



## KNOWLEDGE, ATTITUDE AND PRACTICES OF FOOD VENDORS REGARDING FOOD BORNE DISEASE IN DISTRICT HARIDWAR

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**ABSTRACT** Food safety knowledge, attitudes and practices among food vendors are crucial in the prevention of foodborne disease outbreaks, as contaminated food is major source for spreading of foodborne disease. This study, therefore, sought to assess the food safety knowledge, attitudes and practices of food vendors regarding foodborne disease in Haridwar district and to find out the association of knowledge and practices of food vendors regarding foodborne disease with sociodemographic factors. A cross-sectional study was conducted among 274 food vendors from thirty randomly selected wards in Haridwar from January 2024 to June 2024 with pilot study on 30 vendors for reliability analysis of self-made questionnaires. The food vendors above age 18, who had experience of more than 6 months are selected conveniently from 30 wards that are selected by systematic random sampling from the list of 60 wards. The questionnaire contained a total of 47 items of close-ended questions, divided into four parts, as follows: (i) sociodemographic and employment-related information (8 questions), (ii) assessment of food safety knowledge (15 questions), (iii) assessment of food safety attitude (11 questions) and (iv) assessment of food safety practices (13 questions). The data collected will be stored, managed, and analyzed in a password-secured computer ensuring the participant's confidentiality. Once all data was entered, it was imported and analyzed in SPSS version 26 software. Chi square test was used to find out the association of knowledge and practices of food vendors regarding foodborne disease with sociodemographic factors. There are no anticipated risks associated with this study. (11.7%) were categorized as having a high level of knowledge, (57.3%) as low level of knowledge and (31.0%) as moderate level of knowledge. (46.4%) were identified as having a poor attitude, while (53.6%) were characterized as having a moderate attitude. (0.7%) were observed to have good practice levels, (2.9%) were noted to have moderate practice levels and (96.4%) were found to have poor practice levels. For the Age Group variable, among those aged >36, 9 participants (9.8%) had a high level of knowledge, 55 (59.8%) had a low level, and 28 (30.4%) had a moderate level ( $p=0.556$ ). Similar trends were observed for the age groups 18-25 and 26-35. Gender, among males, 18 participants (11.4%) had a high level of knowledge, 86 (54.4%) had a low level, and 54 (34.2%) had a moderate level ( $p=0.448$ ). Females showed comparable trends. Education Level exhibited significant differences, with 21.4% of those with No Formal Education, 7.5% with Higher Secondary education, 18.1% with Primary education, and 9.1% with Secondary education demonstrating high knowledge levels ( $p<0.01$ ). Monthly Income showed significant variation, with none of those earning <10000 having a high level of knowledge, whereas 63.6% of those earning >25000 did ( $p<0.001$ ). Among different age groups, no significant differences in attitude levels were found ( $p=0.261$ ). Gender did not notably impact attitude levels, with similar percentages of poor and moderate attitudes observed among males and females ( $p=0.903$ ). However, education level exhibited a significant association with attitude, particularly among participants with No Formal Education ( $p<0.001$ ). Monthly income did not demonstrate a significant association with attitude levels across different income brackets ( $p=0.452$ ). Among participants aged >36, there were no instances of good practice, with 6 (6.5%) exhibiting moderate practice and 86 (93.5%) demonstrating poor practice, showing a significant association ( $p<0.05$ ). Male participants displayed a complete absence of good practice, with all (100.0%) showing poor practice. Participants who have no formal education did not exhibit any instances of good practice, while all (100.0%) displayed poor practice, indicating a significant association ( $p<0.001$ ). Income level showed notable disparities, with individuals earning <10000 or 10000-15000 showing no instances of good practice, whereas 9.1% of those earning >25000 demonstrated good practice, indicating a significant association ( $p<0.001$ ).

**KEYWORDS :** WHO, KAP, FBD, FSSAI, IDSP, CD Allert

### BACKGROUND

Street foods are ready-to-eat foods and beverages prepared and sold by vendors in public places and on the streets. Millions of people daily feed on street foods, a wide variety of which are easily accessible and relatively cheap [2]. Street food vending businesses contribute significantly to income generation for many individuals from low-income households. Street-vended foods support the dietary diversity of most people in the informal sector because they provide easy access. Street food vending is mostly not regulated by any relevant authority and is often informal [4]. Street-vended foods are often prepared and sold under unhygienic conditions with a lack of basic food service infrastructure and equipment. Due to the lack of these basic services, street-vended foods are considered a food safety hazard for consumers [3]. Access to sufficient amounts of safe and nutritious food is a basic human right and essential to sustaining life and promoting good health. Food safety is one of the integral parts of the Sustainable Development Goals (SDGs) [1]. Food handlers play a major role in ensuring food safety throughout the supply chain (producing, processing, storing, and preparing foods). Food-Borne Diseases are major public health concerns around the world, and the problem is exacerbated in low- and middle-income countries due to widespread poor food handling, and sanitation practices, lack of food handler education, lack of food safety awareness, and weak regulatory systems. The rising concern about foodborne disease has questioned the levels of KAP of street food vendors [5]. According to the World Health Organization (WHO) report from 2015, the global burden of FBD is estimated at more than 600 million cases, or almost 1 in 10 people, with foodborne illnesses occurring every year and 420,000 deaths. Children under five years of age carry 40% of the Foodborne disease burden, with 125,000 deaths

every year, with the highest burden in low- and middle-income countries [6]. The Foodborne disease is also responsible for a significant increase in economic expenditures and decreasing the Gross Domestic Product (GDP) of a nation [7]. In low- and middle-income countries, a large proportion of ready-to-eat foods are sold on the street without maintaining their hygienic conditions. Studies have shown that street food vendors are not familiar with the WHO's Five Keys to Safer Food for food handlers [8], which include keeping clean, separating raw and cooked food, cooking thoroughly, keeping food at safe temperatures, and using safe water and raw materials. Food safety KAP is important because inadequate knowledge, negative attitudes, and poor sanitation practices by street food vendors can cause significant public health problems with food safety issues. Therefore, the KAP of street food vendors on food safety contributes significantly to the occurrence of Foodborne disease among consumers [9]

### INTRODUCTION

Food safety is a top priority for public health worldwide, as foodborne diseases continue to pose serious threats to human health, economic stability, and societal well-being. World Health Organization (WHO) estimates that approximately 600 million people become ill and 420,000 die each year as a result of contaminated food consumption, highlighting the critical need for comprehensive food safety measures (WHO, 2022). Food vendors are important stakeholders in ensuring food safety because they handle and distribute food directly to consumers. In India, the burden of food-borne disease is not known. Most food-borne infections go undetected; only a few have been reported by the media, typically those with high morbidity and happening in urban areas. (CD Allert, 2017) Rapid urbanization and

changing dietary habits in India have resulted in an increased reliance on street food vendors and informal food establishments, making food safety an increasingly important issue. The Haridwar district in Uttarakhand exemplifies this trend, with its bustling food markets and vibrant street food culture. However, the mix of traditional dietary practices, weak infrastructure, and little regulatory monitoring in such environments increase the risk of foodborne illness.

Understanding food vendors' knowledge, attitude, and practices (KAP) toward foodborne diseases is critical for developing targeted interventions to improve food safety and protect public health. While earlier studies have looked into many aspects of food safety among food vendors in a variety of contexts, there has been little research focused on the Haridwar district particularly.

Poor food handling practices and insufficient information were observed in FAO studies on the microbial contamination of food supplied by vendors. Due to inadequate personal hygiene or cross-contamination, food service personnel's hands may act as vectors for the spread of food-borne illnesses. Food handlers' handling techniques and awareness must be improved because foodborne illnesses are frequently caused by poor personal hygiene.

Bacteria, viruses, protozoa, and helminths are all pathogenic organisms that can spread via contaminated food. Contaminated food can appear, taste, and smell like safe food. According to a review of foodborne disease outbreaks documented in India between 1980 and 2016, major microbial pathogens that cause foodborne illnesses include *Staphylococcus aureus*, *Vibrio* sp., *Salmonella* sp., *E. coli*, *Yersinia enterocolitidis*, and Norwalk-like virus.

The most common cause of foodborne infections is salmonella. *Listeria monocytogenes* can grow inside the refrigerator of ready-to-eat foods. The bacteria *Staphylococcus aureus* grows in food and produces toxins that can cause food poisoning. Even though cholera is primarily transmitted through water, contaminated water can potentially harbor the disease when consumed. These diseases can result from a variety of sources, including bacteria, viruses, parasites, toxins, and chemicals, emphasizing the complexity of the issue and the need for comprehensive preventative measure. (CD Allert, 2017). Ensuring food safety is especially difficult in fast urbanizing areas like India, where eating patterns are changing. Urban populations' need for food is largely met by street food vendors and unofficial dining places. Nonetheless, their unstructured operations, insufficient infrastructure, and scant regulatory supervision lead to gaps in food safety regulations. Even though street food vendors play an important role in the food supply chain, they usually labor in unsanitary conditions, increasing the risk of foodborne illnesses. Uttarakhand's Haridwar district serves as a symbol for this movement. Haridwar is a popular devotional place and tourist attraction, drawing lots of people, which has led to a thriving street food scene. The district offers special potential and challenges for maintaining food safety because of its socio-cultural dynamics, which are defined by a fusion of tradition and urbanization. Despite the growing recognition of the importance of food safety, there is a notable gap in research focusing specifically on the knowledge, attitudes and practices (KAP) of food vendors regarding foodborne diseases in the Haridwar district. Understanding the KAP of food vendors is crucial for identifying areas of vulnerability in food safety practices and designing targeted interventions to mitigate risks.

The aim to fill this vacuum in the literature and offer empirical data to support food safety measures and regulations that are adapted to the unique circumstances of Haridwar is what spurred this study. This study evaluates food vendors' knowledge of foodborne illness risks in order to identify areas of strength and weakness in current food safety practices among food vendors in Haridwar to elucidate the factors influencing these practices, including sociodemographic characteristics and environmental factors and Propose evidence-based recommendations for enhancing food safety standards and promoting public health in the district

The objective of this study to assess the knowledge, attitude, and practices of food vendors regarding foodborne diseases in the Haridwar district which entails conducting a comprehensive evaluation of the KAP of food vendors operating in the Haridwar district with regard to foodborne diseases to understanding and awareness of foodborne diseases, their causes, symptoms, and preventive measures among food vendors. To understand the

perceptions, beliefs, and feelings towards food safety practices, including their willingness to adopt hygienic behaviors and comply with regulations and to know the actual behaviors and actions undertaken by food vendors in handling, preparing, and serving food, as well as the implementation of food safety measures in their establishments.

This study helps in improving Public Health Outcomes because it has the potential to greatly enhance public health outcomes, especially in Uttarakhand, India's Haridwar area. Foodborne illnesses are a major public health burden since they cause a large number of illnesses, hospital admissions, and occasionally even fatalities each year. It also helps in empowering Food Vendors and Promoting Equity by giving them the information and abilities needed to guarantee the safety of food they prepare and sell; this study has the potential to empower food vendors. This research will better equip food vendors to prevent foodborne disease in both themselves and their customers by implementing safer food handling procedures and promoting a better grasp of food safety concepts. In addition to its immediate practical implications, this study also contributes to the scientific knowledge base on food safety and foodborne diseases particularly in the context of street vendors in India. This study fills an essential gap in the literature by undertaking a complete assessment of food sellers' food safety KAPs in the Haridwar area, providing useful insights into the region's food safety procedures. The study's findings can be used to inform future research and exploration of food safety issues in urban settings in India and around the world.

## Review Of Literature

### 1. Food Borne Illnesses

(Abdul-Mutalib, Syafinaz, Sakai, & Shirai, 2015) Food borne disease is a broad category of sickness that is becoming a global public health concern. According to (WHO, 2022), they are brought on by eating food tainted with bacteria, fungus, viruses, and parasites most. The main causes of this outbreak are typically pathogenic bacteria such as *Salmonella Typhi*, *Escherichia coli*, *Staphylococcus aureus*, *Vibrio cholera*, *Campylobacter jejune*, and *Listeria monocytogenes*. The toxin secretion of the microorganisms in the intestinal tract of the infected individual is usually the cause of this outbreak. Worldwide, foodborne microorganisms have been found to be a major source of morbidity. They can also adapt to new settings and are interested in developing a more potent and effective breed of bacteria. Subsequent studies must focus on measures to reduce or prevent the situation. This is due to the fact that foodborne bacteria will also evolve, and developing a vaccine or antibiotic could provide some relief. The scope of foodborne disease and food safety in the twenty-first century has expanded because of variety of evolving influences. In addition to foodborne illnesses caused by known pathogens (bacterial, viral, and parasitic), new foodborne illnesses have been discovered as a result of emerging and reemerging pathogens. Foodborne illnesses are increasingly linked to environmental risks, social and behavioral variables, advancements in science and technology, and changes in the population. In India, developing suitable food safety policies is hampered by a severe lack of epidemiological data on food-borne illnesses. (CD Allert, 2017)

A review of the food safety research in India highlights a lack of reliable data on key topics such as HACCP, risk assessment, and KABP. In India there is very few studies have been conducted to evaluate food hygiene and food safety practices in catering organizations. Also, Poor hygiene and safety knowledge among food handlers pose a significant risk of microbial contamination. India's exporters of agricultural products and processed food are expected to prioritize risk identification and early warning techniques in the future. The Indian government formed the Food Safety and Standards Authority (FSSAI) to address this issue and minimize misunderstanding generated by several statutes. (Yadav, Mahna, & Rekhi, 2015)

One of the common problems associated with selling street food is the real and potential danger posed by bacterial contamination. The operating conditions of street vendors are often undesirable, both in preparing and selling food. Foodborne diseases have increased in recent years and have negative consequences for the health and economy of many developing countries. (Akabanda, Hlorts, & Owusu-Kwarteng, 2017) Carelessness and lack of hygiene by food handlers can allow pathogenic bacteria to come into contact with food and, in some situations, live and multiply in sufficient numbers to infect consumers. Food handlers also usually lack training in food safety and hygiene measures. (Okojie & Isah, 2014)

## 2. Food Handling

According to (Prabakaran & Srinivasan, 2024) When it comes to basic cooking skills, 98.2% of respondents knew that vegetables should be cleaned before being sliced. It can be washed more than once, according to 92.7%. Just tap water should be used for washing, according to 66.4% of respondents, while drinking water should be utilized for cooking (71.8%). 37.3% of respondents believed that food could be reheated as often as needed, and 45.5% believed that oil could be reused repeatedly. The majority 94.5% of respondents said that the cooking area needed to be cleaned. Merely 29.1% said that cleaning the service area was always necessary. The majority (97.3%) believed that food and drink containers ought to be kept closed. Just 20.9% of respondents said that pest and bug protection should be guaranteed. The majority, 98.2%, believed that disposing of waste properly was crucial.

In study of (Singh & Singh, 2024) shows that 35.4% of street food sellers had never heard of food-borne illnesses, while 59% of them were aware that eating inadequately cleaned fresh fruits and vegetables might be harmful to one's health. Of the 110 food handlers, none had received any sanitation or hygiene instruction. Sixty-six percent of food handlers disagreed with the idea that workers should cover their heads and wear aprons, while only 37 percent agreed. Upon evaluating the individuals' food hygiene procedures, it was discovered that the majority of food handlers (55.4%) washed fruits and vegetables with tap water. Due to limited availability to water, used utensil care was inadequate. The WHO stated that the availability of water that is suitable for drinking and washing is one of the biggest issues facing street food vendors. As a result, while operating a street food business, water supply needs careful consideration. When asked about their sanitary procedures in the storage area, the food handlers revealed that (44.5%) of the respondents cleaned their storage area once a week, (32.7%) once a day, (14.5%) twice a week, and (8.1%) once a month. This study found that food merchants follow somewhat hygienic storage area measures.

This study found that almost half of food vendors had very poor food hygiene practices and knowledge. Food hygiene attitudes and customer feedback were all significantly associated with food hygiene knowledge. Furthermore, licensing status, food hygiene information, and food hygiene training were found to be statistically associated with food hygiene practices. There were significant relationships found between food safety practices and knowledges, as well as knowledge and attitude. (Azanaw, Engdaw, Dejene, Bogale, & Degu, 2022). According to a study in Bangladesh, street food vendors have low food safety knowledge, negative food safety attitudes, and poor to moderate food safety practices. Several sociodemographic variables are linked to street food vendors' food safety knowledge (age, income, marital status, work experience and residence), attitudes (age, marital status, income, and education level), and practices (education level and work experience in food handlers). Given the associated public health concerns that can arise as a result of insufficient or a lack of food safety, including poor food handling or preparation practices, there is a need for targeted strategies and measures such as education about foodborne pathogens and their negative impact, food safety trainings, awareness campaigns, and financial support to improve street food vendors' knowledge, attitudes, and food safety practices. To prevent foodborne illness and related outcomes, the government organizations, in collaboration with local authorities, should make concrete efforts to ensure the safety of street foods and improve street food vendors' knowledge, attitudes and level of practice through targeted informational campaigns as well as strict monitoring and regulation. (Abid, Banna, & Hamiduzzaman, 2022)

Secure food supplies promote trade, tourism, national economies, food and nutrition security, and sustainable development. The number of people purchasing and consuming food prepared in public spaces has increased due to urbanization and changes in consumer behavior. The global food chain is getting longer and more complex as a result of rising consumer demand brought on by globalization. Food safety is expected to be impacted by climate change as well. Food handlers and producers have an increased obligation to ensure food safety as a result of these difficulties. Localized incidents have the potential to rapidly escalate into global emergencies because of the rapid and extensive spread of products. (WHO, 2022)

According to this study in China Street food vendors had very limited knowledge of safety practices and provided vague information on future planning and reactivation of the area. Almost all respondents

(nearly 95%) responded positively to hygiene-related questions, indicating a focus on business. However, personal observations and inquiries did not yield positive results due to improper food handling, serving, and storage procedures. During food preparation, only 38.09% of vendors wore clean clothes, 28.57% wore jewelry, and only 9.52% were concerned about their fingernails due to bare-handed service. Some vendors (23.81%) handled money while serving food, but none were aware of hair and hand protection. Some vendors (47.62%) served food on paper plates. 71.43% of vendors took leftover food home, while 9.52% stored it without refrigeration for the next day. Some vendors (52.38%) reported washing their hands, while 42.86% did not. Of those who washed their hands, 42.86% reported using only water, 14.28% soap, and 23.81% detergent. (Ghatak&Chattarjee, 2018)

## 3. Burden of Food Borne Disease

Between 2009 and 2018, there were 2688 food-borne disease outbreaks that were reported to the IDSP, resulting in 153,745 illnesses and 572 people are died. Every year, an average of 269 outbreaks (range: 67–383), 15,375 illnesses (range: 5147–23,425), and 57 people dead (range: 26–109) reported. Food-borne disease outbreaks occurred at a rate of 2.2 outbreaks per 10,000,000 people on average each year, reaching a peak of 3.2 in 2016. The highest number of cases of illness—22,177 cases in 2013 and 23,425 cases in 2016—were reported in these years, accounting for 30% of all food-borne illness cases. Only 0.37% of cases had resulted in a death as of December 2018, with 69% of those deaths happening between 2009 and 2013. The majority (19%) of these deaths are reported and happened in 2012. Over the next five years, the percentage of deaths dropped to 31%, but the percentage of illnesses rose to 56%. (Bisht, Kamble, Chaudhary, & Chaturvedi, 2021)

A recent World Bank report highlights the "unnecessarily high" economic burden caused by food-borne diseases, despite the fact that the cost of unsafe food in India has nearly halved from \$28 billion in the previous year. India and China bear 49% of the economic burden from foodborne diseases (FBDs) in low- and middle-income countries, and 71% in Asia. However, the report shows that China alone accounts for more than \$30 billion of the total burden, more than doubling India's share. Animal-sourced foods are estimated to account for 21% of India's foodborne disease burden, compared to 59% in China. The report, titled 'The Safe Food Imperative', was recently discussed at the World Health Organization's first international food safety conference. The report recognizes India's recent efforts to streamline food safety regulations, highlighting the potential for improved health and commercial outcomes through collaboration among public agencies, businesses, and consumers. The Food Safety and Standards Authority of India (FSSAI) establish measures such as tight packaging and labeling, restaurant and street food regulation, and food product assessments to assure food quality in India (Times of India, 2019).

(Gupta, Dudeja, & Minhas, 2017) In poor nations, street food plays a significant role in the food supply chain. These foods are typically made and marketed in unclean settings with little access to sanitary facilities, safe water, or trash disposals. Therefore, eating food from the street increases your chance of contracting food poisoning from microbiological contamination, inappropriate use of food additives, adulteration, and environmental pollution. WHO has issued specific rules about the responsibilities of street-food vendors.

The aim of public health surveillance is to define the magnitude and burden of a disease, to identify causative and predisposing factors, and to investigate outbreaks so that control measures can be implemented quickly and to assess the impact of prevention as well as control efforts. Foodborne disease public health surveillance is critical for identifying common causative agents, as well as reporting and investigating all outbreaks. It will be followed by specific suggestions for future prevention and control. There should be a clearly defined organizational structure that regulates surveillance throughout the country, with state and district nodal officers. Standardized reporting formats should be developed, and capacity building should be undertaken. (Kohli & Garg, 2015)

Food safety knowledge varied among research, but most participants had limited understanding of cross-contamination, foodborne diseases, and pathogens. Research studies in the Gulf region have concentrated mainly on food handlers in hospitals, universities, and restaurants. Some studies conducted in Saudi Arabian and Kuwaiti hospitals found that catering personnel and supervisors had adequate

food safety knowledge. However, this research revealed some significant gaps in food safety knowledge. For example, more than 90% of food handlers stated that they keep there working on if they were sick until the disease was proven, while one-third claimed they would not disclose sickness to avoid getting unpaid. Similarly, research conducted in another hospital discovered that almost half of food handlers had limited awareness of foodborne pathogens, factors influencing microbial growth, and cross-contamination, with around 40% unaware of the ideal temperature for refrigerated items. It was also found that hospital food staffs have poor understanding of foodborne bacteria and proper food storage temperatures. These findings are particularly alarming because hospital food service staff serve meals to vulnerable patients with impaired immune systems. (Sulaiman, 2023)

**Aim and Objectives**

**Aim**

To assess knowledge, attitude and practices of food vendors regarding food-borne disease in district Haridwar.

**Objectives**

The study is focused on the following two broad objectives:

- 1) To assess knowledge, attitude and practices of food vendors regarding Food-borne disease.
- 2) To find out the association of knowledge and practices of food vendors regarding Food-borne disease with sociodemographic factors.

**METHODOLOGY**

**Study Design:** This was a workplace- based cross-sectional study to find out the Knowledge, Attitude and Practices of Food Vendors regarding Food Borne Disease in district Haridwar.

**Study Area:** Study was performed in Haridwar. The Haridwar occupies approximately 2360 sq.km. area. The district is administratively subdivided into 4 tehsils i.e. Haridwar, Laksar, Roorkee, Bhagwanpur and six other development blocks i.e. Roorkee, Bhagwanpur, Narsan, Bahadrabad, Khanpur and Laksar. According to the Nagar Nigam Haridwar, its divided into 60 wards.



Figure 1: Map of Haridwar.

**Study Population:** Roadside Food Vendors in the study area. Mostly available in clusters of 3-4 in a particular area like small market area, outer of small mall, Chowks, outside sabzi mandi, outside manufacturing plants, outside court, outside tehsil, SP city office, near red light, outside bus stand, outside hospitals, outside railway station, nearby har ki Pauri.

**Inclusion Criteria**

All food vendors in study area who are willing to participate and Food vendors who are working from at least 6 months at study area.

**Exclusion Criteria**

Food vendors who refused to give consent and who have age below 18 years.

**Sample Size:** While literature review, previous study which was done on Ethiopia showed that majority of food vendors had knowledge regarding transmission of disease by not following standard food safety practices, the study's sample size is calculated using a single formula of population proportions based on the following assumptions over three fourths (79.7%) [Jember Azanaw 2021] of the food vendors have knowledge about food safety practices. The percentage of knowledge among street vendors is 79.7% (p), the confidence level is 95% that is 1.96 (z) and 5% margin of error (d)

$$n = (Z\alpha/2)^2 \times P(1-P) / d^2$$

$$n = (1.96)^2 \times 0.797(1-0.797) / (0.05)^2$$

$$n = 248.6 \sim 249$$

[Garedew Tadege Engdaw 2021] Where n= sample size Z= at level of

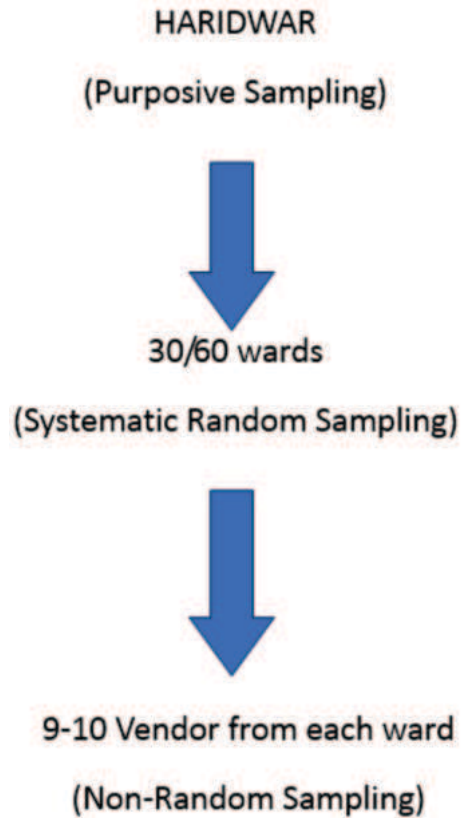
confidence-95% = 1.96

P= prevalence (79.7% or 0.797) d= Margin of error (5% or 0.05)

After adding 10% non-response rate, final sample size is 249 + 24.9 = 273.9~274

**Sampling Technique**

According to Municipal corporation, Haridwar have 6 blocks (Narsan, Roorkee, Bhagwanpur, Bahadarabad, Laksar, Khanpur) and 4 tehsils (Haridwar, Bhagwanpur, Roorkee, Laksar) of which Haridwar urban is divided into 60 wards.



**Study Duration**

Activity	Duration
Changes in Proposal and Ethics Approval	1 <sup>st</sup> month
Data Collection	2 <sup>nd</sup> to 3 <sup>rd</sup> month
Data importing in excel, Cleaning and Plan for Analysis	4 <sup>th</sup> month
Coding and analysis preparation of final report	5 <sup>th</sup> month
Finalization and Submission of the project	6 <sup>th</sup> month

**Study Tools:** A self-made pretested questionnaire will be used.

- 1) Sociodemographic profile (age, education, Socio-economic status, income, marital status)
- 2) Knowledge, attitude, and practice regarding Foodborne disease.
  - a) Knowledge section will cover the awareness and knowledge about transmission of Foodborne disease by reuse of un washed utensils, Unhygienic.
  - b) Attitude section will cover any contaminants, exposure, knife cut and transmission of disease from that cut.
  - c) Practice will cover hand wash before and after every customer, use of washed utensils every time, use of sanitized knife, boilers, washed and boiled raw vegetables, safe drinking water, hygiene disposable system.
  - d) knowledge section contains 15 questions for 'True' 1 score is given and for 'False, don't know' 0 score is given. Then total score was calculated by adding all the correct answers and dividing it with 15.
  - e) Attitude section contains 11 questions for 'Agree' 1 score is given and for 'Disagree, No idea' 0 score is given. Then total score was calculated by adding all the correct answers and dividing it with 11.
  - f) Practice section contains 13 questions for 'Always' 1 score is given and for 'Never, Rarely, Sometimes, often' 0 score is given. Then total score was calculated by adding all the correct answers and

- dividing it with 13.
- For observations checklist of 12 questions from 12 golden rules mentioned by FSSAI, was used.

Total scores of Knowledge, Practices and Attitude then converted into percentage and the percentage is categorized according to the Bloom's Criteria. (27)

Knowledge Level	Frequency	Percentage
Low Level	157	57.3
Moderate Level	85	31.0
High Level	32	11.7
Attitude Level		
Poor Attitude	127	46.4
Moderate Attitude	147	53.6
Practice Level		
Poor	264	96.4
Moderate	8	2.9
Good	2	.7

**Pre-testing of the Questionnaire:** A Pre-test was done prior to the start of study, on 30 subjects to test the validity of questionnaire. Participants involved in a pre- test were included in study. Its Cronbach's Alpha Value came out to be 0.68, which is acceptable.

Cronbach's Alpha	Number of Items
0.68	51

**Study Variables**

- Independent variables: Age, Education, Marital status, Type of shop
- Dependent variables: Knowledge about Foodborne disease, Attitude and practice regarding Foodborne disease.

**Outcome Measures**

A set of 15 questions with three possible answers (“True”, “False” and “Don't know”) was used to analyze the participants' knowledge of food handling safety. This section covered personal hygiene and sanitation, contamination between items, utensil cleaning, appropriate temperature, reheating of food, pathogens transmitted via food and disease. According to (Mitri.C, Mahmoud, Elgerges, &Jaoude, 2018), each correct answer that was addressed as “True” was marked as 1 point, while “False” and “Don't know” have 0 responses in this section. Each participant might receive a total score that can range from 0 to 15, with higher scores indicating a higher level of food safety knowledge. The participants' opinions regarding food safety were measured using an 11-item scale. This section contained information on responsibility for procedures for food safety, the impact of foodborne diseases on socioeconomic development, food contamination, and refrigerator maintenance. All questions had three possible answers: “agree”, “Disagree” and “no idea”. For each response of “agree”, has 1 point, whereas for responses of “disagree” and “no idea”, has 0 (Mitri.C, Mahmoud, Elgerges, &Jaoude, 2018). Summing the overall scores (range: 0-11) helped to estimate the food safety attitude of the participants. Food safety practices included knowledge on role of personal hygiene, hand-washing habits, and food- borne illness and cross-contamination prevention strategies. Practice section contains 13 questions for 'Always' 1 score is given and for 'Never, Rarely, Sometimes, often' 0 score is given. Then total score was calculated by adding all the correct answers and dividing it with 13 (Al Banna, et al., 2021).

**Data Collection**

- Participation Information sheet was given to food vendors in local language and study was explained to study participants.
- Informed consent was taken. Data was collected through one-to-one interview method.
- Socio-demographic details include age, education, socioeconomic status, marital status, monthly income etc was collected.
- Pre-tested questionnaire was used to understand the Knowledge, attitude and practice (KAP) regarding Foodborne disease.
- Language of questionnaires was both English and Hindi.

**Operational Definitions**

- Shop owner: vendors who have proper infrastructure and permanent shelter shop.

- Roadside vendors: vendors who doesn't have proper infrastructure or permanent shop
- Using Bloom's cut-off point, knowledge had been scored as good (80%-100%), moderate (60-79%), or bad (less than 60%).
- The overall attitude and practice were categorized using Bloom's cut-off point, had been scored as good (80%-100%), moderate (60-79%), or bad (less than 60%).

**Statistical Analysis**

- After collecting the relevant data, it was entered and cleaned using Microsoft Excel.
- Once all data was entered, it was imported and analyzed in SPSS version 26 software.
- Descriptive statistics including frequency, percentage and mean were calculated.
- For inferential statistics, the Chi-square test was used. The association between vendor's Knowledge, Attitudes and Practices regarding food borne disease and sociodemographic factors was calculated using these tests, with a significance level of 0.05 and a 95% confidence interval.

**Ethical Considerations**

- The approval for this study was taken from the Institutional Ethics Committee of the Indian Institute of Public Health, Delhi (IIPH-D). Permission from the college administration was taken before collecting the data.
- Participant were informed in their local language about the study.
- All details are confidential.
- Purpose of study was explained to the participants in lay terms avoiding words which are overly scientific.
- Written informed consent was taken from participants. Consent was verbally explained to the participant in their local language.
- They were informed that participation is voluntary.
- If the participant was illiterate an independent witness sign was taken and thumb print of the participant was taken.

**RESULTS**

A workplace-based cross-sectional study was organized to find out the knowledge, attitude, and practices of food vendors regarding foodborne disease in district Haridwar. We also find out the association of knowledge and practices of food vendors regarding foodborne disease with sociodemographic factors.

**Socio-demographic Characteristics Of Study Participants**  
**Table 1- Age Distribution Of The Study Population (N=274)**

Age Category	Frequency	Percent
18-25	78	28.5
26-35	104	38.0
>36	92	33.6
Total	274	100.0

Among the total sample of 274 individuals, 78 participants (28.5%) are aged 18-25, 104 participants (38.0%) are aged 26-35, and 92 participants (33.6%) are over 36 years old.

**Table 2: Gender (N=274)**

Gender	Frequency	Percent
Female	116	42.3
Male	158	57.7
Total	274	100.0

Nearly half of the participants; 116 were female (42.3%) and 158 were male (57.7%).

**Table 3: Religion (N=274)**

Religion	Frequency	Percent
Hindu	236	86.1
Muslim	36	13.1
Sikh	2	.7
Total	274	100.0

Most of the participants 236 were Hindu (86.1%), 36 were Muslim (13.1%) and 2 were Sikh (0.7%).

**Table 4: Food Safety Training (N=274)**

Training	Frequency	Percent
No Training	274	100.0

None of the 274 participants had received food safety training, representing 100% of the sample.

**Table 5: Marital Status (N=274)**

Marital Status	Frequency	Percent
Married	154	56.2
Single	120	43.8
Total	274	100.0

154 were married (56.2%) and 120 were single (43.8%).

**Table 6: Education Qualification (N=274)**

Qualification	Frequency	Percent
No Formal Education	14	5.1
Higher secondary	67	24.5
Primary	72	26.3
Secondary	121	44.2
Total	274	100.0

14 had no formal education (5.1%), 67 had higher secondary education (24.5%), 72 had primary education (26.3%), and 121 had secondary education (44.2%).

**Table 7: Monthly Income (N=274)**

Monthly Income	Frequency	Percent
<10,000	31	11.3
10,001-15,000	77	28.1
20,001-25,000	25	9.1
15,001-20,000	119	43.4
>25,000	22	8.0
Total	274	100.0

31 had incomes less than 10,000 (11.3%), 77 earned between 10,001 and 15,000 (28.1%), 25 had incomes between 20,001 and 25,000 (9.1%), 119 earned between 15,001 and 20,000 (43.4%), and 22 participants had incomes exceeding 25,000 (8.0%).

**Table 8: Employment Type (N=274)**

Employment Type	Frequency	Percent
Full Time	140	51.1
Part Time	89	32.5
Temporal	45	16.4
Total	274	100.0

140 were employed full-time (51.1%), 89 worked part-time (32.5%), and 45 were engaged in temporary employment (16.4%).

**Table 9: Knowledge Of Food Vendors Regarding Foodborne Diseases**

Knowledge regarding food-borne diseases	Frequency (Yes)	Percentage
Drinking and Eating at the work place leads to the risk of the food contamination.	39	14.2
Wearing gloves while preparing food lower the risk of transmitting infection to the consumers.	115	42.0
Preparing food ahead of time may result in food poisoning.	39	14.2
Reheating the food is likely to lead to food contamination.	47	17.2
Perishable foods should be stored at a temperature of 5 degrees Celsius.	113	41.2
Inappropriate application of cleaning/sanitation methods on equipment (knife, slicing machine, and refrigerator) can raise the risk of foodborne disease to the consumers.	192	70.1
Washing hand before food handling can lower the chance of contamination.	272	99.3
Wearing gloves when cooking or serving food minimizes the chance of illness transmitting to food-service employees.	106	38.7
Water for food preparation from unhygienic source leads to the chance of food contamination.	144	52.6
During infectious diseases of the skin and eyes, employees should take leave to recover from work.	172	62.8
Cross-contamination is when micro organisms from a contaminated food is transferred from one food handler's hands or utensils to another	164	59.9
All persons including children, old-ages, pregnant women and adults are at equal risk for food poisoning.	192	70.1
Typhoid can spread by food.	160	58.4
Diarrhea can spread by food.	192	70.1
Hepatitis A can spread by food.	193	70.4

Some of the participants (39, 14.2%) believes Drinking and Eating in the work place increases the risk of food contamination, Almost half of the participants (115, 42.0%) have knowledge that wearing gloves while preparing food reduces the risk of transmitting infection to consumers, Some of the participants (39, 14.2%) acknowledged that Preparing food ahead of time may result in food poisoning, Some of the participants (47, 17.2%) believed Reheating the food is likely to lead to food contamination, Half of the participants (113, 41.2%) knew that the perishable foods must be stored at a temperature of 5 degrees Celsius, Most of the participants (192, 70.1%) recognized that incorrect application of cleaning/sanitation procedures on equipment can raise the risk of foodborne disease to the consumers, Almost every participant (272, 99.3%) knew that washing hand before food handling can lower the chance of contamination, More than 1/4 of the

participants (106, 38.7%) believed that wearing gloves when cooking or serving food minimizes the chance of illness transmitting to food-service employees, Many of the participants (144, 52.6%) knew that water for food preparation from unhygienic source leads to the chance of food contamination, Majority of the participants (172, 62.8%) believed that during infectious diseases of the skin and eyes, employees should take leave to recover from work, More than half of the participants (164, 59.9%) believe that cross-contamination is when microorganisms from a contaminated food is transferred from one food handler's hand or utensils to another, Many of the participants (192, 70.1%) believed that all persons, including pregnant, children, women, elderly, and the adults, are at equal risk for food poisoning, Most of the participants (160, 58.4%) knew that typhoid can spread by food, The Majority of the participants (192, 70.1%) acknowledged that diarrhea can spread by food, Many of the participants (193, 70.4%) knew that hepatitis A can be transmitted by food.

**Table 10- Attitude of Food Vendors Regarding Foodborne Diseases.**

Attitude regarding food-borne diseases	Frequency (Agree)	Percentage
One of the most critical roles of food handlers is to uphold food safety standards.	274	100.0
Raw and cooked foods need to be preserved separately to prevent the danger of food contamination.	217	79.2
Food hygiene training for employees is a significant problem in lowering the danger of food contamination.	0	0
Workers' health status need to be assessed before to employment.	274	100.0
To limit the possibility of perishable food contamination, the refrigerator's temperature must be monitored on a periodic basis.	1	.4
Food-borne illnesses can have serious health and economic consequences for society.	274	100.0
Food-service workers' employment responsibilities include proper food handling to prevent contamination and infections	272	99.3
After serving food, whatever remains should be stored in the fridge.	274	100.0
It is not safe to leave prepared food out of the refrigerator for longer than two hours.	55	20.1
Using rings, watches raises the risk of food contamination.	32	11.7
Food handlers with infection or cuts on their hands should avoid touching meals without gloves.	149	54.4

All 274 participants (100.0%) agreed that one of the most critical roles of food handlers is to uphold food safety standards, Two hundred seventeen participants (79.2%) agreed that Raw and cooked foods need to be preserved separately to prevent the danger of food contamination, There were no participants (0.0%) who agreed that Food hygiene training for employees is a significant problem in lowering the danger of food contamination, All 274 participants (100.0%) agreed that Workers' health status need to be assessed before to employment, Only 1 participant (0.4%) agreed that to limit the possibility of perishable food contamination, the refrigerator's temperature must be monitored on a periodic basis, All 274 participants (100.0%) agreed that Food-borne illnesses can have serious health and economic consequences for society, Two hundred seventy-two participants (99.3%) agreed that Food-service workers' employment responsibilities include proper food handling to prevent contamination and infections, All 274 participants (100.0%) agreed that after serving food, whatever remains should be stored inside the fridge, Fifty-five participants (20.1%) agreed that it is not safe to leave prepared food out of the refrigerator for longer than two hours, Thirty-two participants (11.7%) agreed that using rings, watches, and earrings raise the risk of contamination, One hundred forty-nine participants (54.4%) agreed that food handlers with any infection or cuts on their hands should avoid touching meals without gloves.

**Table 11- Practice of Food Vendors Regarding Foodborne Diseases**

Practice regarding food-borne diseases	Frequency (Always)	Percentage
Do you wash your hands prior preparing unwrapped raw foods.?	57	20.8
Do you wash your hands after preparing unwrapped raw food.?	143	52.2
Do you wash your hands prior preparing unwrapped cooked food.?	16	5.8
Do you wash your hands after preparing unwrapped cooked food.?	19	6.9
Do you cover your hairs during work.?	45	16.4
Do you use mask at the time of preparing or distribute foods.?	51	18.6
Do you always use separate kitchen utensils to preparing raw and cooked food.?	29	10.6
If you have lesions on your hands, you treat yourself and continue your task.?	52	19.0
Do you allow nails of your finger to grow as wearing gloves prevent the transmission of germs.?	64	23.4
Do you use apron during work.?	87	31.8
Do you ask to clean surfaces that contact food before and after preparing food.?	64	23.4
Do you always check expiry of food products while using them.?	36	13.1
Do you always check quality of food packaging while buying food products.?	25	9.1

Before handling unwrapped raw food, 57 participants (20.8%) reported consistently washing their hands, After handling unwrapped raw food, 143 participants (52.2%) reported consistently washing their hands, Only 16 participants (5.8%) reported that they consistently wash their hands before serving unwrapped cooked food, After handling unwrapped cooked food, 19 participants (6.9%) reported consistently washing their hands, During work, 45 participants (16.4%) reported consistently using a hair cover, When preparing or distributing foods, 51 participants (18.6%) reported consistently using a mask, To cook food and prepare raw separately, 29 participants (10.6%) reported consistently using separate kitchen utensils, In the event of hand lesions, 52 participants (19.0%) reported consistently treating themselves and completing their work, Despite the potential risk of germ transmission, 64 participants (23.4%) reported consistently allowing their fingernails to grow while wearing gloves, During work, 87 participants (31.8%) reported consistently wearing an apron, Before and after food preparation, 64 participants (23.4%) reported consistently requesting cleaning of food contact surfaces, While using food products, 36 participants (13.1%) reported consistently checking their shelf life, When purchasing food products, 25 participants (9.1%) reported consistently checking the integrity of food packages.

**Table 12- Attitude, Knowledge and Practices Levels of Food vendors Regarding Foodborne Diseases**

Knowledge Level	Frequency	Percentage
Low Level	157	57.3
Moderate Level	85	31.0
High Level	32	11.7
Attitude Level		
Poor Attitude	127	46.4
Moderate Attitude	147	53.6
Practice Level		
Poor	264	96.4
Moderate	8	2.9
Good	2	.7

32 participants (11.7%) were categorized as having a higher level of knowledge, One hundred fifty-seven participants (57.3%) were classified as having a low level of knowledge, Eighty-five participants (31.0%) fell into the category of having a moderate level of knowledge, One hundred twenty-seven participants (46.4%) were identified as having a poor attitude, One hundred forty-seven participants (53.6%) were characterized as having a moderate attitude, Only two participants (0.7%) were observed to have good practice levels, Eight participants (2.9%) were noted to have moderate practice levels, Two hundred sixty-four participants (96.4%) were found to have poor practice levels.

**Table 13: Association of Knowledge of Vendors Regarding Foodborne Disease with Sociodemographic Factors**

Variable		Knowledge Level			P value
		Low	Moderate	High	
Age Group	18-25	48 (61.5%)	23 (29.5%)	7 (9.0%)	0.556
	26-35	54 (51.9%)	34 (32.7%)	16 (15.4%)	
	>36	55 (59.8%)	28 (30.4%)	9 (9.8%)	
Gender	Male	86 (54.4%)	54 (34.2%)	18 (11.4%)	0.448
	Female	71 (61.2%)	31 (26.7%)	14 (12.1%)	
Education Level	No Formal Education	9 (64.3%)	2 (14.3%)	3 (21.4%)	<0.01
	primary	43 (59.7%)	16 (22.2%)	13 (18.1%)	
	Secondary	74 (61.2%)	36 (29.8%)	11 (9.1%)	
	Higher secondary	31 (46.3%)	31 (46.3%)	5 (7.5%)	
Monthly Income	< 10000	31 (100.0%)	0 (0.0%)	0 (0.0%)	<0.001
	10000-15000	71 (92.2%)	4 (5.2%)	2 (2.6%)	
	15001-20000	46 (38.7%)	62 (52.1%)	11 (9.2%)	
	20001-25000	7 (28.0%)	13 (52.0%)	5 (20.0%)	
	>25000	2 (9.1%)	6 (27.3%)	13 (63.8%)	

For the Age Group variable, among those aged >36, 9 participants (9.8%) had a high level of knowledge, 55 (59.8%) had a low level, and 28 (30.4%) had a moderate level (p = 0.556). Similar trends were observed for the age groups 18-25 and 26-35, Gender, among males, 18 participants (11.4%) had a high level of knowledge, 86 (54.4%) had a low level, and 54 (34.2%) had a moderate level (p = 0.448). Females showed comparable trends, Education Level exhibited significant differences, with 21.4% of those with No Formal Education, 7.5% with Higher Secondary education, 18.1% with Primary education, and

9.1% with Secondary education demonstrating high knowledge levels (p< 0.01), Monthly Income showed significant variation, with none of those earning <10000 having a high level of knowledge, whereas 63.6% of those earning >25000 did (p<0.001).

**Table 14: Association of Attitude of Vendors Regarding Foodborne Disease with Sociodemographic Factors**

Variable		Attitude Level		p value
		Poor	Moderate	
Age Group	18-25	30 (38.5%)	48 (61.5%)	0.261
	26-35	51 (49.0%)	53 (51.0%)	
	>36	46 (50.0%)	46 (50.0%)	
Gender	Male	74 (46.8%)	84 (53.2%)	0.903
	Female	53 (45.7%)	63 (54.3%)	
Education Level	No Formal Education	14 (100.0%)	0	< 0.001
	Primary	35 (48.6%)	37 (51.4%)	
	Secondary	60 (49.6%)	61 (50.4%)	
	Higher Secondary	18 (26.9%)	49 (73.1%)	
Monthly Income	< 10000	17 (54.8%)	14 (45.2%)	0.452
	10000-15000	40 (51.9%)	37 (48.1%)	
	15001-20000	49 (41.2%)	70 (58.8%)	
	20001-25000	10 (40.0%)	15 (60.0%)	
	>25000	11 (50.0%)	11 (50.0%)	

Among different age groups, no significant differences in attitude levels were found (p = 0.261), Gender did not notably impact attitude levels, with similar percentages of Poor and Moderate attitudes observed among males and females (p = 0.903), However, education level exhibited a significant association with attitude, particularly among participants with No Formal Education (p < 0.001), Monthly income did not demonstrate a significant association with attitude levels across different income brackets (p = 0.452).

**Table 15: Association of Practice of Vendors Regarding Foodborne Disease with Sociodemographic Factors**

Variable		Practice			p value
		Poor	Moderate	Good	
Age Group	18-25	77 (98.7%)	1 (1.3%)	0 (0.0%)	<0.05
	26-35	101 (97.1%)	1 (1.0%)	2 (1.9%)	
	>36	86 (93.5%)	6 (6.5%)	0 (0.0%)	
Gender	Male	116 (100.0%)	0 (0.0%)	0 (0.0%)	<0.01
	Female	148 (93.7%)	8 (5.1%)	2 (1.3%)	
Education Level	No Formal Education	13 (92.9%)	1 (7.1%)	0 (0.0%)	<0.01
	Primary	72 (100.0%)	0 (0.0%)	0 (0.0%)	
	Secondary	120 (99.2%)	0 (0.0%)	1 (0.8%)	
	Higher Secondary	59 (88.1%)	7 (10.4%)	1 (1.5%)	
Monthly Income	< 10000	31 (100.0%)	0 (0.0%)	0 (0.0%)	<0.001
	10000-15000	77 (100.0%)	0 (0.0%)	0 (0.0%)	
	15001-20000	119 (100.0%)	0 (0.0%)	0 (0.0%)	
	20001-25000	22 (88.0%)	3 (12.0%)	0 (0.0%)	
	>25000	15 (68.2%)	5 (22.7%)	2 (9.1%)	

Among participants aged >36, there were no instances of good practice, with 6 (6.5%) exhibiting moderate practice and 86 (93.5%) demonstrating poor practice, showing a significant association (p<0.05), Male participants displayed a complete absence of good practice, with all (100.0%) showing poor practice, Participants with no formal education did not exhibit any instances of good practice, while all (100.0%) displayed poor practice, indicating a significant association (p<0.001), Income level showed notable disparities, with individuals earning <10000 or 10000-15000 showing no instances of good practice, whereas 9.1% of those earning >25000 demonstrated good practice, indicating a significant association (p<0.001).

Checklist	Frequency (%)
Vending premises clean and pest free.	132 (48.2%)
Potable water for preparation.	274 (100%)
Keep Hot food Hot and Cold food Cold.	131 (47.8%)
Handle and store types of food separately.	186 (67.9%)
Store cold food at cool temperature.	187 (68.2%)
Use separate chopping boards, knives etc.	1 (0.4%)
Wear clean clothes.	273 (99.6%)
Wash hands before and after handling food and after using toilet. Coughing, Sneezing etc.	186 (67.9%)
Bandage to cover cuts.	81 (29.6%)
Handle food when unwell.	80 (29.2%)
Clean and separate dusters to clean surfaces.	167 (60.9%)
Separate and covered dustbins for food waste.	167 (60.9%)

For observations checklist of 12 questions from 12 golden rules mentioned by FSSAI was used 48.2% of vending premises were clean and pest-free, All (100%) vendors used potable water for preparation, 47.8% adhered to keeping hot food hot and cold food cold, 67.9% handled and stored different types of food separately, 68.2% stored cold food at cool temperatures, Only 0.4% used separate chopping boards and knives, Nearly all vendors (99.6%) wore clean clothes, 67.9% washed their hands before and after handling food, and after using the toilet, coughing, or sneezing, 29.6% used bandages to cover cuts, 29.2% continued to handle food when unwell, 60.9% used clean and separate dusters to clean surfaces, 60.9% also had separate and covered dustbins for food waste.

## DISCUSSION

This study was conducted to analyse the knowledge, attitude, and practices of food handlers regarding foodborne diseases. In district of Haridwar. Total 274 participants were included in the study who have shops in the study area. Most of the respondents were male and majority of the participants were married similar to findings in Indian and Malaysia studies. (20-25)

Total Majority of the participants have poor knowledge regarding food-borne disease. One fourth of participants have moderate level of knowledge. More than half of the participants have moderate attitude regarding food borne disease. Majority of the participants have poor practices regarding food borne disease. (20-22)

Majority of the participants have knowledge that water for food preparation from Unhygienic source raise the risk of food contamination same findings were observed in Ethiopia and India studies (20,23,24,25) several studies performed in different countries shows that majority of street food handlers had poor knowledge of food hygiene (25). Majority of the respondents in this study have moderate attitude which have significant association with education qualifications (<0.01). Similar findings were observed in other studies (21,22,25)

Practice refers to how people demonstrate their knowledge and attitudes through their actions. In our current study, although food vendors exhibited a favourable knowledge, this was not reflected in their practices. Majority of the respondents have poor practices. In our study we found strong association between practices of participants and sociodemographic factors like age group, education, gender, income. Similar kind of finding are identified in other studies (21-25)

## Strength Of The Study

1. Comprehensive evaluation of knowledge, attitudes and practices among participants, providing a detailed understanding of their behaviors and beliefs regarding food borne disease.
2. The study's methodology allowed finding out specific gaps and areas for improvement, which can inform targeted interventions.
3. The findings offer valuable insights that can guide future educational and policy efforts to improve health outcomes.

## Limitations

1. Since list of vendors was not available, vendors in the study area were selected conveniently.
2. Since the practices of study participants were self-reported and not objectively monitored, social desirability bias cannot be ruled out.
3. Most of the study participants were from the informal sector, so the study results may not be generalizable to all shop vendors.

## Recommendations:

1. Training and workshop can be conducted regarding awareness and Adequate practices for foodborne disease.
2. Health education programme and IEC materials can be developed. Mass media and health care individuals can play a big role in promoting Adequate knowledge related to foodborne disease.
3. Further research on the larger sample can be done. Qualitative research can be conducted for better understanding of barriers and enablers.
4. Licensing and registration of shops by local government authorities can help in providing
5. training and monitoring quality of services.

## CONCLUSION

In the present study which was conducted in Haridwar showed that majority of food vendors had good knowledge about food borne disease and most of them have moderate attitude and majority of

participants have poor practices regarding food borne disease. Majority of shops were not registered. This study showed that good knowledge and moderate attitudes do not necessarily change into good practices, as shown by the results. This study can help to find various factors that influence outcomes and should be considered when training street food vendors.

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