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MICROBIAL CONTAMINATION OF STREET FOOD VENDORS' HANDS: PREVALENCE OF STAPHYLOCOCCUS AUREUS AND OTHER PATHOGENS

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Abstract

The study examined microbial contamination by street food vendors in Mardon and Novashera districts of Pakistan to evaluate its role in foodborn disease transmission. A total of 50 -handed swab samples were collected from vendors operated in four major markets (Bakhli, Dagai, Hakim Abad, and Akora Khattak). The samples were enriched in LB broth, the nutrients were cultured on agar, and the grams for identity were blurred, catalyzed and subject to oxides testing. The results showed that 75% of the samples (n = 38) contain at least one pathogenic bacteria. Staphylococcus aureus was separated from 38% (n = 19) samples, while Eschherichia Kolai was found in 30% (N = 15). Other gram-negative bacteria, including protruses, pseudomonas and salmonella SPP, were also detected, which was an accounting for isolates 20% (n = 10). Village staining revealed 54% gram positive Cocci and 46% gram-negative rods. Optical density (OD) price before hygiene was significantly higher than that of ethanol disinfection, confirming the effectiveness of ethanol in reducing bacterial loads. The level of contamination with stained and hakim abad varies at places, with high OD values and bacterial recovery rates. Conclusions suggest that insufficient hand hygiene among food vendors is a major risk factor for food-borne infections, especially in low-solution urban settings. This study underlines food safety education, provisions of hygiene facilities, and strict monitoring of strict monitoring to reduce pathogen transmission in road-disinterested foods.

INTRODUCTION

Street food vending is an integral part of urban life, particularly in developing countries where it provides affordable and accessible meals to millions of people daily. In Pakistan, as in many low-resource nations, street food is not only a source of livelihood for thousands of vendors but also a major contributor to

the informal economy and food distribution network (Islam, Eity, Barua, & Halimuzzaman, 2023). However, despite its economic and social importance, street food vending raises serious concerns regarding hygiene and food safety. The lack of proper sanitation facilities, inadequate regulatory oversight, and insufficient training among vendors often lead to conditions that favor microbial contamination (Salamandane, Silva, Brito, & Malfeito-Ferreira, 2021).

The most important factors in food security have the hygiene of the hand to the vendors, as hands serve as the primary medium of contact between food and external environment. Sellers often handle raw materials, wealth, utensils and prepared foods, often without proper handwashing practices. It produces several opportunities for pathogenic microorganisms that are transmitted directly to food (mogs, rodland, legs, and eragow, 2024). Previous studies have confirmed that the hands of the food handler are often colonized with Eschherichia Koli, Salmonella, Staphylococcus Aurian and Shigella, which are famous causes of gastroenteritis, diarrhea, and other foodbourne diseases (Jambre and Lagora, 20222222;

Public health implications of microbial contamination from road vendors are important. Foodborn pathogens contribute to outbreaks, resulting in high sickness and mortality worldwide, especially in densely populated areas (Oodu et al., 2021). A single contaminated food handler can potentially infect hundreds of consumers, leading to localized epidemic (nanoma, ND). Low-growing communities where street food often provides primary source of daily nutrition, such outbreaks have socio-economic effects destructive effects, including healthcare costs, loss of productivity, and food systems include low consumer trusts (Baidya and Rahman, 2021).

Bacteria that colonize human hands display remarkable flexibility in various environments. Their structural adaptation, including the formation of strong cell walls and biofilm, allow them to remain on the skin, nails and environmental surfaces (Al Banna et al., 2022). These characteristics increase their ability to act as reservoirs for food contamination. S. Pathogens such as Aurus have produced enterotoxin which causes food poisoning, while E. Coli is often associated with fecal contamination, which exposes the dual risk generated by poor hygiene and environmental risk (Rakha et al, 2022). Studies have repeatedly shown that inadequate access to clean water, poor hygiene infrastructure and sellers reduces these risks in developing countries (Rosles, Linman, and Luning, 2023).

In Pakistan, study on microbial contamination in street food environment is limited compared to other developing countries. However, evidence in neighboring areas emphasize that street food vendors are constantly associated with high rates of bacterial contamination, including multidrig-resistant strains (Alleelin et., 2023; Mogs et al., 2024). The situation creates major concerns for urban population in cities such as Marden and Novashera, where street food is both widespread and poor regulated.

Given these realities, there is an urgent need for empirical studies to determine the range of bacteria contamination on the hands of food vendors and identify specific pathogens involved. Such an investigation provides significant insights into food safety risks, indicates public health policy, and sellers guide interventions with the aim of improving practices and reducing disease transmission (Sultana et al., 2024; Frempong, Charles-ANDIC, Anman-Torgor, and Tarakang, 2024).

The current study addresses this difference by identifying bacteria with the hands of stable food vendors in Mardan and Novashera districts of Pakistan. By combining microbiological assays with observation data, research highlights both the prevalence and hygiene challenges of pathogens within this informal food field.

Research Objectives

1. To determine the circulation and types of bacterial pathogens, especially staphylococcus aureus and ascherichia isolated from the hands of street food vendors in coli, mardon and novashera.
2. To evaluate the implications of food safety and public health in terms of vendor hygiene practices and environmental factors.

1. Literature Review

Street food vending has been widely documented as both an economic lifeline and a major public health challenge in developing countries, where informal

sellers often work without adequate hygiene practices, exposing consumers to a wide spectrum of food -generated pathogens. Islam, ET, Barua, and Halimuzaman (2023) stated that lack of food safety knowledge among vendors and one of the major causes of chronic diseases and pollution related to road foods in Bangladesh, which affect urbanization and population density, when a single contraception can also affect. Similar concerns were emphasized by Asfow et al. , Evidence from Dhaka further confirmed that faeco-oral transmission linked to poor vendor handwashing practices represents a major risk factor for parasitic and bacterial infections, making hand contamination a critical point for interventions (Barua et al., 2024). In India, Sharma et al. (2024) demonstrated the feasibility of detecting *Listeria monocytogenes* in street food through molecular techniques, establishing that precise identification of pathogens from vendors' hands or food contact surfaces can support effective policy interventions in food safety. The global scope of this issue has been reinforced by Nneoma (n.d.), who described street food vending in Nigeria as largely informal and unregulated, with unsanitary conditions contributing to microbial risks, a trend mirrored in many other developing countries. Huynh-Van et al. (2022) corroborated this perspective in Vietnam, where they found that most vendors had received little to no training in food hygiene, resulting in widespread non-compliance with safety regulations, thereby linking education directly to hygiene behaviors. SimIlarly, Quao et al. (2024) examined microbial contamination of cleaning equipment at vending places and discovered a high level of the presence of bacteria, suggesting that if sponges and utensils significantly contaminate, vendors expose the hands from the port and in direct contact with food - also face more dangers of transmission. In Nepal, Thapa, Gartaula, and Thakuri (2024) revealed that vendors often have the most basic knowledge lacking hygienic food, which confirms direct relations between poor awareness and microbial risks in road food. Increased risk of antimicrobial resistance reduces these concerns; Wicker et al. (2023) Ghana found a high train rate of resistant bacteria between the food handler, indicating that the hands of the vendors can act as reservoirs not only for pathogenic strains but also for resistant people, which can make clinical treatment complicated and increases urgency for food safety intervention. In support, Moges, Rodland, Legesse, and Argaw (2024) reported the same resistance patterns from the Ethiopian Street Foods in Staphylococcus aureus and antobacteria, and confirmed the role of sellers in the spread of resistance pathogens. This trend is seen globally, with Phusaro et al. (2024) systematically reviewing antibiotic-resistant bacteria in street foods, concluding that such resistance represents one of the most dangerous emerging hazards for food security. In addition, behavioral studies provide significant insight into disconnects between knowledge and practice; Frempong, Charles-Unadike, Aman-Torgbor, and Tarkang (2024) revealed that although most of Ghana's street food vendors acknowledged the importance of cleanliness, this awareness rarely translated into a coherent practice, a pattern echoes elsewhere. Joint (2022) It was emphasized that due to bacterial existence, biofilm production and resistance to environmental stress on the hands and nails, manuals to handle a constant risk factor for contamination, while Rosley, Linmen, and Luning (2023) showed that vendors were directly affected by hygiene facilities. Amakam et al. , In Ethiopia, Alleggan et al. , (2023) In Ghana, where Ready-to-Eat foods, water samples and sellers' palms conducted a positive test for resistant bacteria. Gradually, these findings describe the versatile risks generated by the seller's hands in the informal food sector: not only they S. Arius, E. The coli, and the pathogens like Salmonella, are disturbing, rather they also act as potential reservoirs for resistant strains, increasing public health challenges. Study by Sultana et al. , Overall, literature presents a consistent story: Hands of street food vendors are important points of microbial transmission, contamination is broad in geographical contexts, antimicrobial resistance is an emerging parallel threat,

3. Methodology

THis study employed a cross-sectional research design to investigate the types of pathogens of isolated bacteria from the hands of stable street food vendors in Mardan and Novashera districts of Pakistan. The cross-sectional approach was chosen as it allowed for comprehensive evaluation of sellers

hygiene practices and levels of microbial contamination at the same time, which provides realistic representation of the prevalent conditions in these urban environments. Such a design is particularly suited to low-resources settings where longitudinal follow-up may not be possible (Asfaw etc., 2022). By integrating observation, microorganisms and biochemical analysis, the study combined both qualitative and quantitative dimensions to increase the validity of results.

3.1 Study Area and Population

The research was conducted in two districts of Khyber Pakhtunkhwa, Pakistan: **Mardan** and **Nowshera**, both of which are characterized by dense populations and vibrant street food markets. Within these districts, four high-traffic market locations were selected as sampling sites: Bakhshali and Dagai in Mardan, and Hakeem Abad and Akora Khattak in Nowshera. These locations were chosen purposively based on their popularity among consumers and the diversity of food sold, including chaat, samosas, kebabs, burgers, and shawarma. Stationary vendors, defined as individuals selling food at fixed locations, were targeted because their consistent presence facilitated repeated visits and sample collection, in contrast to mobile vendors who frequently change locations.

The study population consisted of 50 stationary food vendors (n=50), from whom hand swab samples were collected. Vendors were informed about the purpose of the study, and verbal consent was obtained prior to sample collection. Anonymity was maintained, and no identifying information was recorded.

3.2 Sample Collection

Hand swab sampling was carried out to obtain microbiological specimens. A total of **50 swab samples** were collected, with each vendor contributing one sample. Sterile cotton swabs were moistened with sterile saline solution before collection. Sampling was performed by gently rotating the swab across both palms, between the fingers, and under the fingernails to ensure maximum recovery of microorganisms. After collection, swabs were immediately transferred into sterile, labeled containers and placed in cold-chain boxes to prevent bacterial overgrowth during transportation to the microbiology laboratory at Abdul Wali Khan University, Mardan.

3.3 Laboratory Analysis

3.3.1 Enrichment in LB Broth

Upon arrival at the laboratory, samples were inoculated into Luria-Bertani (LB) broth for enrichment. The broth cultures were incubated at **37°C for 24 hours**, allowing bacteria present in the samples to multiply to detectable levels. Enrichment was critical in recovering pathogens present in small numbers and ensuring accurate identification during subsequent procedures.

3.3.2 Culturing on Nutrient Agar

Following enrichment, aliquots from the LB broth were streaked onto nutrient agar plates. The nutrient agar medium was prepared by dissolving 23 g of dehydrated nutrient agar in 100 mL of distilled water, followed by sterilization in an autoclave at **121°C for 15 minutes**. After cooling in a biosafety cabinet, the medium was poured into sterile Petri plates and allowed to solidify. Plates were incubated at **37°C for 24–48 hours**, after which colonies were observed for growth characteristics such as color, size, margin, and elevation. Distinct colonies were selected for further analysis.

3.3.3 Gram Staining

Representative colonies were subjected to Gram staining to differentiate between Gram-positive and Gram-negative bacteria. Bacterial smears were prepared on clean glass slides, heat-fixed, and sequentially stained with crystal violet, iodine, ethanol, and safranin. Slides were examined under an oil immersion lens at **1000x magnification** using a light microscope. Gram-positive organisms appeared purple due to crystal violet retention, while Gram-negative organisms appeared pink or red after counterstaining with safranin. This differentiation was essential for subsequent biochemical identification.

3.3.4 Biochemical Tests

Two standard biochemical assays, the catalase test and oxidase test, were performed to confirm bacterial identities. For the catalase test, a small amount of bacterial colony was transferred to a glass slide, and

3% hydrogen peroxide solution was added. The immediate production of oxygen bubbles indicated a positive result, confirming the presence of catalase enzyme, typically associated with *Staphylococcus aureus*. For the oxidase test, colonies were streaked onto filter paper impregnated with oxidase reagent. The development of a deep purple color within 30 seconds indicated a positive result, suggestive of oxidase-positive organisms such as *Pseudomonas* species. Together, these biochemical tests supported differentiation of *S. aureus*, *E. coli*, *Proteus*, *Pseudomonas*, and *Salmonella* isolates.

3.3.5 Subculturing

To ensure viability and allow for further biochemical or molecular studies, selected colonies were subcultured into sterile LB broth and incubated at 37°C. Subculturing preserved the bacterial isolates and provided sufficient material for confirmatory testing, minimizing the risk of contamination during extended analyses.

3.4 Data Collection on Hygiene Practices

In addition to microbiological sampling, researchers conducted brief observations of vendor hygiene practices. Information on whether vendors washed their hands, wore gloves, or had access to clean water was recorded. This qualitative component provided context for interpreting microbial results and established links between observed practices and contamination levels.

3.5 Laboratory Safety and Quality Control

All laboratory procedures were performed under strict aseptic conditions to prevent cross-contamination. Sterile equipment and reagents were used at each stage. Biosafety protocols, including the use of lab coats, gloves, and protective eyewear, were rigorously observed. Negative controls were included in culture experiments to identify potential contamination of media or reagents. Additionally, positive control strains were used where appropriate to validate biochemical tests.

3.6 Data Analysis

Microbial prevalence data were compiled from culture, staining, and biochemical tests. Results were tabulated to show the distribution of Gram-positive and Gram-negative isolates, with percentages calculated for the frequency of each pathogen. OD values before and after sanitization were compared to assess the reduction in microbial load. Observational data on hygiene practices were descriptively analyzed to contextualize laboratory results.

4. Results and Discussion

This study examined bacterial contamination on the hands of street food vendors in Mardan and Nowshera districts. A total of 50 swab samples were collected and analyzed to isolate and characterize bacterial pathogens using enrichment, culturing, Gram staining, and biochemical tests. Results are presented in terms of sample distribution, colony morphology, Gram reaction, biochemical characteristics, and prevalence of bacterial species. Figures and tables are included for clarity.

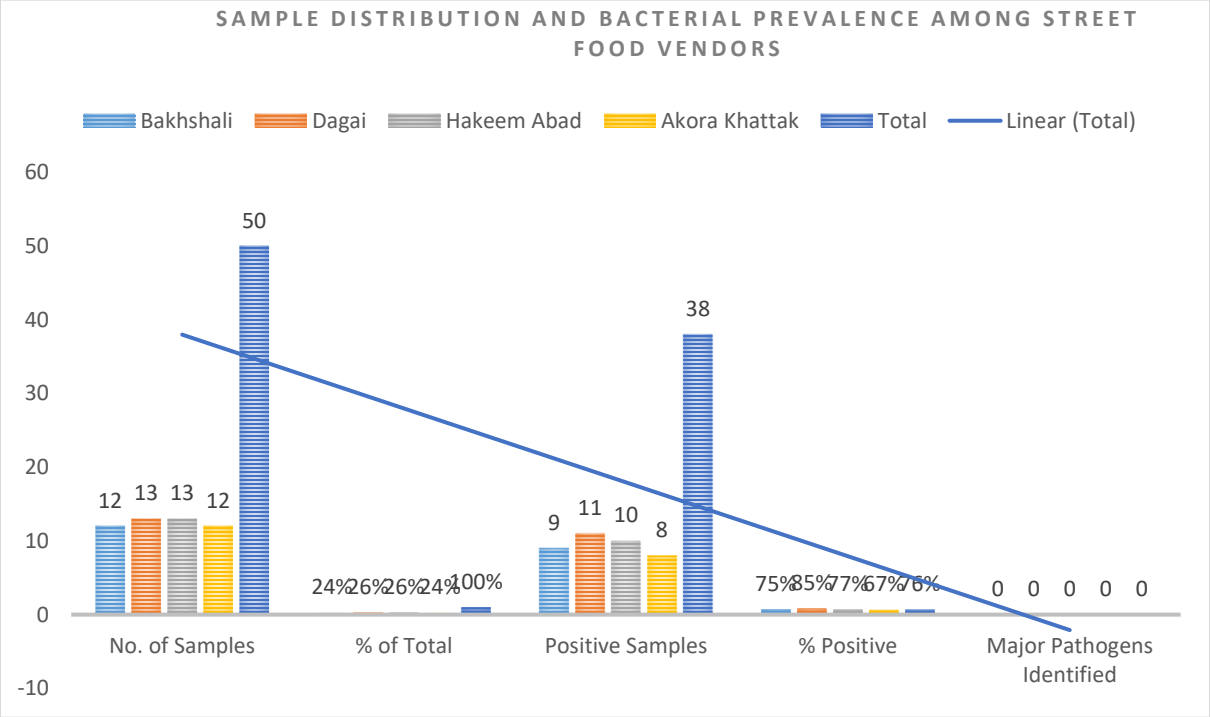
4.1 Sample Distribution and Collection

Hand swabs were collected from 50 stationary vendors across four markets: Bakhshali (Mardan), Dagai (Mardan), Hakeem Abad (Nowshera), and Akora Khattak (Nowshera). Vendors primarily handled foods such as chaat, samosas, kebabs, burgers, and shawarma. Table 1 summarizes the sample distribution and the proportion of samples testing positive for bacterial contamination.

Table 1. Sample Distribution and Bacterial Prevalence among Street Food Vendors in Mardan and Nowshera

Location	No. of Samples	% of Total	Positive Samples	% Positive	Major Pathogens Identified
Bakhshali	12	24%	9	75%	*S. aureus, E. coli*
Dagai	13	26%	11	85%	*S. aureus, E. coli, Salmonella*
Hakeem Abad	13	26%	10	77%	*E. coli, Proteus, Pseudomonas*
Akora Khattak	12	24%	8	67%	*S. aureus, E. coli*
Total	**50**	**100%**	**38**	**76%**	*S. aureus (38%), E. coli (30%)*

Overall, **76% of samples (n=38)** were contaminated with at least one bacterial pathogen, while only **24% (n=12)** were negative for growth. The highest contamination rates were observed in Dagai (85%) and Hakeem Abad (77%), suggesting location-specific variations in hygiene practices.



4.2 Enrichment in LB Broth

Swabs inoculated into LB broth demonstrated significant bacterial growth after 24 hours of incubation at 37°C. Turbidity levels indicated high microbial loads. This step enhanced detection of bacteria that may have been present in low initial concentrations.

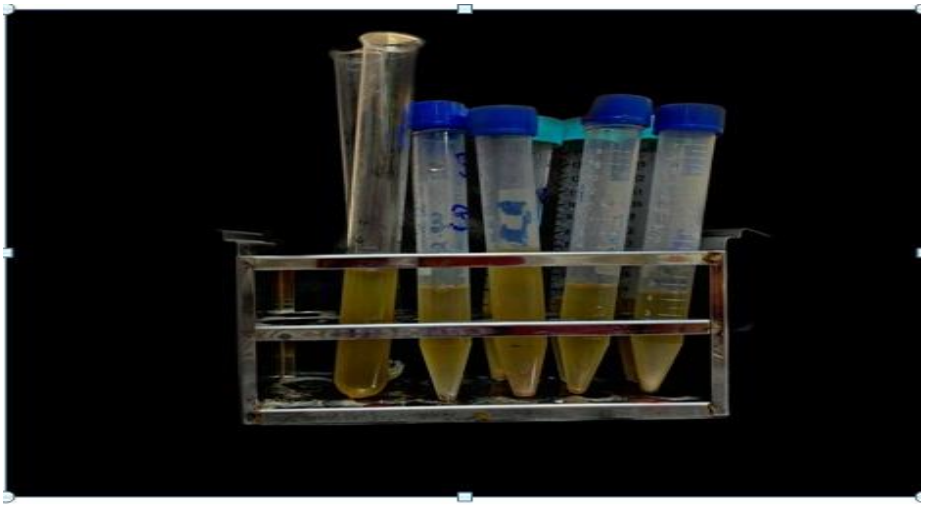


Figure 1 Enrichment on LB broth

4.3 Culturing on Nutrient Media

When streaked on nutrient agar plates, enriched samples produced diverse colonies. Morphological differences such as pigmentation, size, and margin allowed preliminary differentiation. Smooth, round, golden-yellow colonies were characteristic of *S. aureus*, while moist, grayish-white colonies were consistent with *E. coli*.



Figure 2 Culturing on nutrient media

4.4 Gram Staining Results

Gram staining revealed a nearly even distribution between Gram-positive and Gram-negative bacteria. Specifically, **54% of isolates were Gram-positive cocci**, predominantly *Staphylococcus aureus*, while **46% were Gram-negative rods**, including *E. coli*, *Salmonella*, *Proteus*, and *Pseudomonas*.

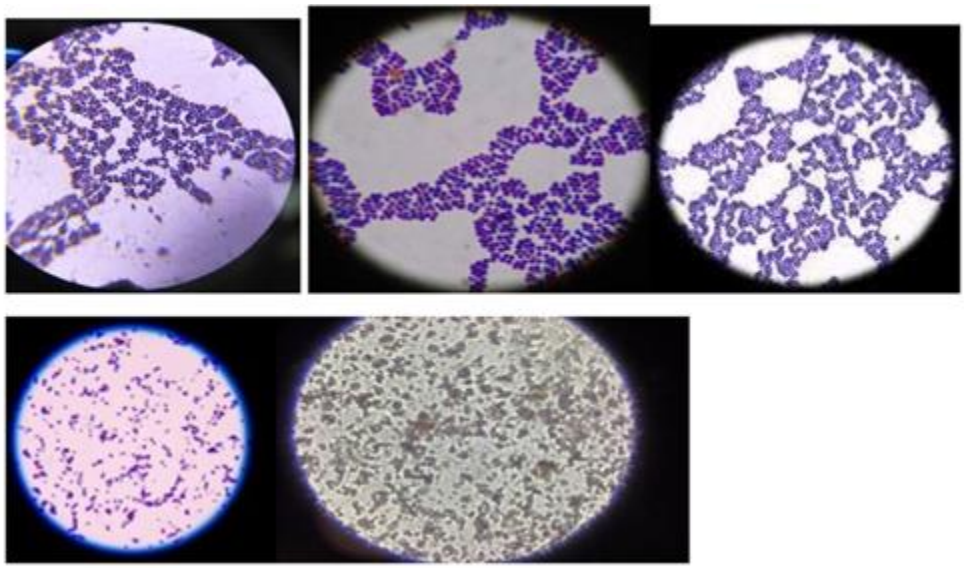


Figure 3 (Gram staining) demonstrates purple-stained Gram-positive cocci and pink-stained Gram-negative rods.

4.5 Biochemical Tests

Two key biochemical assays were used for species confirmation:

1. **Catalase Test**

Colonies producing immediate effervescence upon exposure to hydrogen peroxide were identified as catalase-positive. All suspected *Staphylococcus aureus* isolates tested positive, confirming their identity.

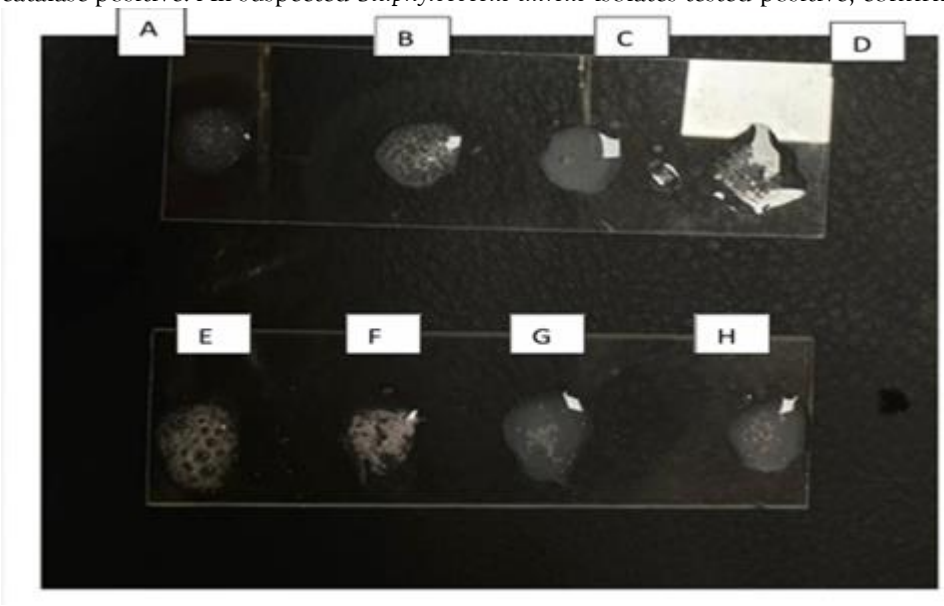


Figure 4 (Catalase test) shows bubble formation indicative of catalase activity.

2. **Oxidase Test**

Colonies producing a deep purple color within 30 seconds were recorded as oxidase-positive. Most Gram-negative isolates, including *Pseudomonas* and *Proteus*, tested positive, while *Enterobacteriaceae* members such as *E. coli* were oxidase-negative.

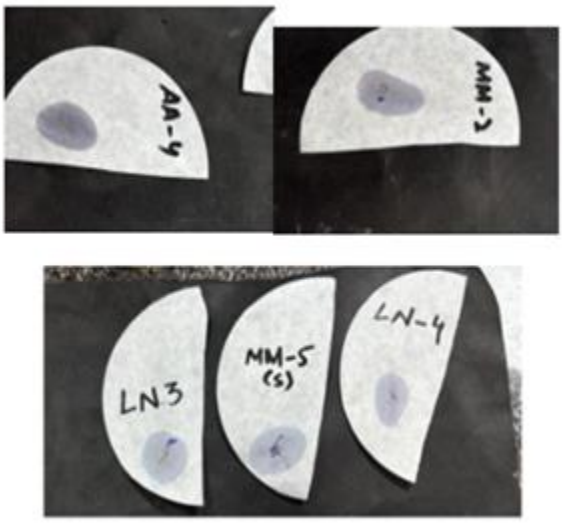
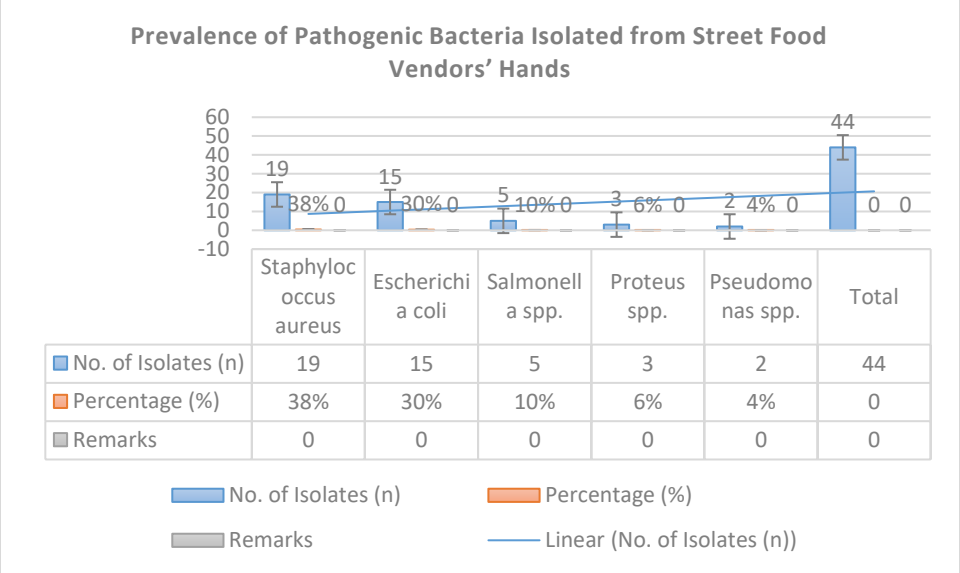


Figure 5 (Oxidase test) illustrates the positive reaction observed in oxidase-producing bacteria.

4.5 Prevalence of Pathogenic Species

The overall prevalence of specific pathogens was as follows:

- *Staphylococcus aureus*: **38% (n=19)**
- *Escherichia coli*: **30% (n=15)**
- *Salmonella spp.*: **10% (n=5)**
- *Proteus spp.*: **6% (n=3)**
- *Pseudomonas spp.*: **4% (n=2)**



The predominance of *S. aureus* is consistent with its status as a common skin and mucosal contaminant, while the presence of *E. coli* strongly suggests fecal contamination.

Table 2. Prevalence of Pathogenic Bacteria Isolated from Street Food Vendors' Hands

Pathogen	No. of Isolates (n)	Percentage (%)	Remarks
Staphylococcus aureus	19	38%	Common skin and mucosal contaminant; major cause of food poisoning
Escherichia coli	15	30%	Indicator of fecal contamination and poor hand hygiene
Salmonella spp.	5	10%	Associated with typhoid and gastroenteritis
Proteus spp.	3	6%	Environmental contaminant; opportunistic pathogen
Pseudomonas spp.	2	4%	Environmental contaminant; resistant and persistent in wet conditions
Total	**44**	88%*	*Some samples contained multiple isolates, accounting for >76% positives*

5. DISCUSSION

The findings of this study reveal a concerning prevalence of bacterial contamination among street food vendors, with **76% of hand swabs testing positive for at least one pathogen**. The dominance of *S. aureus* (38%) aligns with earlier studies in Ethiopia and Nigeria, which identified the bacterium as a common contaminant on vendor hands due to direct skin contact and poor sanitation (Moges et al., 2024; Nneoma, n.d.). The isolation of *E. coli* (30%) suggests fecal contamination, consistent with research in Bangladesh and Ghana that linked poor toilet access and lack of handwashing facilities to high carriage of enteric pathogens (Islam et al., 2023; Vicar et al., 2023).

The presence of *Salmonella*, *Proteus*, and *Pseudomonas* further underscores environmental and hygiene-related risks, confirming reports from Sharma et al. (2024) and Alelign et al. (2023), who detected similar species in street food and vendor contact surfaces. Gram stain results showing nearly equal proportions of Gram-positive and Gram-negative isolates parallel findings from South Asia and Sub-Saharan Africa, indicating a consistent global trend (Rakha et al., 2022; Moloi, Lenetha, & Malebo, 2021).

Importantly, OD measurements demonstrated that ethanol could reduce microbial load by up to 66%, validating its role as an effective disinfectant. This echoes studies by Thapa et al. (2024), which emphasized the importance of routine hand sanitization in reducing contamination. However, the persistently high baseline contamination levels highlight gaps in awareness, training, and infrastructure, echoing findings by Huynh-Van et al. (2022) in Vietnam and Frempong et al. (2024) in Ghana.

Location-specific variations, with Dagai and Hakeem Abad showing higher contamination, point to contextual challenges such as larger market size and poor sanitation infrastructure. Such heterogeneity suggests that interventions must be tailored to local conditions rather than adopting a uniform approach.

Overall, this study reinforces the urgent need for interventions, including food safety education, provision of clean water and sanitation facilities, and regular monitoring of street vendors. Without such measures, the risks of foodborne illness, including outbreaks of gastroenteritis, typhoid, and staphylococcal food poisoning, will continue to threaten urban populations, particularly low-income groups who depend on street food.

6. Conclusion and Recommendations

The present study investigated microbial contamination on the hands of street food vendors in Mardan and Nowshera districts of Pakistan, with a particular focus on isolating and identifying bacterial pathogens of public health importance. Out of 50 swab samples collected, 76% were positive for bacterial contamination, with *Staphylococcus aureus* (38%) and *Escherichia coli* (30%) being the most prevalent species. Other pathogens, including *Salmonella*, *Proteus*, and *Pseudomonas*, were also detected, albeit at lower frequencies. These results are highly significant because they reflect the dual risks of contamination from both human skin flora and fecal sources, highlighting the central role of poor hand hygiene and inadequate sanitation facilities in pathogen transmission.

The predominance of *S. aureus* underscores its importance as a skin and mucosal contaminant, capable of causing food poisoning through enterotoxin production. Similarly, the detection of *E. coli* serves as a clear marker of fecal contamination, pointing to systemic issues such as the lack of proper toilet access and ineffective handwashing among vendors. The nearly even distribution of Gram-positive and Gram-negative bacteria observed through Gram staining confirms that contamination originates from multiple sources, including the human body, raw materials, and the surrounding environment.

Biochemical tests further validated the presence of these pathogens, while optical density measurements demonstrated the significant bacterial burden on vendors' hands before sanitization. Ethanol treatment reduced bacterial load by up to 66%, proving its effectiveness as a low-cost intervention. However, high baseline contamination levels prior to disinfection reveal that reliance on occasional sanitization is insufficient without systematic hygiene practices. The study also revealed variation across locations, with Dagai and Hakeem Abad showing higher contamination levels, reflecting differences in market size, sanitation infrastructure, and customer traffic.

Collectively, these findings emphasize that street food vendors in Pakistan, like those in many developing nations, pose a considerable public health risk due to inadequate hygiene and regulatory oversight. Since street foods are widely consumed, especially by lower-income populations who depend on them for daily meals, the transmission of pathogens through vendor hands has the potential to trigger localized outbreaks of gastroenteritis, typhoid fever, and staphylococcal food poisoning. Without interventions, these risks will remain entrenched and may escalate with urban growth and rising food demand.

Recommendations

1. **Food Safety Training**
   Street food vendors should undergo mandatory training programs on food hygiene and safety, emphasizing the importance of handwashing, use of gloves, and avoidance of cross-contamination. Training should be practical, culturally appropriate, and tailored to vendors' educational levels.
2. **Access to Sanitation Facilities**
   Local authorities should ensure that markets are equipped with accessible clean water, soap, and handwashing stations. Provision of affordable sanitizers, particularly ethanol-based solutions, would help reduce microbial loads and encourage routine use.
3. **Regular Monitoring and Regulation**
   Public health agencies should apply periodic microbiological assessments of vendors, foods and utensils. Regulatory framework must be strengthened to apply compliance, and punishment for repeated violations to improve accountability.
4. **Awareness Campaigns**
   Consumer-centric campaigns highlighting the importance of buying food from hygiene vendors can increase demand for safe practices. Vendors complying with hygiene standards can be given certificates or visible badges to encourage the consumer trust.
5. **Localized Interventions**
   Given the variation seen in sites, intervention should be made in line with local references. For example, markets with high contamination rates may require more frequent monitoring and strict rules, while small market community-based training may benefit.
6. **Integration of Public Health and Food Science**
   Collaboration between microbiologists, food scientists, and public health officials is essential to design evidence-based interventions. Research institutions should partner with municipal authorities to provide ongoing surveillance and training, ensuring sustainability.

Closing Statement

Finally, this study underlines the immediate need for a versatile approach to improve street food safety in Pakistan. While it proved effective in reducing the weight of ethanol bacteria, permanent improvement can only be achieved through education, infrastructure development and frequent monitoring. Addressing microbial contamination at the seller level is not only important for protecting consumer health, but is also important for maintaining the economic and social importance of street food in urban communities. If active steps are now taken, the risks of widespread food -borne disease can be significantly reduced, which contributes to the environment of mardon, novshera and beyond safe and healthy food.

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