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HAZARDOUS CHEMICALS IN FOODSTUFFS: PERCEPTION OF CONSUMERS, SELLERS AND DOCTORS IN BANGLADESH

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ABSTRACT:

Consumption of chemical mixed hazardous foodstuffs has been a reality now-a- days in Bangladesh. In the face of many health hazards due to food adulteration, that has drastically increased, the researchers have paid a lot of attention to the issue recently. This study attempts to show the perception of both consumers and sellers regarding chemical mixed hazardous food followed by doctor's opinions regarding its impact on health. It also shows that there exists high level of awareness with adequate information among consumers and sellers but they are ignorant about its severe negative impact on health. Still they are less motivated to avoid these foods which eventually lead them to embrace suicidal consumption with dissatisfaction. It also seeks a socio-cultural and legal solution to the problems from both consumer's and seller's point of view. Gender and income level had significant influence on awareness whereas education had not. Proper execution of anti-adulteration laws can help people avoid many fatal diseases caused by hazardous foodstuffs.

Key words: Hazardous foodstuffs, food adulteration, perception, awareness, consumers, sellers, doctors.

1. INTRODUCTION

A human must consume food on a regular basis in order to experience health. From food, people obtain energy and materials for body repair and growth. Energy is important for human survival and it is needed so that we can move, grow, and function. We get our energy from food we eat and the food should be hygienic. Without hygienic food, human body cannot meet their needs. The right to get safe and hygienic food is the prime human right. Business person who are basically involved in food business, it is their responsibility to supply hygienic and adulteration free food to their customers. In Bangladesh, all food additives should be carefully regulated by Bangladesh Standards & Testing Institution (BSTI). There are so many international organizations such as World Health Organization

(WHO), the International Standard Organization and the World Trade Organization who must ensure that food items are safe to eat, hygienic, and adulteration free. Food adulteration is very much common problem both developed and less developed countries. Any food item may be considered as adulterated if its nature and quality are not up to the standard. BSTI established all laws and regulations to protect the food adulteration and to ensure the hygienic food for the people. Even though hazardous chemicals in foods and foodstuffs are very common in Bangladesh. There exists a vibrant situation in Bangladesh where food adulteration is a serious problem. Meanwhile, the issue has got interest of the researchers and the population in general.

In Bangladesh businesspeople are basically responsible for these as there is a common tendency to make quick money in this society. They mix dangerous chemicals with food to look attractive for the gullible and ignorant consumers. Almost all over the world to check this kind of anti-social evil and prevention of food adulteration, various laws and regulations are being imposed by the government.

From the early 1980s through the late 1990s, autism increased tenfold; from the early 1970s through the mid-1990s, one type of leukemia was above 62 percent, male birth defects doubled, and childhood brain cancer was above 40 percent (Duncan 2006). Some experts suspect a link to the man-made chemicals that pervade our food, water, and air. There's little firm evidence. But over the years, one chemical after another that was thought to be harmless turned out otherwise once the facts were in. Now a days, with the huge increase of cancer patients, the link with hazardous chemicals that are used in food is widely accepted by both the researchers and health experts.

This study will gain insight into this paradox that even after good awareness on hazardous chemicals and its implication on health, why and how the people of Bangladesh are captivated into this trap of having such food and foodstuffs.

2. OBJECTIVE OF THE STUDY

The aim of present study is to find out the answer of the following questions: i) What is the perception of consumers and sellers regarding chemical mixed hazardous products in Bangladesh? Ii) What is the present situation of food adulteration in Bangladesh? Why and to what extent are chemicals used in foodstuffs? iii) What types of chemicals used in the food adulteration and its impact on health among the large section of people of

Bangladesh? iv) What should be the socio-cultural and legal solutions to the problems of food contamination from both consumer and seller point of view?

3. LITERATURE REVIEW

At present, to say which food or food item contains no harmful chemicals is very difficult. The condition is so alarming that the educated, wealthy and cautious citizens of the country are also compelled to consume adulterated foods and foodstuffs. (Hossain 2008). Unscrupulous traders normally adulterate food. In the process of adulteration, extraneous matters are directly added to food grains. (Daily Star, Mar 31, 2010). Of course, attractiveness and longevity could also be achieved using health-friendly permitted chemicals and food colours, but these are more expensive than the hazardous chemicals currently in use. Therefore, one could reasonably claim that such producers or sellers process foods with hazardous chemicals simply to increase profits and to conduct business with less capital and equipment (Hossain, et al. 2008). Recent study has shown that a total number of 74.8% of the consumers do not have the capacity to differentiate between natural and chemical mixed hazardous products. Consumers have become used to in using chemical mixed products and they no longer look for natural one rather the consumers pretend to be happy in consuming chemical mixed hazardous products. (Choudhury and Rahman, 2009).

Study in Bangladesh has shown that hazardous chemicals such as calcium carbide are now being widely used to ripen green tropical fruits, such as bananas, mangoes, guavas, papayas, tomatoes and pineapples (Amin et al., 2004; Prothom Alo, 2005). Chemicals are also being used to color vegetables in an effort to make cucumbers appear greener or tomatoes redder (ripe). Besides using chemicals to ripen fruit, some unscrupulous traders throughout the country have been adulterating food items, such as popular sweetmeats, soft drinks, beverages, confectionaries and others, using low-cost textile dyes to draw customers (Billah, 2007). In addition, unscrupulous fishmongers preserve fish with formalin, which keeps the body of the fish seemingly solid to disguise internal decomposition (Amin et al., 2004; Ullah, 2005; Rashid, 2007b). From the perspective of the sellers or producers, using hazardous chemicals yields many benefits. Artificially ripened fruits have a deceptively attractive appearance; fruits matured with carbide appear ripe longer and are more attractive then natural ones. The use of chemicals in food items has direct consequences for public health and many cause complex diseases, including cancer, in humans (Billah, 2007). However because of the various activities of the Food Safety and Inspection Service under the US Department of Agriculture, the European Union Health and Consumer Protection Division and the WHO, public awareness of food

safety has increased in developed countries. In developing countries, however, and especially in Bangladesh, consumer altitudes towards chemically treated foods remain unexplored. Hossain et. all 2009 on their study found that there is no significant difference in terms of consumption of adulterated foods between the different education and income groups while Education of the consumers seems to be a significant factor for the awareness about hazardous chemicals as well as the idea about the effects of chemicals in food. (Chowdhury and Rahman, 2009). Although anti-adulteration drive is going on, the situation of Bangladesh has not much improved. Without the license of BSTI and organization was producing 17 types of food items including vegetable oils, Mango juice, spice etc. where most of the items were produced with hazardous chemicals (Prothom Alo, March 04 2010 pp 7). Some people were punished for mixing 1 mound water with 2.5 mound milk (Jugantor, 13 May 2010 pp 7). Even renowned business person recently gets bail in a food-adulteration case. (January 27, 2011, The daily Prothom Alo). Since the market is flooded with adulterated items and low quality consumer goods Bangladesh (UNB - United News of Bangladesh; August 8, 2010), the necessity of studying the perception of both consumers and sellers is worth mentioning.

4. METHODOLOGY

This research is an exploratory type in nature. To conduct the study, primary data were extensively used and secondary data, sometimes, were used in selective cases. The dearth of secondary data is the main reason for relying heavily on primary data. Basically, secondary data were collected from Bangladesh Bureau of Statistics, different publications of Ministry of Health, and other published sources.

4.1 Sample

A total number of 620 respondents, consumers/sellers/doctors, were surveyed across the country. The country has 7 divisions 64 districts, 7 metropolitan cities, and 599 thanas. For this study, the relevant primary data were collected from all the divisions, metropolitan cities, 45 districts from all over the country. To make the sample representative, respondents were selected from all the different areas from the country. For data collection purpose, 45 districts were chosen randomly, using lottery method. A total number of 300 consumers were selected randomly from different locations of the country. Further, a total number of 300 sellers from different districts were selected applying judgmental sampling method, assuming that the selected respondents seemed to be better responsive, more knowledgeable, and representative following the purpose of the study. Only 20 doctors

from metropolitan areas were taken for study purpose. Open-ended questions served mainly in collecting data from doctors and pharmacists, which were later analyzed qualitatively. The survey was conducted from December 2013 to March, 2014 by a set of trained interviewers who were the students of tertiary educational institutes in Bangladesh.

4.2 Survey instrument

A structured questionnaire was developed to collect respondent's opinion on chemical mixed hazardous products. To find the intensity of the opinion, 5-point Likert Scale was used in some questions. There were 10 other questions, in which 8 were demographic and awareness related, and 2 were open-ended set to elicit respondents' views and suggestions.

4.3 Statistical Methods for Calculations

Data were then analyzed by using SPSS 17.0 with simple statistical techniques like frequency distribution, percentage etc. Descriptive statistics were analyzed and interpreted on both all the statements and all the questions related to demographic variables. Both frequency and cumulative frequency tables were used to express the certain percentage of different value levels. The missing values/opinions were excluded from the analysis, and the frequencies were calculated from the valid opinions only. Therefore, while preparing the tables the total number of samples undertaken slightly fluctuated due to the missing values. Under certain hypotheses significant association between some important variables of consumers and sellers was tested and established using statistical techniques, like Cross-tabulation, Chi-square tests, and the results were interpreted in light of the opinions of the respondents from open-ended questions.

5. RESULTS AND DISCUSSIONS

5.1 Analysis and Findings (Consumer's part)

Data shows that more than 75 percent of the total respondents are aware about the chemical mixed products. Two major interpretations can be made from the frequency table. One, a large scale awareness program is required to let people know about the presence of these poisonous foods. Secondly, mass group knows about the chemical mixed products but they have no other option other than buying those hazardous foods. It is also found that 34% of the consumers do not have the capacity to differentiate between natural and chemical mixed products.

Table-1: Frequency distribution of the Awareness to hazardous chemicals, Idea about effect of chemicals in food and Differentiate between natural and chemical mixed food.

Scale of Reaction by the respondents		Awareness to hazardous chemicals		Idea about the effect of chemicals in food		Difference between natural & Chemical mixed food	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
	Yes	227	75.6	98	32.6	179	59.66
	No	6	2.04	51	0.17	21	0.07
	Yes, I have heard	67	22.3	151	50.33	100	33.33
Total		300	100.0	300	100.0	300	100.0

Large no of respondents (73.33%) marked that they buy both natural and chemical mixed foods. 25.33% respondents claimed that they buy natural food and only 1.34% consumers marked for chemical mixed products. According to researcher's point of view this is a very logical findings and it can also be said that those who said they buy both categories, actually they buy chemical mixed foods mostly because they can't differentiate between the two food categories. About 69.99% (48.66 + 21.33) of the respondents said that they are very dissatisfied with the chemical mixed foods. Very small number of respondents has expressed there satisfaction 7.6% regarding the food and foodstuffs. One thing is clear from the table bellow is the people of Bangladesh are somehow trapped to buy chemical mixed hazardous cause only 25% could claim that they buy natural food and foodstuffs although people are much aware on this issue.

Table-2: Frequency distribution of the types of food bought, satisfaction in using chemical mixed products and opinion to stop the production of chemical mixed products (Missing system is not counted in this case).

Variables	Category/options	Frequency	Percentage
Types of food Bought	Natural	76	25.33
	Chemical mixed	4	1.34
	Both	220	73.33
	Total	300	100
Satisfaction in using chemical mixed foods	Highly Satisfied	4	1.38
	Satisfied	19	6.30
	Somewhat satisfied	67	22.33
	Dissatisfied	146	48.66
	Highly dissatisfied.	64	21.33
Reason for selling Chemical mixed hazardous products	Total	300	100
	To make products lucrative	71	23.67
	Consumers are demanding for that	34	11.11
	Natural good are not available	90	30.0
	It is cheaper than natural goods	72	24.0
	To make profit	33	11.0
	Total	300	100

5.2 Analysis and Findings (Seller's part)

The data shows that a large segment (84.5%) of the seller is selling chemical mixed products to make more profit. Again a large chunk (70.3%) of sellers said that they sell chemical mixed foods as those are more lucrative and thus customers have huge demand (70.3%) for those. Natural products are available but producers supply them at a small scale thus inducing the sellers to sell chemical mixed products. Probably this type of products offer more profit to producers even. When asked, 34.66% and 30.33% of the sellers said that they have some idea and no idea about the effects of chemical used in foods respectively. Only 35% sellers told that they have ideas about the effects of hazardous products. Fortunately, 93.2% of the sellers have shown their opinion in favor of stopping mixing chemical to the food stuffs which is a positive intension of Bangladeshi people to stop such malpractices.

Table-3: Frequency distribution of opinions of the sellers

Opinions		Frequency	Percentage
Do you know the effects of chemical mixed products	Yes	105	35.0
	No	91	30.33
	Some idea	104	34.66
Total		300	100
Do you think mixing chemical should be stopped	Yes	280	93.33
	No	20	6.67
Total		300	100

5.3 Comparison between the response of Sellers and Consumers:

The chi-square test indicates that the gender of the consumers and idea about chemical in food are significantly associated. Same result goes for the sellers which show that the idea about the chemical in food doesn't depend on gender. It is also found that the satisfaction is related to the income level of the respondents for both consumers and sellers. An interesting finding show that the awareness of the respondents as well as the idea of health affects of such food are not significantly associated with the level of education for both consumers and sellers. This finding differs with the findings of Hossain et all. No significant differences were found in terms of consumption of adulterated foods between the different education and income group (Hossain 2008).

In Bangladesh very few women are engaged in selling because of the socio-cultural reasons. And the education level among the sellers is relatively low but the general awareness among sellers, consumers and doctors are visible. In one point both consumers and sellers are united that the mixing of chemical in food should be stopped. One very important finding the researchers want to disclose that the sellers are just intermediaries and not that much guilty. Rather producer and supplier are mostly liable for this malpractice.

Table-4: Association test between considered variables

Description of the variables	Consumers			Sellers		
	Value of Chi-square	d.f.	P-Value	Value of Chi-square	d.f.	P-Value
Gender of the respondents' and their 'Idea about the effect of chemical in food'	8.67	2	0.22	9.35	2	0.19
'Income level of the respondents' and 'Satisfaction in using chemical-mixed food'	34.29	20	0.73	45.30	20	0.32
'Education of the respondents' and 'Awareness to hazardous chemicals'	249.71	5	0.00	259.01	5	0.01
'Education of the respondents' and 'Idea about the effect of chemical in food'	246.39	8	0.03	238.89	8	0.00

From chi-square test, it can be concluded that the education of consumer seems to be a significant factor for the awareness about hazardous chemicals as well the idea about the effect of chemicals in food. There is strong evidence of association between Education of the respondents' versus awareness and idea about the effect of chemical in food'.

Interestingly, income was found a insignificant factor regarding the awareness and satisfaction of chemically treated food for both the consumers and sellers. This indicates that no matter how the income level is, the respondents are engaged in both selling and consuming chemical mixed hazardous food and foodstuffs.

5.4. Discussions

Eating contaminated food may cause diarrhoea, dysentery and other diseases. Consumer Association of Bangladesh (CAB) — Bangladesh's only consumer rights group — confirms that wholesalers do indeed use urea fertilizer in rice to make it whiter.

In a survey conducted by DCC officials found that 100 percent of examined samples of Rasogolla, kalojaam, chamcham, curds and sandesh were adulterated. Bangladesh's Pure Food Ordinance (1959) states that at least 10 percent milk fat is mandatory in sweetmeat. But in most cases, the percentage of milk fat is not more than five percent.

Sources at the Bangladesh Standards and Testing Institute (BSTI) — the government agency responsible for enforcing standards and issuing permits for the manufacture of processed foods — admit that a wide variety of products such as soybean oil, butter oil and mustard oil are being sold in the markets with fake BSTI seals.

The producers responsible for food adulteration generally establish their factories with little capital and without proper permission from the relevant authorities. They adulterate food items such as bakery products, noodles, chanachur (fried nuts and other salted and spiced foods), different spices, oil and others. Hydrogenated oil and animal fats are used to adulterate ghee (butter oil). Small amounts of cyanide and artificial colour are added to soybean and palm oils to prepare (adulterated) mustard oil (Amin et al., 2004). Muri (puffed rice) is whitened with urea. Harmful substances are added to brighten turmeric powder and to make chilli powder spicier.

6. FINDINGS FROM THE DESK OF DOCTORS AND NUTRITIONISTS

In a single word the doctors and nutritionists are just against the use of these chemical mixed hazardous products due the ill effects over human body.

Hazardous chemicals in foods cause neurological damage in children, shaving off IQ points. The chemical used to ripen the fruits is called Calcium Carbide and is extremely hazardous to the human body because it contains traces of arsenic and phosphorous. The nutritional elements that should be in fruits and vegetables, if adulterated with dyes and synthetic colors, are destroyed. Eventually the digestion of those poisonous fruits or

vegetables may cause diarrhoea, dysentery and even death. Meanwhile children are fast becoming the greatest casualty of the widespread adulteration. If children don't get the vitamins and minerals from fruits and vegetables to rebuild tissues, the result could be severe malnutrition.

According to the doctors, the awareness level among the community, specially awareness regarding the depth and severity of the health hazard of food adulteration is not up to the mark. People are likely to be tolerant to the fact that they will have to live with chemically treated and few natural foods simultaneously. There have been huge health problem in Bangladesh as well as health related business has tremendously increased in the last decade. Disease like caner, kidney failure, liver cirrhosis etc. has significantly increased than any other time in Bangladesh. And the root cause of most health hazards are the scarcity of safe food. There exist vicious cycle of ill-business in many consumer goods including foods and food stuffs in Bangladesh and the people of Bangladesh are the worst victim of food adulteration side by side. Even there exists significant awareness in the metropolitan city areas, people has no way out except buying chemically treated foods. Although philanthropists and some social organizations are much vocal with this issue, but the steps taken by the government is never satisfactory. The anti-adulteration drives are always insignificant in terms of the number of incidents of adulteration by the sellers and middleman.

Here are few chemicals and problems that the mass people can face by using those chemical mixed products.

- Dyes: Eating foods containing industrial dyes and colors causes violent allergic reactions, respiratory problems, asthma, liver disorders and kidney dysfunction and bone marrow disorders. Nowadays, coal tar dyes are being used in sweetmeats. Asthma Caused by toxic dyes used in most Chinese restaurants.
- Erythrosine: Red food coloring that can lead to tumor in thyroid gland, asthma, bronchitis and hyperactivity.

- Formaldehyde: Formaldehyde - normally used to preserve dead-bodies - is used to preserve fish bound for city markets.
- Iodine: Found in high quantities in most condensed milk brands. Indicate use of vegetable fat.
- Pesticides: When pesticides enter the body on a regular basis, they affect the liver until it is damaged permanently. Quality Seal Many products use forged and/or expired BSTI seals
- Tartrazine: Yellowish orange food color that can lead to cancer, headaches, allergies such as asthma, inflammation, eye irritation and runny nose. (Khan and Khandker, 2006).

7. STEPS TAKEN BY BANGLADESH GOVERNMENT AGAINST ADULTERATION OF FOODS

Article two of the European Union Human Rights Act 1998 saying that 'Everyone's right to life shall be protected by law'. Now it is thinkable that, how the people of Bangladesh are protected with regard to the above basic necessities, in real life situation, to comply with the fundamental rights of the Constitution of the country.

In recent months, we see that the legal actions taken by the Government against food outlets on the ground of adulteration, contamination and other health hazards. Legal actions, like fines, warrant for arrest to the concerning owners and managers and cases against adulterators are taken on the basis of examination of foods using only senses like taste, flavor, color, texture etc.; other than the general Health & Safety of the food premises. Very recently a famous 'social business' personality is accused of food adulteration (27 January 2011, Prothom Alo).

People in general, seriously lack of basic knowledge on Health and Safety and Food Hygiene; traders hardly know about the laws and restrictions related to their businesses; consumers hardly know about their rights; government hardly undertook any awareness

campaign for the traders and consumers; government's concerning departments hardly took any venture to train the food handlers.

Laws like Pure Food Ordinance of 1959, BSTI Act of 2003 and Bangladesh Penal Code of 1860 (sections 272-273); in addition to the Constitutional rights, duties, responsibilities and various provisions. BSTI is an appreciable initiative by the government for the purpose of formulating, adopting and monitoring a national standard for Bangladesh. Under the laws, the mobile courts visit various cities and towns to enforce laws and punish the trader for adulterating the food products. But still the drive is not satisfactory irrespective of the severity and dimension of the misdeed.

8. CONCLUSION

Food adulteration in common in Bangladesh and a significant part of both the consumers and sellers are well aware about this issue at the same time they have become used to such events. The form, intensity, diversity of using hazardous chemicals in foods and food stuffs has increased beneath the awareness of mass people. There exists huge dissatisfaction regarding the use of such chemicals among consumers, seller and general people but people seem to be trapped in a vicious cycle of ill-business. The government has very less drive on anti-adulteration of foods which is not up to the mark. Health hazard and health related problems die to chemical mixed food and foodstuffs is acute in the country while there is increasing trend of health hazards among all walks of people. Severe disease like asthma, diarrhea, cholera, cancer, kidney failure, liver cirrhosis etc. can occur due to hazardous chemical use whereas consumers are not very aware and sellers are dauntless to some extent. Income is a significant factor of the awareness on chemically treated foods and

foodstuffs but interestingly education was identified as a non-significant factor regarding the awareness in general. There also exists a significant difference between the opinion of male and female sellers and consumers.

One clear conclusion can be made that the consumers are easily deceived by the sellers due to the ignorance of the consumers. It may even be possible that consumers become used to in using chemical mixed products and they no longer look for natural one rather the consumers pretend to be happy in consuming chemical mixed hazardous products. The wide availability of chemicals, synthetic colours and flavours makes the adulteration comparatively easy, while making it difficult for consumers to detect. The reasons that a businesspeople/seller use harmful chemicals with their products are to make the product more attractive to the customers, to extend the products life time, natural raw materials are not available and very costly, consumer demands because it is cheaper than natural food products. So it is clear that the seller use hazardous chemicals with food to maximize their profit.

Consumers in Bangladesh are at the mercy of unscrupulous producers and sellers. Although laws and government initiatives exist to eradicate food adulteration, the government is unable to enforce these laws or eliminate corrupt practices and alliances. Better law enforcement and scientific food testing is needed along with current efforts to harmonize global food safety legislation.

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APPENDIX 1

A Rapid Action Battalion personnel shows red chillies, mixed with powdered bricks and bran, kept for packaging at a factory in Khatunganj Ilias Market in Chittagong.

Photo: The Daily Star, 11 August 2009

APPENDIX 2

A mobile court accomplished by Rab-2 and BSTI officials in an anti-adulteration drive conducted a raid on the factory of Enni Food Product Company Ltd in the city's Badda and recovered different food items in unhygienic condition. The court arrested Mohammad Enayet Hossain from the spot and awarded him three months' imprisonment along with a fine of Tk 1 lakh, in default of which he will have to suffer one more year in jail.

Photo: The Daily Star, 19 August 2009

APPENDIX 3

Hormone are being given to ripen tomato

Photo: The Daily Prothom Alo, 11 November 2009.

APPENDIX 4

Sample districts under study:

Name of the districts	Name of the districts
01. Panchagarh 02. Thakurgaon 03. Dinajpur 04. Lalmonirhat 05. Kurigram 06. Nilphamari 07. Rangpur 08. Bogra 09. Jaipurhat 10. Gaibandha 11. Naogaon 12. Rajshahi 13. Nawabganj 14. Sirajganj 15. Natore 16. Pabna 17. Meherpur 18. Kushtia 19. Chuadanga 20. Jhenaidah 21. Magura 22. Narail	23. Jessore 24. Pirojpur 25. Satkhira 26. Khulna 27. Bagerhat 28. Bhola 29. Jhalakati 30. Barisal 31. Barguna 32. Patuakhali 33. Jamalpur 34. Netrokona 35. Kishoreganj 36. Sherpur 37. Tangail 38. Mymensingh 39. Manikganj 40. Narayanganj 41. Gazipur 42. Dhaka 43. Munshiganj 44. Narsingdi 45. Rajbari