



Awareness of Food Safety Practices among Households in Punjab, Pakistan

Abdulaziz Thabet Dabiah¹, Khodran Hamdan Al-Zahrani¹, Muhammad Muddassir^{1,*}, Abdulmalek Alsanhani¹, Muhammad Kashif² and Ayesha Aziz³

¹Department of Agricultural Extension and Rural Society, College of Food and Agriculture Sciences, King Saud University, P.O. Box 2460, Riyadh 11451, Saudi Arabia

²Department of Agricultural Extension and Rural Studies, College of Agriculture, University of Sargodha, Sargodha, Pakistan

³Human Development and Family Studies Institute of Home Sciences, University of Agriculture, Faisalabad, Pakistan

*Corresponding author: ranamuddassir@gmail.com; mrajpoot@ksu.edu.sa

ABSTRACT

Foodborne diseases are an inevitable threat to Pakistan's population. The rapid spread of gastrointestinal disorders has demanded the adoption of hygiene and quality practices. Understanding households' awareness of food safety measures could play an essential role in planning an effective policy regarding implementing food safety measures to reduce foodborne diseases. Therefore, the current study investigated awareness of food safety practices among households. A simple random sampling technique was used to collect data from women's households residing in District Jhang, Pakistan. A pre-tested paper-based questionnaire was prepared in their local language. The outcomes of the analysis showed that most households were highly aware of food safety practices. The households' marital status significantly influenced their awareness of food safety. The study proposes that the Punjab Food Authority should arrange food safety programs and training sessions regarding the awareness of the health advantages of food safety practices.

Keywords: Food safety practices, Households, Women, Awareness, Punjab.

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INTRODUCTION

A foodborne outbreak is defined as an "incident during which at least two people contract the same illness from the same contaminated food or drink" (ECDC, 2020). The World Health Organization (WHO) stated that food safety generally refers to ways and methods to confirm that the production, preservation, supply, and utilization of food happen in a secure manner (WHO, 2015). These safety practices from production to consumption reduce the penetration of unwanted organisms and stains to food packaging or food environment (BRC, 2015; De Filippo et al., 2021). The consumption of contaminated food causes food borne diseases. According to Thomas et al. (2015), approximately 4 million people suffered annually from various foodborne diseases in Canada. Among all diseases, Norovirus, Clostridium perfringens, Campylobacter spp., and Salmonella spp. are rapidly spreading through contaminated food. According to WHO (2015), 1.9 million children died from various diseases

spread by contaminated food and water. Such casualties have increased health care costs in developed and developing countries. Food infectivity can occur at different levels of the food chain process (WHO, 2015). Mostly, foodborne diseases among consumers spread through poor kitchen practices and hygiene, improper cooking, reheating of food leftovers, preparation of food by infected persons, chilling food ineffectively and consumption of food after 12 hours of preparation (Unusan, 2007a, 2007b; Munck et al., 2020). Poor hygiene and the consumption of *Salmonella*-contaminated foods causes illness. The *Salmonella* outbreak in Slovakia, Spain and Poland infected 1581 people that was directly spread through infected eggs (Munck et al., 2020). Increase in its outbreak became a major concern around the world and pushed population towards ready-to-eat food products (Zweifel & Stephan, 2012). Low- and middle-income countries are passing through food hazards and foodborne disease (Pires et al., 2021; Henson et al., 2023, Riaz et al., 2024).

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The households performed as a frontline in the battle against diseases caused by infected food (Redmond & Griffith, 2009). So, it is the responsibility of households to prevent foodborne diseases through proper food handling (Unusan, 2007a). The spread of foodborne diseases is a big challenge to consumers in developed and developing countries. In Europe, *Salmonella* and *Campylobacter* are the cause of foodborne infections at large scale (Callejón et al., 2015; Myintzaw et al., 2020). According to the European Centre for Disease Prevention and Control, ECDC, (ECDC, 2020) aside from campylobacteriosis which had 246,571 reported cases, *Salmonella* is responsible for causing human infections at large scale. In 2018, around 91,857 people suffered from food borne disease in the EU. Moreover, in 2018, it has been estimated that 5146 foodborne disease outbreaks in the EU Member States subsequently resulted in illnesses to 48,365 people. *Salmonella* alone accounted for more than 30% of these outbreaks.

Proper food preparation and handling ensure food safety and prevent illness to consumers. Usually, foodborne infections spread by consuming contaminated food. Food contamination and food-borne diseases result in the growth of germs, chemical agents, and toxins at manufacturing and consumption stage (Bhunia, 2008; Nordhagen et al., 2022). Global population is extremely concerned about food safety measures to increase public health benefits and environmental improvements. Among all consumers, pregnant women (Wu et al., 2018; Gazu et al., 2023), elders and immunosuppressed people, children under five years are susceptible to food borne diseases

(Silk et al., 2012; Amenu et al., 2021). It believes that conventional food safety practices at home (Ayaz et al., 2018; Al-Kandari et al., 2019), poor food handling in the restaurants and food industries could create food safety issues (Taha et al., 2020; Liguori et al., 2022). Currently, the majority of the households in Pakistan may or may not be aware of food safety practices and threats of ineffective food safety. Therefore, the goal of the current study was to investigate the awareness of food safety practices among households in the District Jhang. The findings of the study could be used by Food authorities of the country that are planning to offer food safety awareness programs for enhancing households' awareness with respect to food preparation, hygiene and foodborne diseases.

MATERIALS & METHODS

Description of the Study Area and Sampling Technique

The Jhang District is divided into 8 towns commonly known as Jhang city, Shorkot, Ahmadpur Sial, Garh Maharaja, Mari Shah Sakhira, Bagh (Jhang), Chund Bhawana, and Jabboana (Profile, 2024) (Fig. 1). The quantitative questionnaire was used to evaluate the awareness about the food safety practices among households' women. Jhang city was purposely selected. Because of the lack of household lists, a convenient sampling technique was used to select respondents. A total of 149 households within Jhang city were selected for the this study as per convenience. Women (aged 18 and above) who prepared food at home on a daily basis were interviewed (Fig. 2).

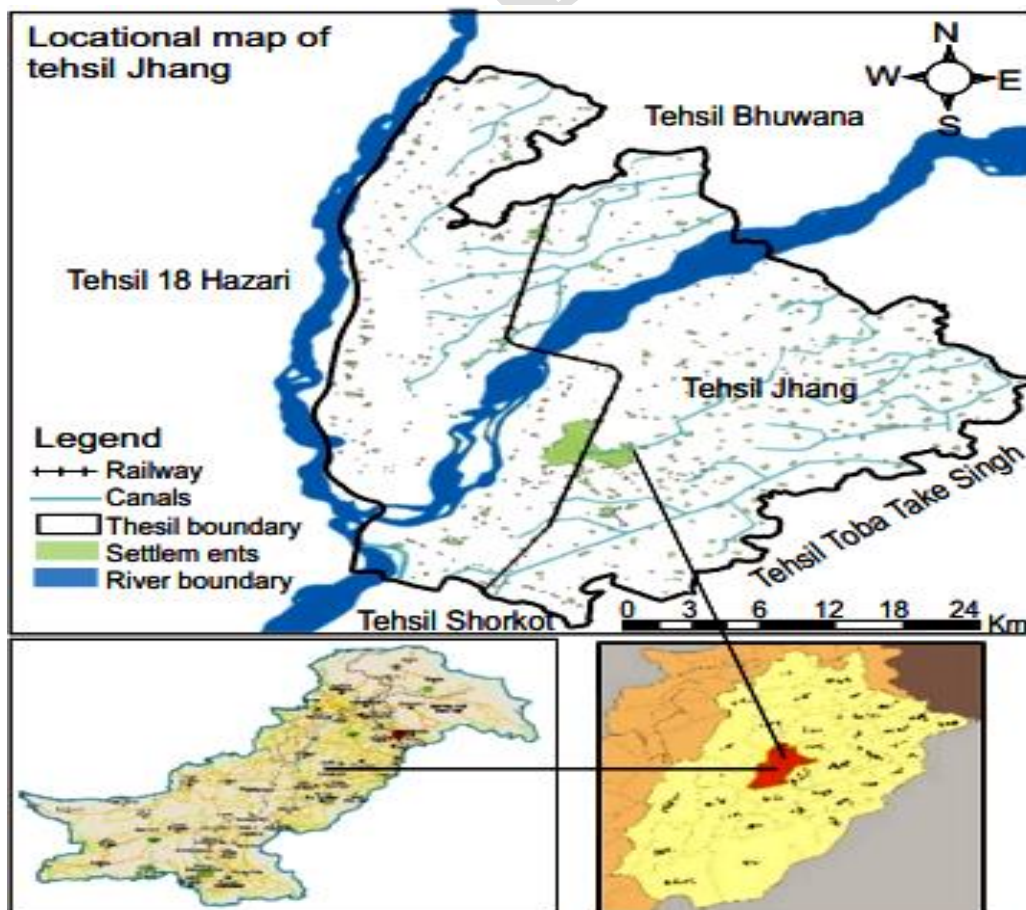


Fig. 1: Map of the study area.

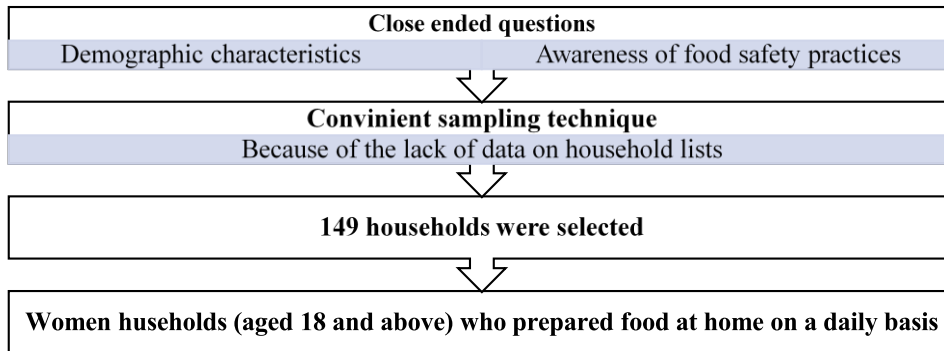


Fig. 2: Sampling Technique for study.

Research Design and Data Collection

A paper-based well-structured closed-ended questionnaire was designed from previous research, used to collect data from household women by conducting face to face interviews (Ayad et al., 2022). The questionnaire was translated into Urdu to avoid wrong responses. The questionnaire consisted of three parts. The first part included demographic characteristics on age, education, cooking experience and marital status. The households' education and cooking experience (1=low; 2=high) and age (1=young; 2=older) were computed as new nominal variables, using their raw scores. School education was considered as low education. Whereas college and university education were considered as high education. From 5-15 years of cooking experience was considered as low experience, whereas 16 to more than 20 years of cooking experience was considered as high experience. The age group of 18 to 29 years was considered as young women, whereas the age group of 30 to more than 50 years was considered as older women. The second part contained questions related to the awareness of food safety measures and handling and the five-point Likert scale (1=not aware at all) to (5=highly aware) was used to obtain responses. Data were collected from 30 household women for a pilot study to test the reliability of the questionnaire (Cronbach's alpha=0.81).

Statistical Analysis

SPSS software was used for data analysis. A descriptive test was used to calculate percentage, mean and standard deviation. For the nominal variables with two categories (age, education, cooking experience and marital status), the independent t-test was used to determine differences in the awareness of food safety practices among households according to their socio-economic characteristics.

RESULTS

Table 1 shows socio-economic characteristics of the respondents, more than two-fourth (52.3%) of the respondents were older. Around two-fourths (47.7%) of the respondents were younger. Around three-fifth (59.7%) of the respondents had higher education. More than two-fifth (40.3%) of the respondents had low education.

More than two-fourth (51%) of the respondents had high cooking experience, more than two-fifth (49%) had low cooking experience. Among the married respondents, more than three-fifth (65%) of the respondents were married and around 35% were unmarried.

Table 1: Socio-economic Characteristics of the Respondents

Items	Gender	
	Frequency	Percentage
Age		
Young	71	47.7
Old	78	52.3
Education		
Low	60	40.3
High	89	59.7
Cooking experience		
Low	73	49
High	76	51
Marital status		
Unmarried	52	34.9
Married	97	65.1

Table 2 shows the households' awareness of food safety measures. All responses were arranged in descending order by the average score. The statement "keeping the cooking utensils clean after use is essential" ranked first with an average score of 4.72. On the other hand, the statement of "food that has been cooked to 70°C or higher does not need to be reheated" ranked last by the average score of 3.80.

The results showed that most households (51%) were highly aware of food safety practices. Over one-fifth (28.2%) of them were moderately aware of food safety measures. About less than one-fifth (20.8%) indicated low awareness of food safety practices (Fig. 3).

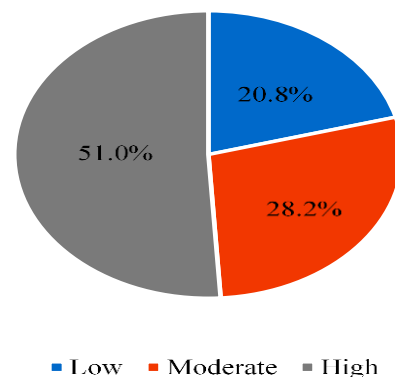


Fig. 3: Overall Awareness of Food Safety Practices Among Households.

Table 3 shows a significant difference in households' awareness of food safety measures according to their education ($t=-2.20$; $P=0.02$). The married women showed relatively higher awareness of food safety measures than the unmarried women. Regarding marital status, the difference in the means represented a large effect (Cohen's $d=0.39$).

Table 2: Awareness of Food Safety Measures among Households

Items	Not Aware	Slightly Aware	Moderately Aware	Aware	Highly Aware	Mean	SD	Rank
	%	%	%	%	%			
Keeping the cooking utensils clean after use is essential	0.7	2.7	3.4	10.1	83.2	4.72	0.715	1 st
Raw food should be kept separately from the cooked food	0.7	4.0	12.1	19.5	63.8	4.42	0.901	2 nd
Before preparing food, household members should wash their hands with soap and water	2.0	3.4	12.1	16.1	66.4	4.42	0.966	3 rd
Thorough washing of vegetables and fruits in tap water is necessary to prevent food poisoning	2.7	4.7	6.7	12.8	73.2	4.49	0.99	4 th
To check the expiry date before eating it	4.7	5.4	4.7	16.8	68.5	4.39	1.10	5 th
Hand washing with running water is not enough to remove bacteria before touching food	1.3	4.0	12.8	21.5	60.4	4.36	0.945	6 th
Good personal hygiene ensures food safety	3.4	4.0	12.8	19.5	60.4	4.30	1.05	7 th
Transfer of bacteria and viruses into food can cause food-borne illness	2.0	8.1	12.8	17.4	59.7	4.25	1.08	8 th
To clean chicken sink drain weekly prevent food poisoning	3.4	5.4	10.1	25.5	55.7	4.25	1.05	9 th
You should taste and smell the food before eating it	2.7	10.1	12.1	16.8	58.4	4.18	1.15	10 th
Cleaning agents can cause food contamination	5.4	6.0	8.1	26.2	54.4	4.18	1.15	11 th
Food contact surface should be cleaned using sanitizing agents	2.7	9.4	12.1	25.5	50.3	4.11	1.11	12 th
Avoid bare hand contact with ready to eat food	6.0	9.4	15.4	23.5	45.6	3.93	1.239	13 th
A frozen food cannot be thawed at room temperature	12.1	10.1	10.1	18.1	49.7	3.83	1.440	14 th
Food that has been cooked to 70 °C or higher does not need to be reheated	7.4	10.1	16.1	28.2	38.3	3.80	1.257	15 th

Table 3: Differences in the Households' Awareness with Food Safety Measures according to their Demographic Characteristics

Variables	Awareness of Food Safety Practices Among Households			
	Mean	SD	t	Sig 2 tail
Age				
Young (n=71)	3.87	0.43	-0.25	0.87
Old (n=78)	3.89	0.43		
Education				
Low (n=60)	3.87	0.44	-.023	0.91
High (n=89)	3.89	0.42		
Cooking experience				
Low (n=73)	3.81	0.44	-1.87	0.47
High (n=76)	3.94	0.41		
Marital status				
Unmarried (n=52)	3.77	0.45	-2.20	0.02
Married (n=97)	3.94	0.41		

Cohen's d=0.39

DISCUSSION

The present study explored the awareness of food safety practices among female households. The majority of the women were highly aware of food safety practices. These findings are similar to other studies conducted in Ireland and Saudi Arabia where the majority of the households were highly aware of food safety practices (Moreb et al., 2017). Similarly, Munir and Ali (2019) found a higher level of awareness of food safety among households. It can be expected that households might attend training sessions on food safety practices. In 2023, the Food and Agriculture Organization launched various food safety programs, seminars and awareness talks to improve awareness of food safety practices for the general community. Around eighty stakeholders participated and showed their commitments to collective action to prevent foodborne illnesses (FAO, 2023).

The socio-economic difference of the respondents revealed that the married women were highly aware of food safety practices as compared to unmarried women in the study area. Our findings are consistent with those from a study conducted in the Kingdom of Saudi Arabia, where married women showed relatively high awareness of food safety practices (Arfaoui & Alghafari, 2021). It is understandable, married women are usually responsible for food preparation for their families and are therefore

accustomed to food safety than unmarried women (Arfaoui & Alghafari, 2021). The married women in the study area received high scores in food safety practices, as it implies that these women may follow the recommended guidelines related to food safety. The married women in the developing countries are usually responsible for family care, food preparation as a mother and wife (Ahmed et al., 2020). The married women in the study area may handle food preparation like other developing countries. During the survey, researchers observed that the majority of the surveyed families did not hire working women or chefs for food preparation and seemed responsible for food preparation for their families. This could be the biggest reason behind the high awareness of the food safety practices among married women in the study area. Our findings are contradicted with those of Taha et al. (2020) found insignificant differences between gender and marital status in the United Arab Emirates regarding awareness of food safety practices.

With regard to marital status, our findings are contradicted with Ashkanani et al. (2021) found a higher level of awareness of food safety among unmarried (Moreb et al., 2017). It can be expected that unmarried households in a specific study area might hold an educational degree, diploma or certificate regarding food safety and be solely responsible for preparing food in their houses. As Shori (2017) reported highest awareness of food safety among educated households. Higher education may increase the awareness of food safety among educated women (Safari et al., 2017).

Our findings are in line with Alhashim et al. (2022) found a higher level of awareness among married households in Saudi Arabia. In the similar context, various studies revealed that married women had a higher level of awareness of food safety than single women. This might be that married households habitually better identified the consequences of food safety and more concern on personal hygiene, preventing the unsafe practice (Odeyemi et al., 2019; Tabrizi et al., 2017). It is understandable that married women might be more conscious about the health of their children and family. In Pakistan, married women are housewives commonly

responsible for food preparation. However, the age of the respondents has no effect on food safety awareness in the study area. Similar findings have been reported by (Saeed et al., 2021). The difference between the awareness levels of food safety with respect to hygiene in married and unmarried women of the current study area might be consequence the higher level of commitment and serious attention to their family health. A higher level of commitment and seriousness to family health could be improved by gaining improved information about food safety through various sources.

Punjab Food Authority, Punjab, Pakistan is running various food safety programs, around half million food handlers have attended training with a target to train 600,000 individuals by June 2025. Moreover, over ten thousand children have been instructed in healthy eating habits under the School Nutrition Program. This program is mainly focusing on grassroots enhancement by extending free training on food safety awareness and food preparation in the national language through the Electronic Learning Management System (ELMS) (Baig, 2025).

The World Health Organization has facilitated practical support for assessing the Food Safety Legal codes in Pakistan planning to find gaps and limitations in the current food laws and regulations. This review might provide opportunities for policy makers in this important area. Moreover, Food Inspectors were provided an opportunity of training on "Hazard Analysis of Critical Control Point". WHO has also supplied Food Safety Lab equipment for the training of future food inspectors on lab testing of potential harmful food/additives. Regarding awareness of food safety practices in the study area. The majority of the respondents were expecting the same kind of food safety awareness program for households. Furthermore, they were demanding free online food safety courses from the Punjab Food Authority. Well aware households did not attend any food safety sessions and learned food safety practices from their parents. The respondents of the study claimed that foodborne diseases are highly spreading and causing illnesses. No doubt, food borne disease is furthermost common in societies due to their epidemic nature.

However, the education level of the respondents has no effect on food safety awareness in the study area. Educated households stated that food borne diseases caused by bacteria, viruses and parasites and negatively affected the human digestive system. The agents of disease are transferred into our body by consuming infected foods, water and uncooked foods. The knowledge about food borne diseases among households in the study area proved that they were aware of food safety practices. Pakistan is an undeveloped country and due to improper food management, gastrointestinal problems are noted at large scale. Bacteria are the most common causes of diarrhea, villi infection, constipation and dysenteric disease in humans. Properly cooked food suggested to overcome the outbreak of the diseases (Ishaq et al., 2021; Usman et al., 2025).

Conclusion

This study assesses female households' awareness of food safety practices in Punjab, Pakistan. The findings suggest that most of the households were aware of food safety practices. Households' marital status improved their awareness of food safety practices. The findings suggest that policymakers should understand the key obstacles to households' awareness of food safety practices. The significant role of the Punjab Food Authority in creating awareness about food safety practices among households is required to accomplish the national food safety goals. Households can be educated about the potential advantages of food safety practices such as sustainable prevention of foodborne diseases using this institution. Improved awareness about food safety practices may also improve their adoption. Moreover, the Punjab Food Authority in the study area should make serious efforts to train households to prevent foodborne diseases. Overall, the adoption of food safety practices among households could reduce economic burden over medical expenditures and reduce food borne diseases. Note that the present study selected women households only from the District Jhang. The outcomes of the survey may not be useful to households of other provinces. Therefore, it is recommended that the same kind of study should be directed in other areas of Pakistan that are more prone to foodborne disease.

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Author's Contribution: ATD: Conceptualization, MM: Writing, original draft preparation, MM: review and editing, KHH: Project administration, AA: Formal analysis, Funding acquisition. AA: Investigation, Methodology, MK: Formal analysis, Data gathering.

Generative AI statement: The authors declare that no Gen AI/DeepSeek was used in the writing/creation of this manuscript.

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