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Consumer perception on food safety practices: A special reference to Bhagalpur and Banka districts of Bihar

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Abstract

Food safety is an essential part to everyone and food handlers like street vendors are the key persons to ensure the food safety through processing, preparation and retailing. The aim of this study was to test the consumer's awareness on food safety. Using random sampling procedure, 80 respondents were collected from two districts named Bhagalpur and Banka of Bihar. A questionnaire was administered to these respondents: 40 each from Bhagalpur and Banka district. Factor analysis confirmed that hygiene. The present study reveals that the customer is more aware about their personal hygiene but not about the good food safety practices. The study proposed that government should implement policies for the good food safety practices by considering the health related issues of the customers.

Keywords: Food safety, hygiene, health, customers

Introduction

Food is a significant factor of population health, nutrition, and productivity. As a result, it is critical that the food we eat is both nutritious and safe. A wide range of foodborne infections can be caused by unsafe food. Food is a fundamental need and a key factor in maintaining physical health. A street vendor is a person who operates from a temporary static structure or mobile stall, as opposed to a permanently built structure, to sell goods or services to the general public. (NASVI, 2004). In the context of the conducted study, street vendors are those people who sell both packaged and well as processed food materials to make it ready to eat and then serve it to their customers and they don't have a permanently built structure but have a provisional static structure or mobile stall. People have great affiliation for having street food.

Food safety worries have significantly increased in increasingly affluent nations. (WHO, 2015). On the other hand, the developing world is where the actual tragedy of food-borne illnesses is being experienced. A high-risk environment is a result of inadequate food production and handling practices (including the inappropriate use of agricultural chemicals), a lack of adequate infrastructure for food storage, and insufficient or improperly applied regulatory requirements. Food contamination at any level, from manufacture to consumption, results in incidences of food poisoning that endanger public health internationally. People in underdeveloped countries typically struggle to cope with food borne disease despite being exposed to more hazardous conditions. For many people who are at or near the poverty level, food-borne illness feeds the cycle of

poverty. Foodborne sickness symptoms can range from mild and self-limiting (vomiting, diarrhoea and nausea) to severe and life-threatening (liver and kidney failure, brain and neurological illnesses, paralysis, and possibly cancers), which can cause extended absences and early death. (WHO, 2015). In order to keep food safe, everyone must play a part. Governments, industry, farmers, universities, and consumers all have a role to play in ensuring food safety. Everyone has a specific function to fulfil. Food safety is an omnipresent endeavour that necessitates input from a variety of stakeholders. Governments, industry, farmers, universities, and consumers all have a role to play in ensuring food safety. Food safety practices must be well-understood by consumers. People should make well-informed eating decisions and acquire appropriate habits. They should be aware of typical food risks and how to safely handle food by referring to food labelling information. Awareness about safety aspects of food hence becomes a serious concern, both for street vendors and consumers and it is a very practical and successful method of preventing communicable diseases. Knowledge of proper and effective food hygiene is important for reducing healthcare associated infections. According to the FSSAI report of 2020-21 released by Union Ministry of Health and Family Welfare, Bihar ranked the lowest in ensuring food safety to its citizens. Score of Bihar was 35 out of 100 points table. Almost 88.7 percent of people in Bihar live in villages and 33.74 percent live below poverty line. This research article is an attempt to get some ideas about people's awareness regarding hygienic food safety in the Bhagalpur and Banka districts of Bihar.

Literature review

Westaway and Viljoen (2000) [5] have studied the 240 South African women's knowledge, attitudes, and behaviour about health and hygiene. Through factor analysis, they were able to confirm that while personal hygiene was prioritized when it came to behaviour; domestic and personal hygiene were crucial components of the attitude scale.

Conducted a study on street vendors in Kuching to evaluate the degree of understanding, attitude, and practice of food safety in the city and to identify the variables influencing them. Age and ethnicity seemed to be significant factors for food safety awareness, and training seemed to be significant factors for attitude, according to their study, which included 361 street food sellers. They also stressed how food safety practices are influenced by food vendor age, knowledge, attitude, and training.

Conducted a study on employees of Petaling Jaya, Malaysia's food courts research to look at how food handlers feel about food safety and hygiene. In their study they found that most of the employees agreed that personal hygiene was an essential component of their jobs. They well knew about the personal hygiene and food safety's importance.

Saxena *et al.* (2019) [6] have studied 246 MBBS, Male students made up 50.4% of the student body, while the remaining female students were studied for various aspects of cleanliness, particularly hand washing practices. In their research, they discovered that students, regardless of their educational background, have strong knowledge of hand washing. They also advised that a suitable training program is needed to raise awareness within the population. The practice of maintaining good hand hygiene ought to be taught in our elementary educational system.

Investigated application and observance of India's food safety rules. According to their study of 200 street food vendors from various socioeconomic groups, the majority of them do not adhere to fundamental food safety rules, such as donning an apron, having access to tap water, being able to clean utensils with soap, and having refrigerators to store food. Just one-third of the street vendors have registered to operate food cart enterprises.

Hossen *et al.* (2021) [8] have studied the level of food vendors' understanding of food safety in Bangladesh's Jashore region. They discovered that while the food vendors had adequate attitudes and knowledge regarding food safety, they had little awareness of proper food handling, which was shown in their mostly subpar facilities and unclean methods when selling the meals. In order to promote proper food handling procedures, they also recommended that the

government implement the required measures and appropriate food hygiene norms and regulations.

Werkneh *et al.* (2023) [7] have demonstrated that street food vendors are knowledgeable about food safety and have attuned (positive) attitudes toward it. The procedures evaluated also demonstrate that most street food vendors adhere to excellent practices. Significant correlations were found between food safety training, sex, monthly income, education, and service year. They also recommended that all street food vendors receive efficient and continuing training on best procedures for food safety.

Methodology

The present study was conducted in Bhagalpur and Banka districts of Bihar. 40-40 respondents from each district were selected for the data collection respectively by using simple random sampling. Thus the total numbers of the respondents selected were 80. A structured questionnaire was developed to obtain information on socio-demographic details (age; marital status; education; family size; family type).

The self assessment statements were written to judge the perception of the customers towards food safety. Fifty-four statements were made by taking care to simple statements representing hygiene aspects. A final set of forty-three statements were selected through judging by the experts. These statements were divided in to four categories named as perception about components of food, perception about hygiene aspects of food, perception about customers own personal hygiene and perception about their concern. The perception about food safety (hygiene aspect) was made on four categories to elicit response of agreement on five-point scale of strongly disagree, disagree, neither agree / nor disagree, agree and strongly agree with scores of 1, 2, 3, 4 and 5 respectively.

That statistical process that combines those closely linked variables is called factor analysis. By organizing variables into many dimensions or factors, each of which is ideally unrelated to the others, the factor analysis technique aids researchers in differentiating the components. Principal component analysis is crucial in factor analysis for determining how much variance is accounted for by each variable (the scale item or statement). This study used factor analysis (with principal component analysis and varimax rotation) to confirm that comments were grouped under particular components of hygiene. Intercorrelation coefficients were calculated to test whether these categories were independent of one another. Category wise statements are given below:

Table 1: Perception about components of food

1. Consumption of organic food improves health condition.
2. Organic foods are safer than normally used conventional food.
3. Chemical flavours enhance the taste but is not good for health.
4. Organic foods do not contain pesticidal residues.
5. There are no chemical fertilizers used in organic food products.
6. Fruit juices are better sources of vitamins and minerals.

Table 2: Perception about hygiene aspects of food

1. Uncovered foods on food stalls should be consumed
2. Housefly infested food should not be consumed
3. Kitchen wastes/food packets should not be thrown publicly
4. Eateries should be neat and clean
5. Kitchen of food vendors should be timely maintained
6. Expiry food products should not be consumed
7. Some Micro-organisms play a major role in food degradation
8. Low quality oil made foods should be avoided
9. Filter water should be preferred to prevent water borne diseases
10. Hand washes and sanitizers should be available at food stalls
11. Toilets at restaurants should be maintained hygienically
12. Heated food items carry less chances of infestation
13. Junk foods are immediate sources of satisfying hunger
14. Rotten foods should be fed to street dogs
15. Non-vegetarian foods should not be consumed from any random food stalls

Table 3: Perception about customers own personal hygiene

1. Tasty food should be preferred over healthy food
2. Coughing, sneezing, spitting should be avoided near food stalls
3. Cost is the major reason for why people go for street foods
4. Food once fell on the floor should not be consumed
5. Chewing gums should not be thrown at public places
6. FSSAI mark should be checked in case of packed foods
7. Hands should be washed nicely before and after consuming food
8. Food with fallen hairs should be reported and not consumed at all
9. Drinking too much of tea in empty stomach can cause gastric problems
10. Over-eating of food may cause indigestion
11. Clean handkerchief should be preferred for drying hands before consuming food
12. Extra fatty or cheesy food may cause indigestion or nausea
13. Teeth should be cleaned nicely after food consumption to avoid mouth stinking
14. Cutting/trimming nails timely is good for health

Table 4: Perception about their concerns

1. Consumer concerns on food safety with respect to irradiation should be there
2. Consumer concerns on food safety with respect to additives should be there
3. Consumer concerns on food safety with respect to growth hormone should be there?
4. Consumer concerns on food safety with respect to bacteria should be there?
5. Consumer concerns on food safety with respect to pesticide residue should be there?
6. Consumer concerns on food safety with respect to animal drug residue should be there

Results

Socio-demographic details

The questionnaire was administered to 80 consumers aged between 22 to 59 years (average age 34.80 with SD = 9.46). Majority of consumers (76.25%) were males and only 23.75% were females, out of which (63.75%) were unmarried and 36.25% were married. 31.25% consumers had higher education and 26.25% had household income between 2 to 5 lakh. Majority of consumers had family size between 2 to 4. 56.25% of consumers had knowledge about food adulteration.

Factor analyses of the perception about components of food

Data on consumer’s perception about components of food was examined for the presence of errors and found no serious outliers for the analysis. The EFA has estimated the Kaiser-Meyer-Olkin (KMO) value of 0.666 which was above the minimum level of 0.5, and a significant Bartlett’s Chi-square ($\chi^2= 92.152$, d.f.= 15, $p<0.001$) indicates sampling adequacy.

Two factors that exceeded the Eigen value of one were retained for rotation. These factors together explained 57.60% of the total variance in the data, which is close to the acceptable level of 60%. The communality estimates for awareness about components of food scale ranged between 0.50 and 0.85. The pattern matrix displayed in Table-5 indicates that among the factors, the factor 1 explained maximum variance (38.36%) and had highest Eigen value (2.318). Items A1, A2, A3 and A4 together positively loaded in factor 1. Factor 2 had the items A5 and A6 with all of them showing a positive relationship. The variance extracted by the first factor was 38.36% and 18.97% for the second factor; the total extracted variance for the two factors was 57.60%.

Cronbach alpha reliability coefficients are calculated for each scale and sub-dimension of the scale reliability. Cronbach alpha internal reliability coefficients are found as 0.83 for the factor 1 and 0.23 for the factor 2. Cronbach alpha reliability coefficient for the whole scale is found as 0.69.

Table 5: Orthogonal (VARIMAX) rotational solution for perception about components of food

Items	Statements	Component	
		1	2
A1	Consumption of organic food improves health condition.	.836	
A2	Organic foods are safer than normally used conventional food.	.821	
A3	Chemical flavours enhance the taste but is not good for health.	.809	
A4	Organic foods do not contain pesticidal residues.	.532	
A5	There are no chemical fertilizers used in organic food products.		.716
A6	Fruit juices are better sources of vitamins and minerals.		.700
	Eigen Value	2.318	1.138
	Variance explained (%)	38.36	18.97
	Cronbach alpha	0.83	0.23

Factor analyses of the perception about hygiene aspects of food and surrounding

Data on consumer’s perception about hygiene of food was examined for the presence of errors and found no serious outliers for the analysis. The EFA has estimated the Kaiser-Meyer-Olkin (KMO) value of 0.739 which was above the minimum level of 0.5, and a significant Bartlett’s Chi-square ($\chi^2= 928.564$, d.f.= 105, $p<0.001$) indicates sampling adequacy.

Four factors that exceeded the Eigen value of one were retained for rotation. These factors together explained 71.959% of the total variance in the data, which is above to the acceptable level of 60%.

The communality estimates for awareness about hygiene of food scale ranged between 0.50 and 0.95. The pattern matrix displayed in Table-6 indicates that among the factors, the

factor 1 explained maximum variance (31.74%) and had highest Eigen value (5.206). Items B6, B7, B8, B9, B10 and B15 together positively loaded in factor 1. Factor 2 had the items B12, B13 and B14 with all of them showing a positive relationship and explained 17.54% variance. Items B3, B4 and B5 are loaded in factor 3 with positive impact and explained 13.57% variance. The items B1, B2 and B11 loaded in factor 4 and explained 9.1% variance. Among them, B11 showed negative relationship.

Cronbach alpha reliability coefficients are calculated for each scale and sub-dimension of the scale reliability. Cronbach alpha internal reliability coefficients are found as 0.94 for the factor 1, 0.91 for the factor 2, 0.68 for factor 3 and 0.17 for factor 4. Cronbach alpha reliability coefficient for the whole scale is found as 0.73.

Table 6: Orthogonal (VARIMAX) rotational solution for perception about hygiene aspects of food and surrounding

Items	Statements	Component			
		1	2	3	4
B1	Uncovered foods on food stalls should be consumed				.643
B2	Housefly infested food should not be consumed				.649
B3	Kitchen wastes/food packets should not be thrown publicly			.648	
B4	Eateries should be neat and clean			.843	
B5	Kitchen of food vendors should be timely maintained			.871	
B6	Expiry food products should not be consumed	.943			
B7	Some Micro-organisms play a major role in food degradation	.968			
B8	Low quality oil made foods should be avoided	.884			
B9	Filter water should be preferred to prevent water born diseases	.934			
B10	Hand washes and sanitizers should be available at food stalls	.686			
B11	Toilets at restaurants should be maintained hygienically				-.583
B12	Heated food items carry less chances of infestation		.831		
B13	Junk foods are immediate sources of satisfying hunger		.949		
B14	Rotten foods should be fed to street dogs		.929		
B15	Non-vegetarian foods should not be consumed from any random food stalls	.844			
	Eigen Value	5.206	2.347	1.974	1.267
	Variance explained (%)	31.742	17.542	13.575	9.100
	Cronbach alpha	0.940	0.910	0.689	0.172

Factor analyses of the perception about customers own personal hygiene

Data on consumer’s perception about own hygiene of food was examined for the presence of errors and found no serious outliers for the analysis. The EFA has estimated the Kaiser-Meyer-Olkin (KMO) value of 0.743 which was above the minimum level of 0.5, and a significant Bartlett’s Chi-square ($\chi^2= 425.9$, d.f.= 91, $p<0.001$) indicates sampling adequacy.

Five factors that exceeded the Eigen value of one were retained for rotation. These factors together explained

68.22% of the total variance in the data, which is above to the acceptable level of 60%.

The communality estimates for awareness about own hygiene of food scale ranged between 0.51 and 0.92. The pattern matrix displayed in Table-7 indicates that among the factors, the factor 1 explained maximum variance (26.83%) and had highest Eigen value (3.99). Items C6, C7, C8, C9 and C10 together positively loaded in factor 1. Factor 2 had the items C4 and C5 with positive relationship and explained 12.71% variance. Items C12, C13 and C14 are loaded in factor 3 with positive impact and explained 11.01%

variance. The items C1, and C2 loaded in factor 4 and explained 9.4% variance with positive impact. And the items C3 and C11 together positively loaded in factor 5 with explained 8.23% variance. Cronbach alpha reliability coefficients are calculated for

each scale and sub-dimension of the scale reliability. Cronbach alpha internal reliability coefficients are found as 0.903 for the factor 1, 0.746 for the factor 2, 0.498 for factor 3, 0.293 for factor 4 and 0.170 for factor 5. Cronbach alpha reliability coefficient for the whole scale is found as 0.74.

Table 7: Orthogonal (VARIMAX) rotational solution for perception about customers own personal hygiene

Items	Statements	Component				
		1	2	3	4	5
C1	Tasty food should be preferred over healthy food				.634	
C2	Coughing, sneezing, spitting should be avoided near food stalls				.777	
C3	Cost is the major reason for why people go for street foods					.635
C4	Food once fell on the floor should not be consumed		.859			
C5	Chewing gums should not be thrown at public places		.867			
C6	FSSAI mark should be checked In case of packed foods	.886				
C7	Hands should be washed nicely before and after consuming food	.913				
C8	Food with fallen hairs should be reported and not consumed at all	.901				
C9	Drinking too much of tea in empty stomach can cause gastric problems	.917				
C10	Over-eating of food may cause indigestion	.596				
C11	Clean handkerchief should be preferred for drying hands before consuming food					.739
C12	Extra fatty or cheesy food may cause indigestion or nausea			.519		
C13	Teeth should be cleaned nicely after food consumption to avoid mouth stinking			.656		
C14	Cutting/trimming nails timely is good for health			.742		
	Eigen Value	3.999	1.882	1.416	1.164	1.090
	Variance explained (%)	26.838	12.731	11.019	9.402	8.231
	Cronbach alpha	0.903	0.746	0.498	0.293	0.170

Factor analyses for perception about their concerns

Data about consumer concerns was examined for the presence of errors and found no serious outliers for the analysis. The EFA has estimated the Kaiser-Meyer-Olkin (KMO) value of 0.758 which was above the minimum level of 0.5, and a significant Bartlett’s Chi-square ($\chi^2= 332.49$, d.f.= 15, $p<0.001$) indicates sampling adequacy. Two factors that exceeded the Eigen value of one were retained for rotation. These factors together explained 81.76% of the total variance in the data, which is above to the acceptable level of 60%.The communality estimates for awareness about consumer concerns scale ranged between 0.74 and 0.95.The pattern matrix displayed in Table- 8 indicates that among the factors, the factor 1 explained

maximum variance (52.988%) and had highest Eigen value (3.34). Items D1, D2, D3 and D4 together positively loaded in factor 1. Factor 2 had the items D5 and D6 with all of them showing a positive relationship. The variance extracted by the first factor was 52.988% and 28.778% for the second factor; the total extracted variance for the two factors was 81.76%. Cronbach alpha reliability coefficients are calculated for each scale and sub-dimension of the scale reliability. Cronbach alpha internal reliability coefficients are found as 0.90 for the factor 1 and 0.80 for the factor 2. Cronbach alpha reliability coefficient for the whole scale is found as 0.807.

Table 8: Orthogonal (VARIMAX) rotational solution about consumer concerns

Items	Statements	Component	
		1	2
D1	Consumer concerns on food safety with respect to irradiation should be there?	.934	
D2	Consumer concerns on food safety with respect to food additives should be there?	.918	
D3	Consumer concerns on food safety with respect to growth hormone should be there?	.942	
D4	Consumer concerns on food safety with respect to bacteria should be there?	.749	
D5	Consumer concerns on food safety with respect to pesticide residue should be there?		.919
D6	Consumer concerns on food safety with respect to animal drug residue should be there?		.918
	Eigen Value	3.34	1.56
	Variance explained (%)	52.988	28.778
	Cronbach alpha	0.90	0.80

Frequency distribution of different categories of consumer’s perception

The results given in Table-9 indicated that the frequency distributions of respondents on various categories of consumer’s perception scores were found to fall into normal

distributions with slight skewness in some of them. This result indicates that these frequencies are found to distribute more or less evenly on either side of mean, thereby falling closer to population.

Table 9: Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Components of food	80	18.00	10.00	28.00	19.6375	4.17419
Consumer concerns	80	22.00	7.00	29.00	22.7125	4.45283
Hygiene aspects of food	80	34.00	34.00	68.00	55.0375	7.58320
Customers own personal hygiene	80	30.00	34.00	64.00	54.5000	6.04414

Correlation among different categories of consumer’s perception

One of the pre-conditions is that the factors extracted from factor analysis should ideally be unrelated to one another and that they are independent in character. To test whether these are independent competencies or overlap on one another, the combined scores of this new set of categories were subjected to correlation analysis. The results are given in Table-10. It is evident from the results that they were independent competencies and did not overlap, except in three cases. Perception for consumer concern and hygiene aspect of food was found to be related and their association was positive and significant at 1% level of probability. Perception for consumer concern and customers own personal hygiene was also found associated and significant at 1% level of probability. Perception for customers own personal hygiene and hygiene aspect of food was also found to be related and their association was positive and significant at 1% level of probability.

Table 10: Correlation

	CC	HAF	COP	CF
Consumer concerns	1.00	0.919**	0.853**	-0.61
Hygiene aspects of food	0.919**	1.00	0.912**	0.001
Customers own personal hygiene	0.853**	0.912**	1.00	-0.22
Components of food	-0.61	0.001	-0.22	1.00

Conclusion

Food safety is an essential part to everyone and food handlers are the key persons to ensure the food safety through processing, preparation and retailing. The study demonstrated that the level of food hygiene perception was satisfactory in consumers of the studied area. This study could identify four core food safety components through rigorous measures scrutiny and statistical techniques. The study established that consumer’s perception is not unidimensional but involved multiple factors. These factors help to understand the overall perception of the consumers. Correlation analysis among the four factors has confirmed that they are independent components of perception. On the basis of the results it is conclude that consumer are more aware about their own personal hygiene but concerns regarding presence of pesticide residue in food was lacking. They are also aware about hygiene aspects of food. The government should take some necessary steps and impose suitable food hygiene rules and regulations to increase good food safety practices.

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