Consumers' Attitude towards Organic Foods:
Evidence from Major Cities in Bangladesh

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Abstract

The demand for organic foods is increasing globally as it is healthier, less emitting and environment-friendly. People buy organic food as responsible consumers in developed countries but what about developing countries like Bangladesh? With this view point, this study aims to find the consumers attitude towards the organic foods as voluntary contribution in mitigating emission and encouraging environment-friendly production. Collecting primary survey data from major cities in Bangladesh, this study estimates the logistic regression of consumers' attitude (purchase) of organic foods as a function of Consumer's Income, Age, and Education level, Knowledge about Climate Change or Environment, and having Elderly persons in their families. The findings show that the level of education of the consumers and their responsibility towards environment and climate change are highly significant in building awareness towards organic foods. It also reveals that consumers' level of income puts no significant importance in creating a positive attitude towards the organic foods. This study suggests that increasing awareness through education and other qualitative measures may change the consumers' attitude towards the organic foods in Bangladesh.

Key words: Consumers attitude, Organic foods, Major cities, Bangladesh

1. Introduction

The demand for organic foods is increasing due to the growing concern for environment, climate and health hazards. The processes of the production are responsible for emission which cause the climate change. It is estimated that almost one third of the Green House Gases (GHGs) emission is contributed by agricultural products (Vermeulen et al, 2012). Hence, to reduce GHG emission from agriculture, production of organic foods is encouraged by the experts that emit very little or no GHGs. Although the reduction of GHG emission is mostly voluntary for the developing countries, still by labeling a product as 'organic product', producers can promote it to the consumers. The consumers may also voluntarily agree to purchase the organic foods or the eco-products as a responsible consumer; to go green, to contribute in emission reduction. Since organic foods are produced in natural process, their prices are also higher than those of the conventionally produced food items. So, the production of the organic foods significantly depends on the consumers' preference; whether they agree to purchase the organic foods with higher prices. On the other hand, the quest of meeting higher demand for foods in the densely populated countries depends on genetically modified (GM) foods. However, the GM food uses huge fertilizers, insecticides

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and pesticides. In Bangladesh, the uses of synthetic fertilizers and insecticides have started extensively during 1960s following the popularities of high yielding varieties (HYV). The GM food is the extensive version of the HYV. Usually, GM foods use excessive pesticides and insecticides, thus they may be contaminated by poisonous chemicals which could be dangerous for human health, and hence there is a debate about the consumption of GM foods (WebMD, 2018). Moreover, some rent seeking businessmen in Bangladesh use various toxic chemicals like carbide and formalin in perishable foods to ripen the premature fruits earlier and to keep them fresh for a long period, respectively. Though the use of these chemicals is strongly prohibited by the law of the land but there is substantial evidence of using those in very common food items in Bangladesh. As a result, people are now very conscious about their food choice and thus demand for organic products, which are produced naturally without using the chemicals, is increasing continuously.

Bangladesh is one of the most vulnerable countries to climate change, even though the country is not responsible for historical carbon emission. According to the Kyoto Protocol (1997), Bangladesh is not required to reduce carbon emission, while 37 industrialized countries and the European community must reduce the carbon emission on an average to 5% of their 1990 level. Therefore, as a developing country Bangladesh has right to produce and emit as much as it wants till 2020 (Kyoto Protocol, 1997), but a voluntary emission reduction could be a pro-active measure since Bangladesh is considered to be one of the worst victims of climate change. Besides, by avoiding poisonous and contaminated foods, people can actually avoid many dangerous diseases like cancer, diabetes, attention deficit disorder, autism, learning difficulties, infertility, chronic fatigue, chemical sensitivities, heart disease, multiple sclerosis, inflammatory bowel disease amongst many other diseases. Thus, if an individual prefers organic foods, he or she must be aware of the global climate, environment and family health. However, no significant study has been conducted on this issue that could have provided some policy implications and guidelines to the policy makers and producers, respectively. With all these viewpoints, the objectives of the paper are to assess individuals' awareness and attitude towards the organic foods, and also find out the factors what motivate them to purchase organic foods in the context of Bangladesh.

The rest of the paper is organized as follows: Section 2 provides a comprehensive literature review and Section 3 describes the data and methodology. In Section 4, results and discussions are presented and Section 5 gives the conclusion of the findings.

2.   Literature Review

Organic foods use natural resources while being produced. It deals with recycling, sustainability and less usages of energy and transport. So far, Bangladesh has no obligation to produce and consume the environment-friendly organic foods. Across the developing countries, it is perhaps a question of food safety, family health and income pattern which are the main reasons behind purchasing organic foods by the customers. To supplement the current study, several studies have been reviewed and summarized here. Surprisingly, no significant research has been conducted in Bangladesh on the organic foods, and consumers' attitude on these. Therefore, most of the studies reviewed here are on other countries.

Elofsson et al. (2016) estimate the demand function for organically produced milk, posting the climate information in the superstores from where data has been collected. The data has been collected from 17 outlets of Coop Forum from Uppsala City of Sweden for four weeks. In their study, they finally investigate the impact of voluntary carbon labeling on the demand for climate certified milk. Their finding show that demand for climate certified milk increases by 6-8% than other milk of the same company, which certainly is an evidence of positive attitudes of the consumers toward the organic milk.

Basha et al. (2015) study consumers' attitude towards the organic foods in two cities of India; Chennai and Bangalore. With a sample size of 50, their finding show the evidence that people buy organic products for the quest of environmental care, health care, life style and quality product. They have estimated different regression functions and all of the explanatory variables have satisfied their hypothesis of previously mentioned concerns. Based on their findings, they concluded that peoples' awareness is increasing towards the organic foods, and the purchase is also increasing.

Consumers prefer organic foods to conventional foods because they think organic foods are healthier than conventional food, and organic foods are environment-friendly. Shepherd et al. (2005) find that healthiness is the main reason behind the consumption of organic foods for most of the consumers and the second main reason is environment. In their study a few consumers reported that they prefer organic foods compare to regular foods because they think the organic foods are very costly but healthier. Krissoff (1998) also point out that consumers usually buy organic foods as they are recognized as healthier. Consumers also believe that organic foods are produced in an environment- friendly mode of production.

Urban et al. (2012) study to find out the reasons behind the preference of organic foods in Czech Republic based on a survey of 250 Czech grown up citizens. Their findings show that a social norm influences the demand for an organic food which is 'organic foods are healthier than the conventional foods'. They also believe that organic foods are environment-friendly as harmful chemicals are not used in the process of the production of organic foods. As a result, most of the consumers actually buy organic foods for the second reason, they opined.

There are different kinds of organic foods available in the market, but most of the time people prefer to buy organic vegetables, fruits, fishes, meats and chocolates. Al-Taie (2017) states that people are more likely to choose organic fruits, vegetables, fishes and chocolates when they buy organic foods. Based on a survey of two hundred and twenty one respondents in the United Arab Emirates (UAE), the author shows that 19.9% people prefer organic fishes, 15.2 % prefer organic fruits, 13.7% prefer organic chocolates, 12.8% organic vegetables and 12.3% people prefer organic meats. Aryal et al. (2009) find that the available organic foods of the Kathmandu Valley are various kinds of vegetables and pulses. They also mention that most of the organic vegetables are seasonal and the "highly demanded" vegetables are lettuce and tomato, which are used to prepare salad. Carroll et al. (2013) mention as stated by the Organic Trade Association (2010) that "organic fruits and vegetables currently represent 39% of organic food sales and 11.4%

of the total sales of fruits and vegetables in the United States". This statistics shows that organic fruits and vegetables possess quite a large space in the organic foods market of the United States.

Who are buying the organic foods? To answer this question most of researchers find aged people with high income and high academic background are the consumers group who often buy organic foods though in some cases women buy more organic food than men. Sangkumchaliang and Huang (2017) find that in Bangkok, consumers of organic foods have higher academic degree and high income. They also state that organic foods buyers are more likely to be older than the non-organic food buyers. The study further finds significant differences in demographic characteristics between the organic food buyers and non-buyers. The study also finds that the organic food buyers are more likely to be educated, older and have high income in the Chiang Mai region of Thailand.

Dettmann and Dimitri (2008) find that compare to Caucasians; African Americans are less likely to buy organic foods. They also state that consumer's likelihood of purchasing organic vegetables is often regulated by higher level of education and high income, which means educated people with high income are more willing to buy organic foods (Alam, 2013). However, they also mentioned that their result is contradicting because highly educated people are more likely to buy organic carrots, but their consumption decreases when income increases. Davies et al. (1995) show that middle aged women with higher level of disposable income are more willing to buy organic foods than men. They also mentioned that higher level income group buys organic foods than that of less income group.

In short, it can be inferred from the reviewed studies that consumers in developed countries with higher income are more likely to buy organic foods. As organic foods are expensive, consumers in developing countries with lower income might not be able to buy organic foods. As a result, attitude towards the organic foods has not been remarkable in a country like Bangladesh compared to a developed country. However, higher income group of the developing country people may have positive attitude to purchase the organic foods. But there is no much studies on this particular area which resembles a significant research gap, and thus the current study is an endeavor to fill the gap.

3.   Data and Methodology

This study is based on primary data collected from the consumers shopping in the targeted superstores in the major cities in Bangladesh. The convenient sampling tool has been used to collect the primary data. The convenient sampling is the non-probability sampling which is used in exploratory research. This sampling technique has been used as getting sample units in front of the superstores was convenient. Compared to simple random sampling the convenient sampling tool is inexpensive in getting the approximation (Bailey, 1994, pp.92). While collecting the data, we used the face to face interview method. Both male and female respondents were interviewed and selecting the respondents was fully random and unbiased. The data has been collected from the major cities including Dhaka, Chittagong, Khulna and Rajshahi. These cities were also chosen because of convenience in terms of costs, labor, and availability of the

superstores. The population of the study is unknown as individuals purchasing foods and items from superstores are considered as the potential population of this study. The targeted sample size was 200, but some of the responses were rejected due to the incomplete information, and thus the final sample size stands for 191. The reason of choosing 200 sample is because of time and monetary constraint. As the population (consumers who buy organic products) is unknown, and the availability of data is challenging, a good number of sample size 200 was considered to have a good representative of the population for this study. Assuming the population of this study as in the higher income group of the society, the aim was to make the sample as much as representative. Though the survey used the convenient sampling technique, but the respondents were chosen randomly. Therefore, all sorts of heterogeneity of the population is expected to be reflected in the sampling which make it a representative sample. The sampling distribution in favor of the four cities was based on the population size. Though the collected number of sample proportion differs from the targeted sample proportion but it meets the weights of the population. Consumers who usually visit supermarkets in these cities were interviewed using a well-structured questionnaire. The questionnaire was constructed with the questions on the demographic information of the respondents, consumers' knowledge about environment-friendly products, and reasons behind their willingness to purchase environment-friendly products from the superstores. The city-wise sampling distribution is shown in *table 1* below:

Table 1: Sampling Distribution

Name of the City	Population*	Name of the Superstores	Targeted Proportion of Sample Size (%)	Actual proportion of Sample (%)	Actual Sample Size
Chittagong	3920222	Agora, Swapna, Meena Bazar, Grocer	24	34	64
Dhaka	10356500	Swapna, Meena Bazar, Agora, Prince Bazar, Almas Superstore	63	40	77
Khulna	1342339	Safe and Save, Aroma	8	16	30
Rajshahi	700133	Swapna	4	10	20
Total	16319194		100	100	191

*Source: http://www.geonames.org/BD/largest-cities-in-bangladesh.html

3.1 Empirical Model

We estimate consumers' preference for organic foods. The empirical model for the consumers' preference is estimated by the concept of the logistic function. A logistic model is used to measure the variation in the dependent variable when it is categorical. In the present study, the dependent variable, Y (attitude of a consumer towards the organic foods) takes two values (binary), either 1 (= positive attitude) or, 0 (= otherwise/ negative or no preference). It is assumed that consumers purchase a good only if they

have positive attitude towards the good. Based on this assumption, a binary logistic function has been considered as the empirical model which follows the following equation (Gujarati, 1995. Pp. 595):

$$P_i = E(Y=1/X_i) = \frac{1}{1+e^{-(\beta_1+\beta_2 X_i)}} \quad ---- \quad (1)$$

$$P_i = \frac{1}{1+e^{-Z}} = \frac{e^Z}{1+e^Z} \quad\quad ---- \quad (2)$$

Where $Zi = \beta_1 + \beta_2 X_i$. Here, equation (2) is referred as the (cumulative) logistic distribution function. The values of Z_i range from $-\infty$ to $+\infty$ and as a result P_i ranges from 1 to 0. That is P_i is nonlinearly related with Z_i (ultimately X_i). It is mentionable that P_i is nonlinearly dependent with β's also. Thus, to avoid the estimation problem in the ordinary least squares regression (OLS), we use the logistic regression method which could be defined as follows:

$$L_i = \ln\left(\frac{P_i}{1-Pi}\right) = Z_i = \beta_1 + \beta_2 X_i \quad\quad ---- \quad (3)$$

Here L_i stands for log of odd ratio of positive attitude towards the organic foods (P_i=1) to otherwise (P_i=0). So, based on the theory of logistic regression model, the log of odd ratio (L_i) is expected to be as follows:

L = f(Consumer's income, education, knowledge abut environment, Age, family having older person, and consumers' claim of responsible buyer)

Hence, the empirical logit model is expressed as:

$$L_i = \ln\left(\frac{P_i}{1-Pi}\right) = \beta_1 + \beta_2 Income + \beta_3 Educ + \beta_4 Env + \beta_5 Age + \beta_6 Older + \beta_7 Resp + u_i \quad --- \ (3)$$

Here, *Income* represents the respondents' monthly income; Education is a binary variable which refers whether the respondent is a graduate or not. Variable *Env* refers respondents' knowledge about environment and climate change. It is also a dummy variable that gets a value of one (1) if the consumer is aware of the consequences of the conventional foods on environment/climate, and 0 = otherwise. Age refers the age of the respondents; *Older* is another binary variable which refers family has any senior citizen (Older = 1) or not (Older = 0; otherwise), *Resp* is another dummy variable and the value Resp = 1 refers that respondents believe that they have responsibility towards the environment/climate and Resp = 0 refers otherwise. Finally, u_i is the random error term.

The coefficients ($\beta_{i's}$) in the equation 3 are expected to be positive with log of odd ratio.

4. Results and Discussions

The survey outcomes have been summarized using Excel and STATA 12 to observe the socio-economic conditions of the respondents and to assess the representativeness of the population of the study.

4.1 Socio-economic and Demographic statistics of the respondents

The descriptive statistics presented in table 2 shows that the average monthly family income of a consumer who usually visit these superstores is about USD 700 (BDT 56550) which is quite higher than the average monthly income of an individual (the current per capita annual average income is USD 1751 (2017-2018) and thus per month income stands for USD 146 only) who is the sole earner of the family.

The mean value of education (the person has a graduation or not) is 0.58 which means that more than half of the respondents are graduates. This statistic provides that most of the respondents who visit the superstores are graduates. According to the descriptive statistics, the number of male customers is a bit higher than that of the female depicts the bias from choice of male over female for environment-friendly products. The average age of the respondents is about 37 years that represents that mid aged people are most likely to visit the superstores. In addition, about 68% respondents are married and those who are married have two children on an average. Almost one third of the respondents replied that they have elderly person in their families. Having children and elderly person in the families can motivate to purchase organic foods as a measure of health care. On average, families of the respondents are comprised with 4.38 members that is much closed to 4.5; the nationally average household size (Arcgis, 2016). It implies that in terms of household size the sample is representative of the population. Finally, the mean value of earning members is 1.36 refers that labor force participation in most of the families is more than 1.

Table 2: Summary statistics of demographic variables

Variable	Mean	Std. Dev	Min	Max
Age	36.94	11.32	18	66
Sex	0.647	0.479	0	1
Educ	0.578	0.495	0	1
Married	0.68	0.467	0	1
No. of Children	2.05	1.31	0	5
Older	0.338	0.475	0	1
MFI	56550	63576	10000	500000
Family Members	4.47	1.38	2	10
Working Members	1.36	0.559	1	3

4.2 Descriptive Statistics of the Explanatory Variables

The descriptive statistics of the core explanatory variables are presented in table 3. According to the mean value of the statistics, about half of the respondents (mean value is 0.45) buy organic foods regularly from the reported superstores, however majority of them (mean value 0.86) also purchase from ordinary markets which do not sell organic foods. It seems that the respondents purchase both organic foods and conventional products simultaneously. Table 3 also shows that almost half of the respondents are familiar with organic foods and the average number of respondents who purchase these products is 0.61, which indicates that more than half of the respondents have the positive attitude of purchasing organic foods.

The mean value of having knowledge of environmental concern or climate change is 0.56. It indicates that more than half of the respondents are aware about environmental or climate impacts of conventionally produced products. In addition, most of the respondents (mean value: 0.87) have knowledge about the negative impacts of climate change in Bangladesh. Whereas above 50% of the respondents showed that they want to be a responsible consumer that can help mitigation of climate change. In response to meet the climate change responsibility, more than 50% respondents (mean value is 0.58) have knowledge of purchasing organic foods. However, about 42% of them; who has knowledge of organic foods, purchase these.

Table 3: Summary Statistics of the Explanatory Variables

Variable	Mean	Std. Dev.	Min	Max
Shop regularly	0.455	0.499	0	1
Shop ordinary	0.861	0.346	0	1
Env/Climate	0.567	0.496	0	1
Knowledge of harm	0.872	0.335	0	1
Responsibility	0.568	0.496	0	1
Knowledge of Env.-friendly products	0.587	0.493	0	1

4.3 Empirical Results

Based on the collected data we have estimate the econometric model (equation 3). The estimated results of Logistic Regressions were conducted for four different models, shown in the table 4 below. Overall, the results of the key explanatory variables in all models show expected signs. The coefficients of Education (graduate or not) and Environmental/climate concerns are highly significant in all estimated models though for the remaining variables they are not significant. Among the 4 models, model 3 considers highest number of observations; 90 though the sample size is 191. Thus, we considered model 3 as the best model estimated. The probability of the chi^2 value is less than 0.05 that satisfies the overall significance of the estimated models. Based on the findings of the model 3, the marginal effect of the education is estimated to be 4.8, which indicates, under a *ceteris paribus* condition, a person having a bachelor or more education is four times more likely to buy an organic food compared to a person having less than a bachelor degree.

Table 4: Estimated Results

Variables	Model 1	Model 2	Model 3	Model 4
Income	1.00 (0.20)	1.00 (0.02)	-	0.999 (-0.11)
Education	7.282 (2.83)	6.901 (2.72)	4.802 (2.85)	7.768 (2.69)
Age	-	0.956 (-0.46)	-	0.979 (-0.71)
Env	6.884 (2.66)	6.679 (2.61)	3.546 (2.23)	5.976 (2.35)
Older	-	-	1.538 (0.77)	1.368 (0.53)
Resp	-	-	1.699 (0.84)	1.431 (0.46)
N	59	58	90	58
Prob> chi^2	0.0001	0.0057	0.002	0.011
Pseudo R^2	0.1859	0.1835	0.1257	0.186

Note: Parentheses are Standard Z values of the estimation

Therefore, the coefficient of education is statistically significant (Z-value 2.85). Also, a person who has knowledge about environment or climate change, is more concerned about the negative impact of conventionally produced products on environment and climate, is 3.5 times more likely to buy environment-friendly products than the other person.

The marginal effect of the environment/climate change shows the expected result which is statistically significant with the Z value (Z=2.23). This marginal effect also indicates that, *ceteris paribus,* a person who is aware of the impact of conventional products on environment/climate is almost 3.5 times as likely to buy an environment-friendly products compared to a person who is not aware of. However, a person's income level and age are neither economically nor statistically significant in all models.

Using a *Chi-square* test, overall significance of model 3 is tested. The p-value is 0.002 which shows that the regression model is significant below to 1% level of significance.

Model 2 includes one more variable; *age*. The effect is similar in magnitude. For education and environment, the odd-ratios are 6.90 and 6.68, respectively. Except for education and environment variables, the other variables such as income and age are neither economically nor statistically significant. *Chi-square (Likelihood Ratio)* is highly significant (P-value: 0.005) which indicates the overall significance of the regression model (at 5% level of significance).

Model 3 drops income and age variables and includes *Responsibility (Resp)* variable. The results are similar to those in models 1 and 2 (Table 4). Though the *Responsibility* variable shows positive influence, but it is not statistically significant. However, the P-value of *Chi-square (Likelihood Ratio)* is 0.002 which shows the significance of the model at 1% level.

Finally, all the regressors are included in Model 4. The trends of the variables are same. Except for the *Income*, *Age, and Responsibility* variables, odd-ratio of the *Educ* and *Env* variables are 7.768 and 5.976 respectively, which are also found to be statistically significant. That is, *ceteris paribus*, a person having more than graduation is almost eight times more likely to buy organic foods than a person with less than a bachelor education level. Similarly, a person with a concern of environment is almost six times more likely to buy organic foods. *Income* and *Age* do not have any effect on purchasing organic foods, whereas *responsibility* shows some positive influence, albeit not statistically significant. Again, the overall regression model is significant at 5% level.

In short, it can be inferred that a higher educated person is more than seven times likely to buy organic foods, and the result is robust. It indicates that in a society where illiteracy is pervasive, higher education could be one of the most important ways to promote organic foods which, however, might require long period of time and hence, could be a long run policy instrument. Environmentally aware people are about six times more likely to buy organic foods, and the result is also robust. In line with the existing literature it implies that creating awareness could be a key policy prescription to promote organic products.

Income does not have any influence on the preference of organic foods which seems rather counter intuitive. The reason might be for the exclusion of price of the organic foods as an explanatory variable. The prices of organic foods have not been included due to unavailability of compatible data. Therefore, it is assumed that the negative influence of price of the organic foods on the preference of these products has been incorporated with income, and has washed out the positive effect of the income.

Usually, in a developed economy, senior people are more likely to buy organic foods/environment-friendly products but this does not seem to be the case in a developing economy like Bangladesh. The reason could be the dependency of the senior citizens on their families. In most cases, the young members of the families are influencing preferences of the families' consumptions of foods and other necessities, and hence, the coefficients of the age or older are not showing expected signs. The coefficient of the responsibility variable shows that it is not statistically significant which reveals the fact that rational people are motivated by their own interest while deciding about their preferences on organic foods, not by the interests of the society as a whole.

5. Conclusion

Organic foods are healthier, tasty and environment-friendly. Therefore, preference to organic products can contribute to climate change mitigation. Though Bangladesh can enjoy the emission right under Kyoto Protocol (1997), a voluntary reduction of carbon emission should be encouraged through the positive attitude of the consumers as it can indirectly contribute to climate change mitigation. By increasing consumers' positive attitude towards the organic foods Bangladesh can contribute to emission reduction. In addition, to address the issue of contaminated foods with toxic chemicals and the resulting health hazards, it is important to create awareness about organic foods. Hence, it is imperative that extensive research be pursued in this area. The current study turns out that consumers' educational level plays a key role for a favorable attitude towards organic foods. Knowledge about environmental consequences of conventional agricultural production can also help. It, however, turns out that, *ceteris paribus*, consumer's income, age, etc. do not matter much on their attitude towards the organic products. This paper however, suffers from relatively small sample size and further dropping of few more observations by STATA for technical reasons. Notwithstanding, we believe, this research will be an endeavor to increase the social awareness on organic foods.

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