Consumers' Perception on Safety of Vegetables in the Urban Markets: A Case Study of Mymensingh City in Bangladesh

Abstract

The major focus of the study was to explore the safety perception of vegetable consumers' as well as their influence on purchasing decision in selected areas of Mymensingh city of Bangladesh. The study was carried out through survey of randomly selected sixty vegetable consumers. Data were collected through face to face interview method using pre-tested interview schedule. Chi-square (χ^2) test was employed to assess the association between socio-economic characteristics and perception towards safety of vegetables. Respondents of the study area showed remarkable individual differences in their selected socio-economic characteristics. Majority of them were middle aged (46.7%), having higher secondary level of education (28.3), small family size (65.0%), self-employed (35.0%) and medium annual income (56.7%). Findings revealed that potato, cauliflower, ash gourd, tomato and okra were the most preferred vegetables in the study area. Majority of the respondents perceived that vegetables sold in the retail market is produced with excessive chemicals (40.0%), mishandling (63.3%) and possess health risk (61.7%). Irrespective of demographic differences, majority of the respondents agreed that vegetables in the market are not so safe for consumption. Having perceived the unsafe vegetables, majority of the respondents (78.0%) still wish to purchase vegetables from the market. Of course, safety perception of respondents influenced their decision as 22.0 percent of them denied to purchase from market in future. Hence, application of organic fertilizer with limited or no use of pesticides can be a solution to ensure safe vegetables in the market as suggested by the respondents.

Comment [a1]: Instead of exact figures, use abstract words

Keywords: perception; food safety, vegetables, urban market.

1. INTRODUCTION

Fresh vegetables are an important source of vitamins and minerals and are an important part of a healthy diet. But pesticides, which are poisonous, can also be found in vegetables (Knezevic and Serdar, 2008). Over 1,000 different chemicals can be used to get rid of unwanted molds, insects, and weeds on crops (Ortelli et al., 2006). Pesticides are used all over the world because they are very effective at preventing crop loss and getting rid of disease-carrying insects (Sharp and Peter, 2005). But the strong chemicals used to kill pests have raised concerns that they cause diseases in people and pollute the environment. Long-term, low-dose exposure to these chemicals has been linked to health problems like lowered immunity, messed-up hormones, less intelligence, problems with reproduction, and even cancer (Wiles et al., 1998).

A vegetable is safe if it doesn't have any chemical residues on it, like pesticides that are used in traditional vegetable farming or dirty water that was used to grow the vegetable, both of which are known to cause contamination. The way people feel about safety affects their buying decisions and lets them adapt to new behaviors and attitudes (Akpinar et al., 2009). Consumers' choices and demand for food products are affected by how safe and good they think the food is. Tellis and Gaeth (1990) said that how people feel about risk affects their buying decisions. People were not buying vegetables that they thought were unsafe. People have thought that using pesticides could have long-term and unknown effects on health. Whether or not this is true is a matter of opinion, but it still matters because if people think those chemicals are linked

Comment [a2]: Mention citation in numeric form only. Like; for this citation use [1] and put this in number 1 under references.

Comment [a3]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a4]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a5]: Use & instead of 'and'

Comment [a6]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a7]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a8]: Mention citation in numeric form only. For example please the comment with first citation comment box.

to health effects they don't know about, that alone can affect their buying decisions. People think that health and safety concerns are the most important things that affect what people like and what they buy next (Yiridoe et al., 2005). Demand from urban consumers for things like clean and attractive food, especially in terms of color, size, and shape, has also led to an overuse of pesticides and chemical fertilizers (Okello et al., 2010).

In Bangladesh, there are various types of vegetables produced year-round (Afrad et al., 2021; Hoque et al., 2018; Hoque and Haque 2011; Hoque et al., 2013) in the subsistence farmers field, homesteads, and commercial fields due to the advances of technology and research initiatives (Afrad and Hoque, 2021). Due to the global climate change, intensity and degree of pest and disease infestation increased over time that compelled the producers to apply pesticides or fungicides for controlling the pest and diseases to get profit of the produces (Hasan et al., 2021a; Hasan et al., 2021b). However, there is a tendency of applying excessive dose of chemicals and more exaggerated thing is the application just before the harvesting or during selling in the market to show pest or disease free produces.

People today want food products that are not only high quality but also safe, healthy, and good for the environment (Chakma et al., 2022; Sultana et al., 2016; Hoque et al., 2018). As income rises, so does people's consumption of food and they become more selective about the quality and safety of the food they buy (Grunert, 2002). They also want consistency and for their money to be worth it. In recent years, consumers have shown that safety, quality and health are very important to them when they choose and eat foods, especially perishable goods (Jacobs et al., 2007). Consumers become more health-conscious and more aware of how their food choices affect their health (Gilbert, 2000). Customers also know that they have an effect on products and stores. So, it's important for retailers and suppliers to know what customers want and need so they can better plan for changes that may happen in the future (Hoque et al., 2010; Hoque et al., 2015; Hoque et al., 2016).

More and more people are realizing that vegetables and fruits are good for health and help live a healthy life (Balickand Cox, 1996). But global warming will pose a threat to the safety of pesticides in food and to people's health (Koirala et al., 2009). Also, information about the systems that are used to make the food (like information about the environmental and ethical effects) and marketing (Hoque et al., 2021) become more important because it affects what foods people choose to eat. That's why research is needed which might give consumers another way to judge the quality of fresh foods. Many studies have been done on food safety, how people think about it, and how they decide what to buy. But there hasn't been much research done on how people's ideas about safety affect their decisions about what to buy, especially when it comes to vegetables. So, the study tries to fill in this gap. Considering these, the study was conducted with the following objectives.

I. To explore the socio-economic profile of the respondents in the study area;
II. To identify the preferences of vegetables consumed by the respondents;
III. To assess the safety perception of vegetables by the urban residents;
IV. To find out the association between consumers' socio-demographic characteristics with safety perception; and
V. To seek respondents understanding towards solutions to improve safety of vegetables in the market.

The following null hypothesis was formulated for the study:

H_0: There is no significant association between consumers' demographic characteristics with safety perception of vegetable.

Comment [a9]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a10]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a11]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a12]: Use & instead of 'and'

Comment [a13]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a14]: Use & instead of 'and'

Comment [a15]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a16]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a17]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a18]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a19]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a20]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a21]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a22]: Mention only last name of author

Comment [a23]: Mention citation in numeric form only. For example please the comment with first citation comment box.

Comment [a24]: Mention citation in numeric form only. For example please the comment with first citation comment box.

H_0: There is no significant influence of respondents' perception on decision about purchasing vegetables from the market in future.

2. METHODOLOGY

The study was conducted in sadar upazila of Mymensingh district. Five areas namely Gohailkandi, Golgonda, Charpara, Natunbazar and Mashkanda of Mymensingh city was selected as the locale of study. For further clarity about locale of this study, a map of Bangladesh showing the respective areas has been presented in Figure 1. The descriptive and diagnostic research design was used in the present study. Because descriptive research design helps in stating characteristics of a particular situation, or group or individuals and used for fact finding with appropriate interpretation. On the other hand, diagnostic or analytical research design was applied in testing of hypothesis and specifying and interpreting relationship among variables.

A total of 60 vegetables consumers were selected as sample respondents taking 12 from each of the five areas following multistage disproportionate random sampling technique. Primary, secondary, quantitative, qualitative data were accumulated for the present study. For collection of primary data at household level a pre-designed interview schedule was developed and the same was pre-tested before finalization. Besides, direct observation of objects, events, places, processes, or people was done and also the findings of discussion with local community members, development workers observation was taken in consideration.

In order to collect pertinent information, an interview schedule was prepared carefully with due patience keeping the objective of the researcher in view. The questions and statements contained in the schedule were simple, direct, and easily understandable to the rural community. The schedule contained both open and closed form questions. Appropriate scales and techniques of measurement were applied to ensure correct responses of the variable concerned. In order to improve, finalize, and make the interview schedule ready for data collection, it was pre-tested with 10 households under real life situation and necessary corrections, alterations and adjustments were made accordingly in the light of the actual and practical experiences and result of the pre-test.

Systematic field work is an important aspect of socio-economic survey research (Islam et al., 2017). Necessary efforts were given to make the field work successful and realistic. While starting interview, the researcher took utmost care to establish rapport with the respondents, so that they don't feel hesitates or hostile to furnish proper responses to the questions of the interview schedule. The questions were explained and clarified whenever any respondent feel difficulty in understanding them properly. If the investigator failed to meet the selected respondent after visiting his/her household for a couple of days, then the researcher selected the respondent from the reserve lists.

Consumers' perception towards safety of vegetables in the market was measured using a summated rating (Likert type) scale (Hasan et al., 2021c; Haque and Hoque, 2021). The scale was prepared with larger number of items initially and subjecting them to editing and screening in the light of pre-testing so as to include only the relevant items reflecting both positive and negative effect on a five-point continuum. The items covered on all aspects related to the safety perception. Before administration, the scale was tested for its content validity and sufficient levels of reliability based on the pre-test results. The perception of a respondent was measured by attributing 5 score for 'strongly agree', 4 score for 'agree', 3 score for 'undecided', 2 score for 'disagree' and 1 score for 'strongly disagree' responses.

After completion of field survey data from all the interview schedules were coded, compiled, tabulated and analyzed in accordance with the objectives of the study. In this

Comment [a25]: There must be review of literature in between introduction and methodology section. Entire Review of literature part is missing

Comment [a26]: Methodology is correct but mention it in subsections like;
Research design
Area of study
Collection of data
Sampling units
Data analysis

process, all the responses in the interview schedule were given numerical coded values. Local units were converted into standard units and qualitative data were converted into quantitative ones by means of suitable scoring system whenever necessary. The responses to the questions in the interview schedules were transferred to a master sheet to facilitate tabulation.

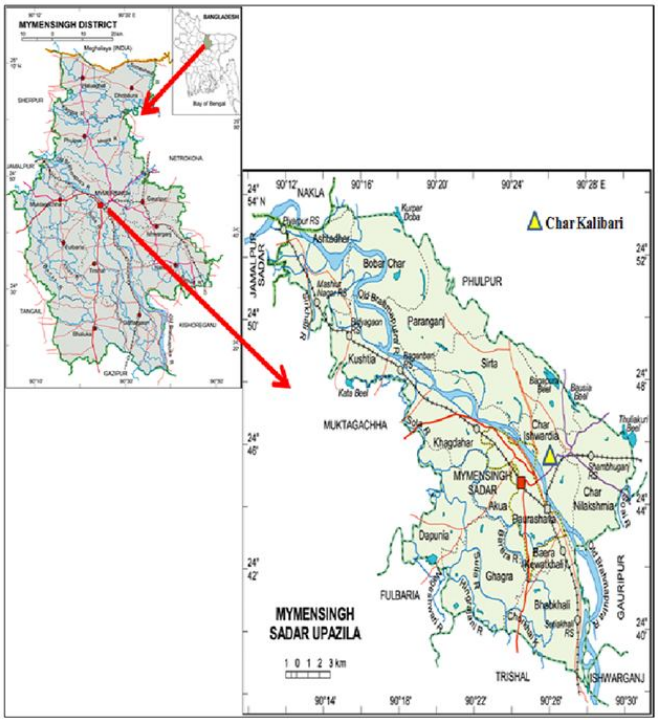

Figure 1. Map of Mymensingh district showing the study area.

The SPSS/PC + computer program (Statistical Package for Social Sciences) was used to perform data analysis. Descriptive statistical measures such as range, mean, number and percentage distribution, standard deviation were used to describe and interpret the data. Chi-square (χ^2) test was employed to assess the association among the responses of respondents on different perception related opinion (Haque and Hoque, 2021). If the computed value was equal or greater than the table value of coefficient at designated level of significant for the relevant degree of freedom, the null hypothesis was rejected and it was concluded that there was significant relationship between the concerned variables. However, when the computed value was found to be smaller than the tabulated value designated level of significant for the relevant degree of freedom, it was concluded that the null hypothesis could not be rejected and hence there was no significant relationship between the concerned variables. Throughout the study five percent (0.05) and one percent (0.01) level of probability with an accompanying 95.0 percent and 99.0 percent confidence level was used as a basis for rejecting the null hypothesis. Computed data were presented by tables and graphs for better understanding.

3. RESULTS AND DISCUSSION

3.1 Socio-demographic characteristics of the respondents

The highest proportions of the respondents (46.7%) were in middle aged category while 30.0 percent were in young aged category and 23.3 percent old aged category. Majority (85.0%) of the respondents in the study area had small to medium family size. The respondents of 'higher secondary education' category constitute the highest proportion (28.3 %) compared to 26.7 percent 'MS' category and 20.0 percent BS level category. Highest proportion (35.0%) of the respondents were engaged in business and 18.0 percent of the respondents were found to be unemployed. The highest proportions (56.7%) of the respondents in the study area were found medium income category (Table 1).

Table 1. Distribution of the respondents according to their socio-demographic characteristics

Variable	Category	Frequency	Percent	Mean	SD
Age	Young aged (<35 years)	18	30.0	39.8	12.4
	Middle aged (35-50 years)	28	46.7		
	Old aged (>50 years)	14	23.3		
Family size	Small family (1- 4)	39	65.0	5.2	1.7
	Medium family (5- 6)	17	28.3		
	Large Family (> 6)	4	6.7		
Education	Primary	5	10.0	-	-
	Secondary	9	15.0		
	Higher secondary	17	28.3		
	Bachelor	12	20.0		
	MS/*Phd*	16	26.7		
Occupation	Govt. employee	20	33.3	-	-
	NGO employee	3	5.0		
	Student	5	8.3		
	Business	21	35.0		
	Unemployed	11	18.3		
Income	Low (Below Tk. 200000)	16	26.7	508180	1008750
	Medium (Between Tk. 200000 – 500000)	34	56.7		
	High (Above Tk. 500000)	10	16.7		

Comment [a27]: criteria is not appropriate. It must be standardized like; post-graduation or higher education

Comment [a28]: this is not standardized classification of occupation. Revise it

Comment [a29]: classification is not correct because for example my income is 200000 then which would I select first one or second one.

And same of the 500000

3.2 Preferences of vegetables

Different types of vegetables were available in the market depending on season. Rank order of different types of vegetables mostly purchased by the respondents has been shown in Table 2.

Table 2. Rank order of preferred vegetables

Sl no	Local name	English name	Scientific name	Number	Percent	Rank
1.	Alu	Potato	*Solanum tuberosum*	60	100.0	1st
2.	Fulcopy	Cauliflower	*Brassica oleracea*	57	95.0	2nd
3.	Chalkumra	Ash gourd	*Benincasa hispida*	57	95.0	2nd
4.	Tomato	Tomato	*Solanum lycopersicum*	56	93.3	3rd
5.	Dharosh	Okra	*Abelmoschus esculentus*	53	88.3	4th
6.	Lao	Bottle gourd	*Lagenaria siceraria*	52	86.7	5th
7.	Data shak	Amaranth	*Amaranthus oleraceus*	52	86.7	5th
8.	Lal shak	Red amaranth	*Amaranthus tricolor*	51	85.0	6th
9.	Potol	Pointed gourd	*Trichosanthes dioica*	50	83.3	7th
10.	Kakrol	Teasle gourd	*Momordica dioica*	50	83.3	7th
11.	Begun	Egg plant	*Solanum melongena*	47	78.3	8th
12.	Palongshak	Spinach	*Spinacia oleracea*	44	73.3	9th
13.	Gazor	Carrot	*Daucus carota*	44	73.3	9th
14.	Korolla	Bitter gourd	*Momordica charantia*	43	71.7	10th
15.	Dhundol	Sponge gourd	*Luffa cylindrical*	43	71.7	10th
16.	Seam	Lablab bean	*Lablab purpureus*	41	68.3	11th
17.	Badha copy	Cabbage	*Brassica napus*	38	63.3	12th
18.	Shojina	Drumstick	*Moringa olefeira*	37	61.7	13th
19.	Borboti	Yard long bean	*Vigna unguiculata*	34	56.7	14th
20.	Jhinga	Ridge gourd	*Luffa acutangula*	33	55.0	15th
21.	Cicinga	Snake gourd	*Trichosanthes anguina*	32	53.3	16th
22.	Shalgom	Turnip	*Brassica rapa*	28	46.7	17th
23.	Mula	Radish	*Raphanus sativus*	28	46.7	17th
24.	Kochu	Taro	*Colocasia esculenta*	28	46.7	17th
25.	Misti morich	Capsicum	*Capsicum annum*	18	30.0	18th

Information displayed in Table 2 revealed that among vegetables purchase by the respondents, potato were ranked in 1st position because potatoes are a versatile food. They can be baked, fried, mashed, boiled, dehydrated & pureed. They can be served cold or

Comment [a30]: Typing error

Comment [a31]: Which positioning tool has been used is not mentioned.

hot. Potatoes are also cheap (Khalil et al., 2013; Khalil et al., 2014). Potato meets everyone's dietary restrictions. Cauliflower and ash gourd were ranked in the 2nd position. Almost all of the respondent keep cauliflower and ash gourd in their daily food menu. Cauliflower is the winter vegetable and ash gourd is the summer vegetable the respondents were purchasing these vegetable in seasonal basis. Tomato was ranked in 3rd position. Maximum consumer consumes tomato as salad and vegetable. As tomato were found round the year and can be purchase at a cheap rate, most of the consumers were preferred tomato in their daily diet chart. Okra was ranked in 4th position. Additionally, okra was among the vegetables that respondents consumed frequently in the study area. Okra is very popular and nutritious vegetable. It might be found in cheap rate. On the other hand, bottle gourd, amaranth, red amaranth, pointed gourd and teasle gourd were ranked in 5th, 6th and 7th position. Eggplant was ranked in 8th position. Though eggplant was available round the year, but maximum respondents were not interested in their diet to keep eggplant as consumers perceived that eggplant has allergic reactions. Some other important nutritious vegetables such as spinach, carrot, turnip, bitter gourd, lablab bean was found in the vegetable market and consumer were purchase those vegetables in the season basis. There were some other vegetables such as sponge gourd, taro, yard long bean etc. that consumers purchased less amount as because, these vegetables were not available in everywhere. A portion of the respondents were not conscious about their nutritional value as capsicum ranked in 18th position. The major factor behind this might be unavailability in all markets. In most of the time it can only be found in super shop and worth high price.

3.3 Consumers' safety perception on vegetables

Information presented in Table 3 revealed that majority (46.7%) of the respondents were agreed with "Vegetables in Mymensingh are generally not safe" followed by 18.3% were neutral and disagree and only 5.0% of the respondents were strongly agreed and strongly disagreed with the statement. *Chi-square* value (16.9^{**}) indicated highly significant difference among the opinions of the respondents. Hence it can be said that safe vegetables were not available in the study area. Findings also revealed that majority (40.0%) of the respondents were agreed with "Vegetables sold in the retail market is produced with excessive chemicals" followed by 30.0 % were neutral 15.0 percent disagreed, 10.0 percent strongly agreed and only 5.0 percent of the respondents were strongly disagreed with the 2nd statement. *Chi-square* value (21.4^{**}) indicates highly significant difference among the opinions of the respondents. Majority (63.3%) of the respondents were agreed with "Retailers mishandle vegetables in the retail market" followed by strongly agree (11.7%), neutral and disagree (both 10.0%) and strongly disagreed (5.0%) with the statement. *Chi-square* value (41.5^{**}) indicates highly significant difference among the opinions of the respondents. On the other hand, majority (61.7%) of the respondents were found strongly agree with "Consuming vegetable with chemical residue possess health risk" followed by agree (15.0%), neutral (5.0%) and disagree (6.0%) with this statement. Only a few numbers of respondents were strongly disagreeing with this statement. *Chi-square* value (44.6^{**}) indicates highly significant difference among the opinions of the respondents.

Table 3. Distribution of respondents according to their perception on safety of vegetables

Perception statement	Strongly agree		Agree		Neutral		Disagree		Strongly disagree		Chi - square
	No.	%	No.	%	No.	%	No.	%	No.	%	
Vegetables in Mymensingh are generally not safe	5	8.3	28	46.7	11	18.3	11	18.3	5	8.3	16.9**
Vegetables sold in the retail market is produced with excessive chemicals	6	10.0	24	40.0	18	30.0	9	15.0	3	5.0	21.4**
Retailers mishandle vegetables in the retail market	7	11.7	38	63.3	6	10.0	6	10.0	3	5.0	41.5**
Consuming vegetable with chemical residue possess health risk	37	61.7	9	15.0	5	8.3	6	10.0	3	5.0	44.6**

Comment [a32]: Indication of ** is not mentioned for this table. Mention the statistical importance of **

3.4 Relationship between demographic characteristics and unsafe perception of Vegetables

Demographic characters may have influences on perception of safety vegetables. Hence, selected demographic characters i.e. age, gender, religion, family size, education level, occupation and income were considered (Table 4).

Table 4. Relationship between demographic characteristics and unsafe perception of vegetables

Demographic characteristics	SA	A	N	D	SDA	Chi-square	df	Sig. level
Age (years)								
Below 30	0	9	3	4	2			
31-50	5	13	6	2	2	11.788	8	.161
Above 50	0	6	3	5	0			
Family size								
Small	4	17	9	6	3			
Medium	1	9	3	3	1	4.614	8	.798
Large	0	2	0	2	0			
Level of formal education								
Primary	0	3	1	2	0			
Secondary	0	5	3	1	0			
HS	2	5	4	4	2	11.954	16	.747
Bachelor	0	8	2	1	1			
MS/PhD	3	7	2	3	1			
Occupation								
Gov. employment	3	9	3	4	1			
NGO	0	3	0	0	0			

Student	0	1	1	2	1	10.172	16	.857
Self employed	1	10	5	4	1			
Unemployed	1	5	3	1	1			
Annual income								
Below 200000	3	5	3	4	1			
200001 -400000	2	16	8	6	2	6.846	8	.553
Above 400000	0	7	1	1	1			

SA= Strongly agree, A= Agree, N= Neutral, DA= Disagree, SDA= Strongly disagree

Data presented in Table 4 gave interesting results when demographic characteristics of respondents were cross tabulated with their perception. Although there are variations among the respondents of Mymensingh city regarding specific components of the perception, unfortunately the chi-square value didn't show any significant differences even at 10% level of significance. Hence, it is very clear that irrespective of socio-economic differences, all categories of consumers are very much concerned about safety issues of vegetables.

3.5 Influences of safety perception on purchasing decision

Comment [a33]: As per the heading more clarification is required. 'Present influence of safety perception and its related actions' is entirely missing

Consumers' buying decision can be defined as a series of activities people engage in when searching, evaluating, selecting, purchasing, using and disposing of products and services so as to satisfy their needs and desires. The classical conditioning theory suggests that product packaging directly influences a consumer's perception of the product. Influenced value perception of product is bound to affect consumers buying decision. Since respondents were very much concern about vegetable safety, their vegetable purchasing decision strongly influence by their safety perception of vegetables.

Comment [a34]: Give the citation for this statement

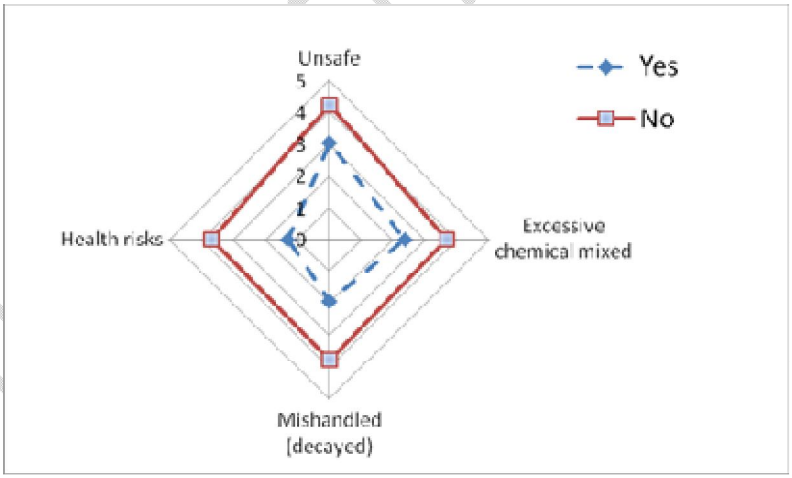

Figure 2. Safety perception (mean score) and purchasing decision

Figure 2 shows that mean perception score of the four components of perception index i.e. unsafe, mixed with excessive chemicals, mishandled, and health risks was found higher for the consumers who might not purchase vegetables in future at 4.23, 3.69, 3.77 and 3.69 respectively compared with 3.02, 2.36, 1.94 and 1.30 for consumers who agreed to purchase vegetables from the market in future. From the diagram it is clearly evident that there is a strong influence of safety perception on consumers purchasing decision.

3.6 Possible solutions to ensure safety vegetables in the markets

Despite the concern about safety of vegetables consumers are optimistic to get fresh and quality vegetables in future to keep their body health. In this connection, all the stakeholders involved with this sector should come forward to solve this chronic problem. In response to the possible strategies to solve above mentioned problems, respondents suggested several pathways as presented in Table 5.

Data displayed in Table 5 shows that most of the respondents (91.7%) suggested limited use of pesticides or not to use any preservatives. As preservatives are very hazardous to human health, they wanted to get the vegetable which is free from any preservatives. Pesticide used in vegetables is increasing day by day. Price plays a vital role in purchasing vegetables. When price is reasonable, purchasing of vegetables increased. Therefore, 85.0 percent respondents in the study area were suggested that reasonable price should be maintained. The biggest problem of synthetic fertilizer is ground water contamination. Groundwater contamination has been linked to gastric cancer, goiter, birth malformations, and hypertension; testicular cancer and stomach cancer. For that reason, 83.3 percent consumer's suggested organic fertilizer instead of chemical fertilizer for vegetable cultivation.

Table 5. Suggestions from the respondents to overcome unsafe issues of vegetables

SL	Suggestions	Frequency	Percent
1	Limited or no use of pesticides and preservatives	55	91.7
2	Reasonable price should be maintained	51	85.0
3	Organic fertilizer should be used	50	83.3
4	Vegetable resources should not be kept in compact condition	48	80.0
5	Transportation system should be developed	47	78.3
6	Fresh vegetables should be separated from rotten vegetables	46	76.7
7	Government should provide training opportunity for vegetable seller	41	68.0
8	BADC and other seed company should provide viable and diseases free vegetable seed to the farmer.	33	55.0
9	Vegetable cultivation should be increased	25	41.7
10	Provide adequate cold storage facility	17	28.3

4. Conclusions and recommendations

Majority of the respondents were male, middle aged, married, having higher secondary level of education, small family size, self-employed and medium annual income. Potato, cauliflower, ash gourd, tomato and okra were the most preferred vegetables in the study area. Vegetables sold in the retail market is produced with excessive chemicals, mishandling, possess health risk and not safe as opined by 40.0%, 63.3%, 61.7% and 46.7% respondents respectively. Unsafe and high price were the major obstacle in consuming required vegetables to keep the health sound. Conserving vegetable resources without chemical or preservatives are highly recommended by the respondents. BADC and other seed company can provide viable and diseases free seed so that vegetable resources could be conserved safely. Ministry of food and commerce can take initiatives to ensure supply of fresh vegetables at the retail shop with reasonable price. Ministry of communication should ensure good communication facilities for the ease of transporting

Comment [a35]: Clear this abbreviation

vegetables to market in fresh form. NGOs and other volunteer group may take awareness building program among the vegetable producer, seller and consumer on safety issues.

5. References

Comment [a36]: Reference are having major correction because of not following standard APA format. Revise as per at least 6th edition of APA

Afrad, M.S.I., Hossain, M.A., Haque, M.E., Hoque, M.A., Hasan, S., Saha, S. and Hoque, M.Z., 2021. Farmers' Response on Field Performance of BSMRAU Developed IPSA Seem and BU Pepe1 Crop Variety. European Journal of Agriculture and Food Sciences, 3(4), pp.63-70.

Sultana, A., Afrad, M. S. I., Hoque, M. Z., Bhattacharjee, D. (2016). Knowledge of Farm Women on Nutritional Value of Farm Products in Bangladesh. Indian Research Journal of Extension Education, 16(2), 25-30.

Akpinar G.A, MS. Aykin, C. Sayin, B Ozkan, 2009. The role of demographic variables in purchasing decisions on fresh fruit and vegetables. Journal of Food, Agriculture &Environment,7(3&4): 106-110.

Chakma, S., Haque, M., Hoque, M.Z., Hossain, M., Afrad, M., Islam, S., Saha, S., Prodhan, F.A., Hasan, S.S. and Choudhury, J., 2022. Adapting Land Degradation and Enhancing Ethnic Livelihood Security Through Fruit Production: Evidence from Hilly Areas of Bangladesh. In *Agro-biodiversity and Agri-ecosystem Management* (pp. 217-238). Springer, Singapore.

Gilbert, L. C. 2000. The functional food trend: what's next and what Americanthink about eggs. Journal of the American College of Nutrition, 19(5) :507-512.

Grunert, K. G. 2002. Current issues in the understanding of consumer food choice. Food Science and Technology, 13(3): 275-285.

Haque, M. E., & Hoque, M. Z. (2021). Utilization and Effectiveness of ICT as Agricultural Information Delivery System in Thakurgao, Bangladesh. South Asian Journal of Social Studies and Economics, 61-68.

Hasan, S. S., Roy, S., Saha, S., & Hoque, M. Z. (2021c). Assessment of the Farmers' Perception on Vermicompost as Waste Management Practice and Economic Return in Some Areas of Bangladesh. European Journal of Agriculture and Food Sciences, 3(3), 14-20.

Hasan, S., Haque, M. E., Afrad, M. S. I., Alam, M. Z., Hoque, M. Z., & Islam, M. R. (2021a). Influences of Socio-economic Factors on Lemon Pest Management Practices in Tangail District of Bangladesh. South Asian Journal of Social Studies and Economics, 59-67.

Hasan, S., Haque, M. E., Afrad, M. S. I., Alam, M. Z., Hoque, M. Z., & Islam, M. R. (2021b). Pest risk analysis and management practices for increasing profitability of lemon production. Journal of Agriculture and Ecology Research International, 26-35.

Hoque, M. Z., & Haque, M. E. (2011). Farming practices in selected charland of Bangladesh: problems and opportunities. Annals of Bangladesh Agriculture, 15 (1&2), 136-146

Hoque, M. Z., Haque, M. E., Afrad, M. S. I., & Akanda, M. A. M. (2013). Contribution

of farming enterprises towards household food security in selected Charland of Bangladesh. Annals of Bangladesh Agriculture, 17(1&2), 47-56.

Hoque, M. Z., Haque, M. E., Afrad, M. S. I., & Hossain, M. A. (2010). Adoption of farming technology by the charland farmers. Bangladesh Journal of Extension Education, 22(1&2), 49-55.

Hoque, M. Z., Haque, M. E., Prodhan, F. A., & Islam, M. S. (2021). Utilization of ICTs in Agricultural Marketing Information Delivery in Charland of Bangladesh. Asian Journal of Education and Social Studies, 10-20.

Hoque, M. Z., Rahman, M. A., Haque, M. E., Afrad, M. S. I., & Rahman, M. M. (2018). Comparative contribution of crops and homestead forest enterprises to rural household economy: A case study of Keshorita Village in Bangladesh. Asian Journal of Advances in Agricultural Research, 1-16.

Islam, M. S., Haque, M. E., Afrad, M. S. I., Abdullah, H. M., & Hoque, M. Z. (2017). Utilization of ICTs in agricultural extension services of Bangladesh. Asian Journal of Agricultural Extension, Economics & Sociology, 1-11.

Jacobs, K., L. Heinemans and P. Donegan, 2007. Future consumer: how shopperneeds and behaviour will impact tomorrow's value chain, Capgemini report.Retrieved from http://www.capgemini.com/industries/products/future_consumer.

Khalil, M. I., Haque, M. E., & Hoque, M. Z. (2013). Adoption of BARI recommended potato (Solanum tuberosum) varieties by the potato farmers of Bangladesh. The Agriculturists, 11(2), 79-86.

Khalil, M. I., Haque, M. E., & Hoque, M. Z. (2014). Adoption of recommended potato (Solanum tuberosum) production technologies by the potato growers of some selected areas of Bangladesh. Bangladesh Journal of Agricultural Research, 39(1), 79-92.

Knezevic, Z. and M. Serdar, 2008. Screening of fresh fruits and vegetables for pesticide residues on Croatian Market. J. Food Control.

Koirala, P., S. Dhakal and A. S. Tamrakar, 2009. Pesticides and Food Safety Issues in Nepal. The Journal of Agriculture and Environment, 10: 33-36

Okello, JJ, SW. Swinton, 2010. From circle of poison to circle of virtue: pesticides, exportstandards and Kenya's green bean farmers. Journal of Agricultural Economics. 61: 209–224.

Ortelli, D., P. Edder and C. Corvi, 2006. Multi residue analysis of 74 pesticides in fruits and vegetable byliquid chromatography-electro mass spectrometry. Analtica Chimica Acta, 520: 33-45

Sharp dan, S. and C. Peter, 2005. Delayed health hazard of pesticides exposure. Annual Review of Public Health, 27: 312-316.

Tellis, G.J. and G. J. Gaeth, 1990. Best value, price-seeking, and price aversion: the impact of information and learning on consumer choices. Journal of Marketing. 55: 34-45.

Wiles, R., K. Davies, and C. Campbell, 1998. Over exposed organophosphate insecticides in children's food. Environmental working group, Washington.

Yiridoe E, S. Bonti-Ankomah , R. Martin 2005. Comparison of Consumer Perceptions and Preference Toward Organic Versus Conventionally Produced Foods. Renewable Agriculture and Food Systems.,20: 193-205.