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Knowledge, Attitude and Practices Regarding Food Safety and Its Effects on Human Health in Punjab, Pakistan

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Abstract
Food safety is ultimate human right for the survival of human life. Hundreds of millions of people worldwide are at the risk of risk of consuming contaminated food. Every year, millions of people become ill, and hundreds of thousands die due to underprivileged safety of food. Microbial, chemical, personal and environmental hygiene are all challenges for food from farm to fork/plate. The current study was conducted in Punjab province to investigate to assess peoples' knowledge, attitudes and practices regarding food safety at domestic level, as well as potential health hazards due to insufficient food safety practices. Sample of 700 women in three districts in Pakistan's Punjab province: Hafizabad, Rawalpindi, and Multan were selected. For analyzing the quantitative data we utilized, bivariate analysis techniques. Specifically, we employed the Chi-square test to assess the degree of significance. Additionally, researcher used the Somers'd and Gamma tests to determine the strength of association. The major findings reveal a strong link between all socioeconomic and cultural variables (i.e. monthly income, education, food preparation at home, food management at home, consumption behavior, willingness to buy, risk perception, influence of media and health effects) and women's attitudes toward acquiring knowledge and practicing food safety to maintain their health. The public was concerned about food safety and handling standards. It was discovered that television could be effective tool for disseminating information about food safety to the general public. The frequency of food preparation at home also contributes to shaping attitudes, with more frequent home preparation leading to more favorable views on food safety practices.
Keywords: Knowledge, Attitude, Food Safety Practices, Effect Human Health

1. Introduction

The World Health Organization (WHO) noted that, foodborne illness can result from various factors, including poor hygiene among food handler's, improper cooking methods, inadequate storage conditions without adherence to temperature guidelines, cross-contamination, and obtaining food from unsafe sources (Al Suwaidi *et al.*, 2015). In addition, probe related to food borne illnesses demonstrated the existence of dangerous bacteria's that cannot be prevented on the hands of food handlers (Ferreira *et al*., 2013); Soares *et al.*, 2012). Therefore, prior studies indicate that the poor appetite knowledge and practice of the handlers, as well as a bad attitude, give a critical influence on the frequency of foodborne disease (Yarrow *et al.*, 2009; Martin *et a.l*, 2012; Chapman *et al.*, 2010). Similarly, the kind of attitudes that food handlers have towards their jobs is considered to be an important factor in how they behave (Al Shabib *et al*., 2016).

In Pakistan, various infections can be found in a variety of foods. Food borne disease figures are difficult to come by in Pakistan because there is no monitoring, surveillance, or infection control. Aflatoxin contamination and mould proliferation are induced by improper milk, cereal grain, and nut processing and storage (Akhter, 2015). Pakistan, as a high-burden country, gives a 413 per 100,000 people yearly incidence rate (Raza *et al.*, 2014). Salmonella can be found in raw or half-cooked eggs, unpasteurized milk, contaminated water, and uncooked meats. Predisposing variables such as poor sanitation and non-sterile environments are responsible for 21 million infections and 21,000 deaths per year. Eighty percent of these instances occur in Asia alone (Siddiqui *et al*,. 2015).

According to a 2014 study by Ng *et al*., obesity has emerged as a major public health issue in both industrialized and developing nations. Obesity has become a serious public health concern in both developed and developing countries, as it has been related to a number of chronic diseases, including diabetes and cancer. Obesity affects people of all ages, but the prevalence of obesity among children and adolescents has increased at an alarming rate. In recent years, a number of research have been done to better understand the social, interpersonal, and psychological variables that contribute to childhood obesity and its associated health consequences (Amiri *et al*., 2011).

According to several research, shifting consumer patterns under the increasing effect of urbanization and industrialization tend to modify people's food choices and dietary practices in modern world (Kaushik *et al.*, 2011). The shift in dietary preferences, is mediated by the global environment, which stimulates the consumption of high-energy foods through commercial media promotion. Young people, obviously, are more influenced by commercial food advertising in the media than their elders (Boyland & Halford, 2013). Food preferences that include a lot of salt, sugar, and fat represent the kinds of eating habits that lead to obesity and other health problems. According to various studies, young people's nutritional needs may differ greatly from those recommended by their parents and health professionals. Various studies on youth dieting, for example, revealed that adolescent dieting was viewed as a healthy eating behavior (Nichter, 2009).

Karimi-Shahanjarini *et al. (*2010) concluded that it was critical to analyze people perceptions of healthy eating and to comprehend the factors that impact their food choices so that barriers to healthy eating could be identified. According to academics, differing ideas on what healthy eating entails might have diverse effects on people's food choices and eating habits.

People's opinions around food have altered considerably in the previous 20 years. Consumers were relying on information source from the internet and social media for making dietary choices, rather than consulting physicians or the scientific sources. This trend was fueled by the abundance of conflicting information online, where opinions of various aspects of nutrition ranged widely, from demonizing gluten while praising carbohydrates to contradictory views on GMOs. That is why having easy access to the internet

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was critical. The food sector may use social media to engage, educate, and communicate with customers while also contributing to the food safety discourse. Over the last decade, food safety has received a lot of attention throughout the world, with an estimated 200,000 to 400,000 Chinese individuals acquiring food poisoning each year (Foods1, 2010).

The incident involving contaminated infant formula served as a stark reminder of the 2003 SARS (severe acute respiratory syndrome) outbreak. During that time, the Chinese governments delayed public notification about the pandemic for four months allowed the disease to spread Hong Kong and other countries (Bradsher, 2008). Despite the fact that the government has taken a tougher stance on food safety rules, the general population remains concerned about food safety (MacLeod, 2012). Polls show that people are concerned about food safety. In 2012, 41% of respondents believed food safety in China was a very significant concern, up from only 12% in 2008.

While 61 percent of Chinese consumers had lost trust in local food supply in the previous year, 28 percent planned to replace domestic products with foreign foods/brands, according to a 2012 consumer poll (Chen & Xie, 2012). Because of the government's control over the media and the Internet, as well as a lack of institutional openness and effort to convey food safety concerns in China, grassroots communication has emerged utilizing a social media platform (or microblogs) to promote the cause of food safety (Magistad, 2012).

While food cleanliness was a crucial factor to consider when choosing a restaurant, most people did not think about food safety (Aksoydan, 2007; Sadashiv, 2023). Customers who were concerned about their safety often mirror the kitchen environment through aesthetics, clear cues, and restroom cleanliness (Barber & Scarcelli, 2009; Worsfold ,2006b; Ahmad & Khalil, 2016). Health inspectors' findings, which were commonly displayed in green, yellow, and red colors or with A, B, and C letter grades, could alert visitors to a possible risk before they enter a restaurant for what they couldn't see. When inspection findings were published, customers gain trust, and this creates a positive feedback loop by increasing corporate revenues (Hume, 2003; Ahmad & Khan, 2021).

Food borne infections (FBIs) are a major public health issue as well as a significant impediment to socioeconomic development. In 2010, the FBIs were linked to 33 million disability-adjusted life years (DALYs) lost worldwide, with children under the age of five suffering 40% of the burden (Havelaar *et al*., 2015). Due to a lack of capacity, limited resources, and fewer institutional frameworks for monitoring and prevention of FBIs, low and middle-income nations have a greater incidence of FBIs and are particularly vulnerable (Grace, 2015). Due to lengthier food distribution, handling, and cross-contamination, risks were higher in cities than in rural regions, as well as the prominence of street food sellers and open traditional markets, which are frequently inspected for biological hazards (Yeleliere, *et al.*, 2017).

Food adulteration has been a problem since the dawn of civilization, not only because it lowers food quality but also because it has several negative health consequences. The purposeful contamination of fundamental food ingredients with low-quality, non-edible, low-cost, or dangerous chemicals is referred to as "food adulteration." Mixing, substitution, keeping decaying items, faking labelling, and disguising the quantity are some of the other ways used (Abhirami and Radha, 2015; Qasim & Tariq, 2019).

Food poisoning (diarrhea) and, as a result, dehydration are the most immediate effects. Organ failure or cancer could be long-term consequences (Ali and Muhammad 2016; Ali, 2018). Filthy and polluted foods and beverages were communal harming illness sources (Nida and Yazdani, 2016). Alauddin, (2012) revealed that contaminants cause a variety of negative health effects, including vomiting, abdominal pain, allergies, asthma, and headaches, as well as psychological retardation, cardiac arrest, and cancer. If taken for a lengthy period of time, food colors might induce paralysis, brain and liver damage, kidney stone, glaucoma, blindness, heart attack, and even sudden death (Amnah Jahangir *et al*., 2016). Rhodamine B was a chemical that was both mutagenic and carcinogenic. It has a wide range of health consequences on people, including reproductive and developmental toxicity, neurotoxicity, acute toxicity, and carcinogenicity, to name a few (Gresshma and Paul, 2012). Despite the fact that methanol yellow is commonly found in food, it promotes tumor growth (Jain *et al*., 2009).

Basically, the goal of this study is to see how often people are concerned about the safety of the food they eat. Mothers or wives are most likely responsible for food management techniques at home in Pakistan, and it is primarily the female's role to serve food and keep the kitchen clean. People's familiarity with high-quality food and their food-choice motives in terms of health, food safety, and environmental issues is the subject of the study. Consumer preferences and decision-making are heavily influenced by knowledge and attitudes. Previous research has demonstrated beneficial links between consumer views and environmentally friendly food choice motives, health conscious food choice motives and food safety concern motives (Ali, 2015; Hsu *et al.*, 2016).

2. Conceptual framework

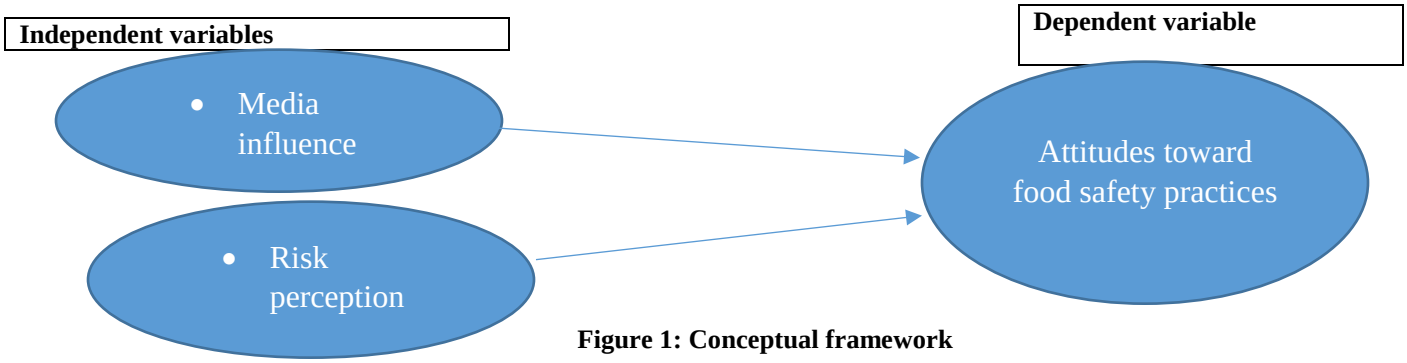

Figure 1: Conceptual framework

This conceptual framework describes consumption behavior, media influence and risk perception as the predictor of the attitude towards food safety practices.

2.2. Objectives

- To assess the knowledge, attitudes and practices of respondents towards food safety.
- To identify the potential threats to human health caused by improper food handling.

3. Methodology

In the present study, Multistage sampling technique was employed for quantitative data collection. The study was conducted as a cross section study involving 700 women across three districts in Punjab province, Pakistan's: Hafizabad, Rawalpindi, and Multan. For analyzing the quantitative data we utilized, bivariate analysis techniques. Specifically, we employed the Chi-square test to assess the degree of significance. Additionally, researcher used the Somers'd and Gamma tests to determine the strength of association. It's worth noting that, we utilized index variables instead of single statement to quantify the strength of association, ensuring a comprehensive evaluation of all indicators for each variables.

4. Results and Discussion

Table 1: Relationship between demographic variables and attitudes toward food safety precautions at home

		Respondents attitudes toward food safety practices			
Demographic characteristics	Attributes	Non Compatible	Compatible	Highly Compatible	Total
Education of respondent	No education	25	101	38	164
		15.2%	61.6%	23.2%	100%
	Primary	4	46	40	90
		4.4%	51.2%	44.4%	100%
	Middle	42	85	15	142
		29.6%	59.9%	10.5%	21.3%
	Intermediate	28	37	31	96
		29.2%	38.5%	32.3%	100%
	Graduate and above	33	56	50	139
		23.7%	40.3%	36%	100%
	Total	132	325	174	631
		20.9%	51.5%	27.6%	100%
Statistics	Chi sequare ≤ 0.000 (154.757)		Somer's d≤ 0.000 (0.126)		
			Gamma ≤ 0.000 (0.171)		
Monthly household income	Up to 20000	23	98	9	130
		17.7%	75.4%	6.9%	100%
	21000-50000	86	112	81	279
		30.8%	40.1%	29.1%	100%
	51000-1 lac	8	42	23	73
		10.9%	57.6%	31.5%	100%
	1 lac +	15	73	61	149
		10.1%	49%	40.9%	100%
	Total	132	325	174	631
		20.9%	51.5%	27.6%	100%
Statistics	Chi sequare ≤ 0.000 (145.875)		Somer's d≤ 0.000 (0.288)		
			Gamma ≤ 0.000 (414)		

According to the data in table 1, Respondents' education, and monthly income from all sources were operationally categorized as 'demographic characteristics' that had some influence on the respondents' attitude by the researcher. Table 1 demonstrated a significant and positive relationship between respondents' education and their opinions toward food safety practices (Chi-square significant value 0.000). Simply said, women with higher levels of education have more favorable attitudes toward food safety practices. There were 61.6% of those with no education had compatible attitudes regarding food safety behaviors. Only 15.2 percent of those with no education had not compatible attitudes toward food safety practices, whereas 51.2 percent of those with primary education had compatible attitudes toward food safety practices. Not compatible attitudes regarding food safety practices were found in 29.6% of those with a middle education, but 59.9 percent of those with a middle school education had compatible attitudes toward food safety practices. Those with intermediate education made up 38.5 percent of the total, and there had compatible knowledge and attitudes toward food safety practices. Those with intermediate education made up 32.3 percent of the total, with knowledge and attitudes that were highly compatible with food safety practices. Hence, 40.3 percent of those with graduation or above education had compatible knowledge and attitudes about food safety practices, and 36 percent of those with graduation or higher education had extremely compatible attitudes about food safety measures. Results can surely tell us that with the education one can easily understand the importance of food safety and have more responsible attitudes toward food safety measures. Table 1 shows that more than half (75.4%) of respondents with a monthly income of up to Rupees 20,000 from all sources had compatible attitudes toward

food safety practices. Respondents with conflicting attitudes regarding food safety practices accounted 30.8%, household income ranging from 21000 to 50000 rupees per month. Up to 100000 rupees and more than hundred thousand income having household 57.6% and 49.0% respondents accordingly had compatible attitudes toward food safety practices. It is also shows that there was a highly significant and positive relationship between respondents' monthly household income and their views toward food safety practices (Chi-square significant value 0.000). As a result of the preceding discussion, it can be concluded that as a household's monthly income rises, females' attitudes toward food safety practices become more reasonable and compatible, and both variables are highly significant related to one another, as evidenced by the coefficient of Somers' d, which is highly significant at the 1.0 percent level of significance.

Table 2: Association between Role of media in respondents' life and their attitudes towards food safety practices

		Respondents attitudes toward food safety practices			
Role of media	Attributes	Non Compatible	Compatible	Highly Compatible	Total
Accessing information	Never	63	170	99	332
		19%	51.2%	29.8%	100%
	Rarely	29	91	23	143
		20.3%	63.6%	16.1%	100%
	Often	30	55	22	107
		28%	51.4%	20.6%	100%
	Always	10	9	30	49
		20.4%	18.4%	61.2%	100%
	Total	132	325	174	631
		20.9%	51.5%	27.6%	100%
Statistics	Chi sequare ≤ 0.000 (107.192)		Somer's d≤ 0.005 (0.097)		
			Gamma ≤ 0.005 (0.153)		
Reliability of information	Neutral	10	42	17	69
		14.5%	60.9%	24.6%	100%
	Unreliable	58	119	93	270
		21.5%	44.1%	34.4%	100%
	Reliable	43	141	54	238
		18.1%	59.2%	22.7%	100%
	Extremely reliable	21	23	10	54
		38.9%	42.6%	18.5%	100%
	Total	132	325	174	631
		20.9%	51.5%	27.6%	100%
Statistics	Chi sequare ≤ 0.000 (128.260)		Somer's d≤ 0.000 (0.175)		
			Gamma ≤ 0.000 (0.262)		

Table 2 reveals a statistically significant (p 0.000) and positive link between the independent variable, respondents' media exposure, and the criterion variable, women's attitudes toward food safety practices. It may be deduced that those housewives who had more media exposure or who 'always' had access to food safety information never had any doubts or unsubstantiated attitudes toward food safety, but instead stayed confident and had 'very compatible' (61.2 percent) attitudes toward food safety practices. More than half of those polled (51.2%) said they never had access to food safety information but had 'compatible' attitudes toward food safety practices. As a result, both the independent variable (accessing food safety information) and the dependent variable (respondents' attitude toward food safety practices) were positively correlated and significantly associated, as evidenced by the p-value (p 0.000) of the co-efficient of association Somers'd.

Custom specification are necessary due to the expected variability in trust level across different information sources. As argued, trust in information from diverse sources such as media, government and scientists is likely to influence behavioral intention differently. Therefore, we identify latent trust factors by (a) gathering trust measures from various sources using 7-point Likert scales based on a selection of food safety information sources (based on Frewer *et al.* 1996)), and (b) conducting principal component analysis on these measures. This allows us to keep the essential differentiation while reducing the number of "trust components."

According to the data in table 3, there was a substantial and positive relationship between respondents' knowledge and awareness of dangerous, fatal, or hazardous foods, as well as their attitude toward food safety practices. In other words, those respondents who had adequate information and understanding regarding fatal foods or foods that were likely to be damaging to human health, and who tried to avoid those hazardous foods at all costs, had more compatible attitudes toward food safety practices.

Emotional reactions to food safety events emerged at more influential is predicting individual perceptions of food safety risk and their actions to prevent such risks, compared to the objective information about food safety incident. When faced to the risky situation related to the food safety, individual engaged in both threat appraisal and coping appraisal process to assess the danger and determine their behavioral responses. Assessments of risk severity and vulnerability are included in threat appraisal, and these two judgments are frequently combined into risk perception (Liao *et al.* 2018).

Table 3: Association between respondents' Risk Perception and their attitudes towards food safety practices

		Respondents attitudes toward food safety practices			
Risk perception	Attributes	Non Compatible	Compatible	Highly Compatible	Total
Avoiding hazardous food	Never	14	7	5	26
		53.8%	26.9%	19.3%	100%
	Rarely	37	19	9	65
		56.9%	29.2%	13.9%	100%
	Often	61	87	14	162
		37.7%	53.7%	8.6%	100%
	Always	20	212	146	378
		5.3%	56.1%	38.6%	100%
	Total	132	325	174	631
		20.9%	51.5%	27.6%	100%
Statistics	Chi sequare ≤ 0.000 (404.178)		Somer's d≤ 0.000 (0.588)		
			Gamma ≤ 0.000 (0.835)		
Adopting adequate practices of food safety	Rarely	12	22	20	54
		22,2%	40.7%	37.1%	100%
	Often	40	52	53	145
		27.6%	35.9%	36.5%	100%
	Always	80	251	101	432
		18.5%	58.1%	23.4%	100%
	Total	132	325	174	631
		20.9%	51.5%	27.6%	100%
Statistics	Chi sequare ≤ 0.000 (45.702)		Somer's d≤ 0.483 (0.025)		
			Gamma ≤ 0.483 (0.046)		

Table 4: Association between Effects on health and respondents' attitudes towards food safety practices

		Respondents attitudes toward food safety practices			
Effects on health	Attributes	Non Compatible	Compatible	Highly Compatible	Total
Tendency of Diseases' symptoms	Swear	45	105	61	211
		21.3%	49.8%	28.9%	100%
	Mild	81	173	35	289
		28%	59.9%	12.1%	100%
	Don't recognized	6	47	78	131
		4.6%	35.9%	59.5%	100%
	Total	132	325	174	631
		20.9%	51.5%	27.6%	100%
Statistics	Chi sequare ≤ 0.000 (163.446)		Somer's d≤ 0.000 (0.248)		
			Gamma ≤ 0.000 (0.366)		

Table 4 depicted the relationship between food safety's health consequences and people's views toward food safety practices. The symptoms of diseases were grouped into three categories: "severe," "mild," and "not recognized." The lack of recognition was explained by the fact that respondents had never experienced any symptoms in the previous one year or 12 months and, if they did, they could recognize the symptoms of any condition. As a result of the findings, there was a positive and substantial link between health effects and attitudes toward food safety practices. The results depicted that 59.9% were those who experienced mild illness symptoms had compatible attitudes concerning food safety practices. The majority of the respondents revealed that they had compatible attitudes toward food safety, which could be explained by the fact that the respondents first experienced health issues as a result of poor food safety practices, and then learned about the potential health threats faced by contaminated or harmful foods, as well as safety measures to reduce the health risks in their foods. Upturns in perceived risk had a minor fundamental effect on intentions and performance, according to Sheeran *et al.* (2014). When interventions that increased perceived risk also triggered anticipatory emotions (fear, concern, regret, guilt), which resulted in greater reaction efficacy or self-efficiency, or decreased response costs, they had a significantly stronger influence on risk mitigating behavior.

4. Conclusion

This study conclude that rural women with higher education have more favorable attitudes toward food safety practices. Approximately 36 percent of women who had completed a graduation or higher education demonstrated a high level of agreement regarding food safety measures and knowledge. Additionally, women whose husbands are educated have more knowledge about food safety practices, indicating that husband's education also impacts their spouses' knowledge. As husband monthly income rises, females' attitudes toward food safety practices become more reasonable and compatible. Housewives with media exposure or consistent access to food safety information never had any doubts or unsubstantiated attitudes toward food safety; instead, they remained confident and had 'very compatible' (61.2 percent) attitudes toward food safety practices. It is also conclude that

respondents with adequate information and understanding regarding harmful foods, and who actively avoided them, had more compatible attitudes toward food safety practices. The majority of the respondents revealed compatible attitudes toward food safety, likely influenced by experiencing health issues due to poor food safety practices, and subsequently learning about potential health threats safety measures. It can be concluded that respondents' knowledge and awareness of all signs of transmissible diseases positively influenced their attitudes toward food safety practices.

5. Recommendations

The outcomes of this investigation indicated that there are considerable gaps in food safety KAPs. The results and conclusions of the survey can be utilized to spark ideas for a complete and effective awareness campaign to promote food-safety best practices across the food-handling life cycle. Changes in KAP indicators compared to KAP measures in this survey can be used to predict how these activities will affect in future studies. According to the findings of the survey, it should be stressed that in order to address food safety KAPs, a wide variety of stakeholder groups must be included. The use of public awareness campaigns to favorably affect consumer attitudes and actions, urging people to be cautious when acquiring, storing, handling, and preparing food, is recommended. Refrigerated foods, dairy items, dry foods, and canned foods are all wonderful options. Households that buy fresh dairy products from farmers or middlemen should also be given special attention.

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