; Eiman *et al*., 2021; Gao *et al*., 2023). Therefore, microbiological analysis is required to determine the level of contamination and its potential risks to health.

Microbiological examination of food samples is generally conducted through bacterial isolation and cultivation techniques, such as serial dilution and the spread plate method. These methods allow for the growth and enumeration of microbial colonies, thereby providing an overview of the number of microorganisms present in the sample (Azzahra, Effendy and Slamet, 2021; Nuryady *et al*., 2021; Jufri, 2020; Kurahman, 2020; Bawanti, 2019; Bhunia *et al*., 2022; Peng *et al.,* 2023; Urip *et al*., 2023; Cobo *et al*., 2018; Nurul *et al*., 2023; Dai *et al*., 2025; Arif *et al*., 2020; David and Davidson, 2014).

RESEARCH METHODS

This study is a quantitative descriptive research employing a laboratory-based approach to detect and estimate microbiological contamination in street food using culture methods based on selective media. The study was conducted from January to March 2025 in the street food center area of Alun-Alun Kidul, Surakarta. Microbiological analyses were carried out at the Microbiology Laboratory, Faculty of Health Sciences, Universitas Duta Bangsa Surakarta.

The research samples consisted of ten types of commonly sold street foods, namely takoyaki (S1), jagung bakar (S2), sate (S3), jadah goreng (S4), bakso bakar (S5), ayam bakar (S6), soto (S7), bakso (S8), pecel lele (S9), and gorengan (S10). The use of

sample codes (S1-S10) was intended to simplify data presentation and analysis, as well as to maintain anonymity and avoid direct identification of specific food vendors or selling locations. Samples were determined using purposive sampling based on the types of food most frequently consumed at the study location. The unit of analysis was the food sample, with two replications (duplicate) conducted for each dilution level.

The equipment used included a blender, Erlenmeyer flask, micropipettes (20-200 µL and 200-1000 µL), sterile tips, petri dishes, a Drigalski spatula, test tubes, an incubator, and an autoclave. The materials used included sterile distilled water, physiological NaCl solution (0.85%), 70% alcohol, as well as Mannitol Salt Agar (MSA) and Sorbitol MacConkey Agar (SMAC) media. All equipment was sterilized using an autoclave at 121°C for 15 minutes under 1 atm pressure. Heat-sensitive equipment was sterilized using 70% alcohol. All procedures were carried out aseptically to prevent contamination.

Mannitol Salt Agar (MSA) and Sorbitol MacConkey Agar (SMAC) media were prepared according to the manufacturer's instructions. Each medium was weighed at 51.5 grams and dissolved in 1 liter of distilled water, then heated until homogeneous. The media were sterilized using an autoclave at 121°C for 15 minutes, cooled to approximately 50°C, and then poured at approximately 15-20 mL into sterile petri dishes and allowed to solidify.

A total of 25 grams of the food sample was homogenized using a blender, then transferred into an Erlenmeyer flask containing 225 mL of sterile distilled water to obtain an initial dilution of 10^{-1}. The sample was subsequently diluted serially to 10^{-2} and 10^{-3} using physiological NaCl solution (0.85%). A volume of 0.1 mL from each dilution was inoculated onto MSA and SMAC media using the spread plate method, then evenly distributed using a Drigalski spatula. Each treatment was performed in duplicate.

Petri dishes were incubated at 37°C for 24-48 hours in an inverted position. After incubation, the growing colonies were observed based on morphological characteristics such as color, shape, and size. Bacterial identification was carried out presumptively based on colony characteristics on each medium. Colonies growing on MSA showing a color change to yellow were interpreted as presumptive *Staphylococcus aureus* due to mannitol fermentation. Meanwhile, colonies growing on SMAC were observed based on sorbitol fermentation ability. Colonies that did not ferment sorbitol (colorless or pale) were recorded as presumptive enteric bacteria potentially belonging to the *Salmonella* group. Identification in this study was preliminary (presumptive identification) and was not followed by biochemical or serological confirmation tests; therefore, the results indicate only the possible presence of bacteria.

Colony counts were performed on plates containing 30–300 colonies. The number of bacteria was expressed in Colony Forming Units per gram (CFU/g) using the formula:

$$\textbf{CFU/g = number of colonies} \times \textbf{dilution factor}$$

Data were analyzed descriptively by comparing colony counts at each dilution level and for each type of food. The results were presented in the form of tables and graphs.

RESULTS AND DISCUSSION

Bacterial Colony Counts at 10^{-1} Dilution

The results of the analysis of bacterial colony counts in street food samples at a 10^{-1} dilution are presented in Table 1. At this stage, observations were conducted to obtain an initial overview of the level of microbiological contamination in each sample. The colony counts included total colonies as well as colonies that were morphologically presumed to be *Staphylococcus aureus* and enteric bacterial groups potentially belonging to *Salmonella*.

The observations showed that colony counts at the 10^{-1} dilution tended to be high, and several samples were classified as TMTC (Too Many to Be Counted), indicating that the data at this dilution level did not fully meet the standard counting criteria (30-300 colonies). Therefore, the results at this dilution were used as a preliminary indication of contamination levels, while further quantitative analysis referred to subsequent dilution levels.

Table 1. Bacterial Colony Counts at 10^{-1} Dilution

No	Sample Code	Total Colonier (Rep 1)	Presumptive *S. aureus*	Presumptive *Salmonella*	Total Colonies (Rep 2)	Presumptive *S. aureus*	Presumptive *Salmonella*
1	S1	241	20	221	253	5	248
2	S2	28	23	5	32	–	32
3	S3	62	24	38	55	21	34
4	S4	TMTC	–	TMTC	290	10	280
5	S5	TMTC	–	TMTC	TMTC	TMTC	TMTC
6	S6	46	29	17	38	4	34
7	S7	37	6	31	43	13	30
8	S8	4	–	4	3	–	3
9	S9	152	29	123	108	7	101
10	S10	TMTC	–	TMTC	147	145	2

Information : TMTC (Too Many To Count). takoyaki (S1), jagung bakar (S2), sate (S3), jadah goreng (S4), bakso bakar (S5), ayam bakar (S6), soto (S7), bakso (S8), pecel lele (S9), and gorengan (S10).

The results at the 10^{-1} dilution indicate that several samples exhibited extremely high colony counts, falling into the TMTC (Too Many to Be Count) category, such as jadah goreng, bakso bakar, and gorengan. This reflects a high level of microbiological contamination in these samples. In contrast, some samples, such as meatballs, showed relatively low colony counts. The data at this dilution level did not fully meet the standard counting criteria (30-300 colonies) and were therefore used as a preliminary indication of the level of contamination.

Bacterial Colony Counts at 10^{-2} Dilution

The results of the analysis of bacterial colony counts in street food samples at a 10^{-2} dilution are presented in Table 2. At this dilution level, most colony counts fall within the countable range (30-300 colonies), allowing for further quantitative analysis. The

observations included total colony counts as well as colonies morphologically presumed to be *Staphylococcus aureus* on Mannitol Salt Agar (MSA) and colonies presumed to be enteric bacteria potentially belonging to the *Salmonella* group on Sorbitol MacConkey Agar (SMAC). The identification performed in this study was preliminary (presumptive) based on colony morphological characteristics.

Table 2. Bacterial Colony Counts at 10^{-2} Dilution

No	Sample Code	Total Colonier (Rep 1)	Presumptive *S. aureus*	Presumptive *Salmonella spp*	Total Colonies (Rep 2)	Presumptive *S. aureus*	Presumptive *Salmonella spp*
1	S1	138	9	129	88	35	53
2	S2	6	1	5	7	0	7
3	S3	45	10	35	40	2	38
4	S4	252	162	90	180	115	65
5	S5	138	30	105	86	22	61
6	S6	14	4	10	20	12	8
7	S7	20	4	16	16	4	12
8	S8	0	0	0	0	0	0
9	S9	106	3	103	120	10	110
10	S10	62	30	32	76	8	68

Information : TMTC (Too Many To Count). takoyaki (S1), jagung bakar (S2), sate (S3), jadah goreng (S4), bakso bakar (S5), ayam bakar (S6), soto (S7), bakso (S8), pecel lele (S9), and gorengan (S10).

Based on Table 2, most samples exhibited colony counts within the countable range, particularly takoyaki, sate, jadah goreng, bakso bakar, pecel lele, and gorengan. This indicates that the 10^{-2} dilution represents the most appropriate dilution level for estimating the number of bacteria in the samples. Samples of jadah goreng and bakso bakar showed relatively higher colony counts compared to other samples, indicating a greater level of microbiological contamination. In contrast, samples such bakso bakar, jagung bakar, and ayam bakar, showed relatively low colony counts, even approaching zero in some repetitions. Variations in colony counts among samples may be influenced by several factors, including food processing methods, environmental hygiene conditions, and the possibility of post-cooking contamination. Foods that undergo intensive heat processing tend to have lower bacterial counts; however, post-processing handling remains a critical factor in determining the level of contamination.

Bacterial Colony Counts at 10^{-3} Dilution

The results of the analysis of bacterial colony counts in street food samples at a 10^{-3} dilution are presented in Table 3. At this dilution level, the number of colonies generally showed a significant decrease compared to the previous dilutions. Most colony counts fell below the standard counting range (30–300 colonies); therefore, the data at this dilution were used as supporting information to observe the consistency of the decreasing trend in bacterial counts. Observations were still conducted on total colonies as well as colonies morphologically presumed to be *Staphylococcus aureus* and enteric bacterial groups potentially belonging to *Salmonella*, on a presumptive basis.

Table 3. Bacterial Colony Counts at 10^{-3} Dilution

No	Sample Code	Total Colonier (Rep 1)	Presumptive *S. aureus*	Presumptive *Salmonella spp*	Total Colonies (Rep 2)	Presumptive *S. aureus*	Presumptive *Salmonella spp*
1	S1	9	5	4	18	6	12
2	S2	2	2	0	2	2	0
3	S3	30	3	27	31	10	21
4	S4	12	6	6	26	11	15
5	S5	42	14	28	60	25	35
6	S6	2	2	0	0	0	0
7	S7	9	4	5	11	4	7
8	S8	0	0	0	0	0	0
9	S9	14	8	6	27	16	11
10	S10	10	1	9	15	7	8

Information : TMTC (Too Many To Count). takoyaki (S1), jagung bakar (S2), sate (S3), jadah goreng (S4), bakso bakar (S5), ayam bakar (S6), soto (S7), bakso (S8), pecel lele (S9), and gorengan (S10).

Based on Table 3, most samples showed colony counts below the minimum standard counting threshold (<30 colonies), indicating that the data at this dilution level were not used as the primary basis for estimating bacterial counts. However, several samples, such as satay and grilled meatballs, still exhibited colony counts that approached or fell within the countable range, indicating relatively higher contamination levels compared to other samples. The decreasing pattern of colony counts from 10^{-1} to 10^{-3} dilutions demonstrates consistency in the distribution of bacteria within the food samples. This finding supports that the serial dilution and culture methods applied in this study were performed appropriately. The data at the 10^{-3} dilution were used as supporting information to observe trends in the reduction of colony counts, while the primary quantitative analysis referred to the 10^{-2} dilution, which met the standard counting criteria.

Estimation of Total Bacterial Count (CFU/g) in Food Samples

The calculation of total bacterial counts in terms of Colony Forming Units per gram (CFU/g) was performed to obtain a quantitative estimation of the level of microbiological contamination in each food sample. The data used in this calculation were derived from the 10^{-2} dilution, as most colony counts at this dilution level fell within the standard counting range (30-300 colonies). The use of data from a dilution that meets these criteria aims to improve the accuracy and validity of the calculations. The resulting CFU/g values were subsequently used as the basis for analyzing food safety levels and for interpreting the study findings.

Table 4. Estimation of Total Bacterial Count (CFU/g) in Food Samples

No	Sample Code	Average Colony Count (10^{-2})	CFU/g	Remarks
1	S1	113	1.13×10^6	Valid
2	S2	6.5	6.5×10^4	<30 (less accurate)
3	S3	42.5	4.25×10^5	Valid

4	S4	216	2.16×10^6	Valid (high)
5	S5	112	1.12×10^6	Valid
6	S6	17	1.7×10^5	<30
7	S7	18	1.8×10^5	<30
8	S8	0	0	Not detected
9	S9	113	1.13×10^6	Valid
10	S10	69	6.9×10^5	Valid

Information : TMTC (Too Many To Count). takoyaki (S1), jagung bakar (S2), sate (S3), jadah goreng (S4), bakso bakar (S5), ayam bakar (S6), soto (S7), bakso (S8), pecel lele (S9), and gorengan (S10).

The results of the Total Plate Count (TPC) expressed in Colony Forming Units per gram (CFU/g) indicate that most food samples exhibited relatively high levels of microbiological contamination. Samples such as jadah goreng, takoyaki, bakso bakar, and pecel lele showed high CFU/g values, exceeding 10^6 CFU/g, indicating significant microbial contamination. In contrast, several samples, including jagung bakar, ayam bakar, and soto, showed colony counts below the standard counting threshold (<30 colonies), resulting in CFU/g values with lower accuracy. Bakso bakar sample showed no colony growth, indicating a very low or undetectable level of contamination under the testing conditions.

When compared to food safety standards based on the Regulation of the Indonesian Food and Drug Authority (BPOM) No. 13 of 2019, which sets the maximum microbial contamination limit at 10^4 CFU/g, most samples in this study exceeded this threshold. This suggests that several foods sold at the study location may not meet microbiological food safety standards. However, it should be noted that bacterial identification in this study was still presumptive, based on colony morphological characteristics on selective media; therefore, further confirmatory tests are required to accurately determine the specific types of bacteria present.

Classification of Microbial Contamination Levels in Food Samples

The classification of microbiological contamination levels in food samples is presented in Table 5 as a further inte rpretation of the Total Plate Count (TPC) values expressed in CFU/g. This classification aims to facilitate a clearer understanding of the overall level of microbial contamination in each sample. The grouping was conducted without associating the results with specific individuals or vendors, but rather as a representation of the microbiological condition of the food at the time of sampling. Therefore, the findings are indicative in nature and are intended to provide a general overview of food safety conditions.

Table 5. Classification of Microbial Contamination Levels in Food Samples

No	Sample Code	CFU/g	Contamination Level
1	S1	1.13×10^6	Very high
2	S2	6.5×10^4	Moderate
3	S3	4.25×10^5	High
4	S4	2.16×10^6	Very high

5	S5	1.12×10^6	Very high
6	S6	1.7×10^5	Moderate
7	S7	1.8×10^5	Moderate
8	S8	0	Low
9	S9	1.13×10^6	Very high
10	S10	6.9×10^5	High

Information : TMTC (Too Many To Count). takoyaki (S1), jagung bakar (S2), sate (S3), jadah goreng (S4), bakso bakar (S5), ayam bakar (S6), soto (S7), bakso (S8), pecel lele (S9), and gorengan (S10).

Based on Table 5, the level of microbiological contamination in the food samples shows considerable variation, ranging from low to very high categories. Several samples fall into the very high category, indicating a high level of microbial contamination under the testing conditions. Other samples are classified within the moderate to high categories, while one sample shows a very low level of contamination. Overall, most samples exhibit microbial contamination levels exceeding the maximum limit established by the Indonesian Food and Drug Authority (BPOM) of 10^4 CFU/g, suggesting that they may not meet microbiological food safety standards.

However, these findings are indicative in nature and are highly influenced by the conditions at the time of sampling. This study is not intended to assess the quality of products from specific vendors, but rather to provide a general overview of the microbiological safety conditions of street food at the study location. The observed variation in contamination levels is likely influenced by hygiene and sanitation factors, including food processing, handling, serving practices, and environmental conditions.

The results of this study indicate that the level of microbiological contamination in food samples varied from low to very high, with most samples exceeding the maximum microbial contamination limit established by the Indonesian Food and Drug Supervisory Agency (BPOM), which is 10^4 CFU/g (Food and Drug Supervisory Agency, 2019). These findings suggest that street food poses a potential risk to public health, particularly when consumed without adequate reheating or further processing. This condition is consistent with previous studies stating that food can serve as a medium for the growth of pathogenic microorganisms that are harmful to human health (Iqbal *et al.,* 2022; Manetu, M'masi and Recha, 2021; Cathleen, Soelaeman, and Liena, 2023; Arifin *et al*., 2022; Kyu, 2025; Demissie, 2021; Pahmi and Endah, 2019; Riantina *et al*., 2024).

The variation in colony counts at each dilution level demonstrates a pattern consistent with the principles of Total Plate Count (TPC), in which the number of colonies decreases as the dilution level increases. This indicates that the methods used are sufficiently representative in describing the level of microbial contamination in the food samples. The culture method using the spread plate technique allows for uniform colony growth, thereby facilitating the enumeration of microorganisms (Putri *et al*., 2021; Bhunia *et al*., 2022; Peng *et al*., 2023; Urip *et al*., 2023; Cobo *et al*., 2018). In addition, the dilution technique employed is a common approach in microbiological analysis for determining the number of microbial cells in a sample (Nurul *et al*., 2023; Dai *et al*., 2025; Arif *et al*., 2020; David and Davidson, 2014).

The presence of colonies interpreted as presumptive *Staphylococcus aureus* and presumptive Salmonella-like colonies indicates the potential presence of pathogenic bacterial contamination. *Staphylococcus aureus* is a Gram-positive bacterium commonly

found on human skin and capable of producing enterotoxins that cause food poisoning (Rianti, Tania and Listyawati, 2022). Meanwhile, the *Salmonella* group consists of Gram-negative pathogenic bacteria that can cause salmonellosis through the consumption of contaminated food (Wasdili, 2019). Both bacteria belong to the group of heterotrophic microorganisms that utilize organic matter from the environment for their growth (Gunawan *et al.,* 2022).

From an epidemiological perspective, the presence of these bacteria in food is closely associated with the occurrence of foodborne diseases, which remain a global public health concern. Infections caused by these microorganisms can result in various symptoms, such as diarrhea, nausea, vomiting, and more severe gastrointestinal disorders (Arisanti, Indriani, and Wilopo, 2018; Ikrila *et al*., 2024). On a broader scale, cases of foodborne diseases have been reported to reach thousands annually, with significant mortality rates (Rudin *et al.,* 2019). This is further supported by studies indicating that foodborne diseases are influenced by multiple factors, including human behavior, environmental sanitation, and the adaptive capacity of microorganisms (Muna and Kairiri, 2020).

The high level of contamination observed in this study is likely influenced by suboptimal hygiene and sanitation practices. Contamination can occur through various routes, such as direct contact with hands, non-sterile equipment, and open environments exposed to dust and pollution (Moges, Rodland and Ambelu, 2025). In addition, humans and animals serve as primary reservoirs for bacteria such as *Staphylococcus aureus* and *Salmonella*, which can subsequently contaminate food through various pathways (Rudin *et al.,* 2019). These microorganisms are known to survive in diverse environments, including soil, water, and surfaces, thereby increasing the risk of food contamination (Thapaliya *et al*., 2017; Samreen, 2021).

Differences in contamination levels among samples are also influenced by food processing methods. Heat treatment processes such as boiling, frying, and grilling can reduce the number of microorganisms; however, their effectiveness largely depends on the temperature and duration of heating (Fiona *et al.,* 2025). Conversely, foods that are stored for extended periods or exposed to open environments have a higher risk of contamination. Other factors, such as the quality of raw materials, storage conditions, and environmental hygiene, also contribute to the microbial load in food (Food and Drug Supervisory Agency, 2019; Atmanto, Asri and Kadir, 2022; Nurmalasari *et al*., 2022; Sukhorukov, 2021; Gamit, Hajoori and Maisuria, 2023; Rini, Saidi and Rohmah, 2023).

Overall, the findings of this study indicate that the microbiological safety of street food remains an important concern in the context of public health. Although the methods used were able to provide an overview of microbial contamination levels, the bacterial identification in this study was still presumptive and requires further confirmatory testing to accurately determine specific species. Therefore, improving hygiene and sanitation practices, as well as strengthening food safety monitoring, are essential steps in preventing foodborne diseases.

CONCLUSION

This study concludes that microbial contamination was detected in street food samples, with Total Plate Count (TPC) values ranging from low to very high levels. Most samples showed microbial counts exceeding the maximum limit set by the Food and Drug Supervisory Agency (10^4 CFU/g), indicating a potential risk to food safety. The presence

of *presumptive Staphylococcus aureus* and *presumptive Salmonella-like colonies* suggests possible contamination by pathogenic bacteria. Therefore, improved hygiene and sanitation practices are essential to ensure the safety of street food products.

SUGGESTIONS

It is recommended that street food vendors improve hygiene and sanitation practices during food preparation, handling, and serving to minimize microbial contamination. Local health authorities are advised to strengthen supervision and provide regular training on food safety for food handlers. Future researchers are encouraged to conduct confirmatory microbiological tests to accurately identify specific bacterial species and expand the scope of sampling for more comprehensive results.

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