Ensuring Food Safety: An Important Challenge Today

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INTRODUCTION

Food safety is a scientific discipline describing handling, preparation and storage of food in ways that prevent food borne illnesses. It includes a number of procedures that should be followed to avoid potentially severe health hazards. It includes the origins of food including the practices related to food labeling, food hygiene, food additives, pesticide residues as well as policies on biotechnology and food and guidelines for the management of governmental import and export inspection and certification systems for foods. Food can transmit disease from person to person as well as serve as a growth medium for bacteria that can cause food poisoning.

WHO'S FIVE KEY PRINCIPLES OF FOOD HYGIENE

- Prevent contaminating food with pathogens spreading from people, pets and pests
- Separate raw and cooked foods to prevent contaminating the cooked foods
- Cook foods for the appropriate length of time and at the appropriate temperature to kill pathogens
- Store food at the proper temperature
- Do use safe water and raw materials

FOOD DEFENSE

- Food defense : It is the protection of food products from intentional contamination or adulteration by biological, chemical, physical or radiological agents. It addresses additional concerns including physical, personnel and operational security. The events may be industrial sabotage or terrorism
- Food protection is the umbrella term encompassing both food safety and food defense

*1 This article is based on a presentation made at the Symposium “Ensuring Food Safety: An Important Challenge Today” held at the 30th CMAAO General Assembly and 51st Council Meeting, Yangon, Myanmar, on September 23-25, 2015.

1 Central Executive Committee, Bangladesh Medical Association (info@bma.org.bd).
Newspaper Cuts Regarding Adulterated Food

“Hardly Anything Safe to Eat”

The Daily Star

Recently newspaper reported that rice prepared from plastic materials and artificially prepared eggs are marketed in Bangladesh which are imported items.

Scrupulous merchants are using:
- engine oil in the preparation of food
- Urea in preparation of puffed rice

Source: Bangladesh Statistical Year Book 2010

FOOD SAFETY SITUATION IN BANGLADESH

WHAT IS OUR CONCERN

1. FOOD ADULTERATION
2. FOOD CONTAMINATION
   - MICROBIOLOGICAL CONTAMINATION
   - PESTICIDE RESIDUES
   - MYCOTOXINS
   - VETERINARY DRUG RESIDUES
   - HEAVY METALS

OUR CONCERN

- Adulteration or intentional addition of illegal agents is mostly due to unethical trade but a lack of knowledge also contributes to some extent
- Contamination along the food chain is mostly due to not following good practices from production level to consumption

FOOD SAFETY SITUATION IN BANGLADESH

RISK FACTORS ASSOCIATED WITH FRUITS AND VEGETABLES

- Microbial contamination:
  - E. coli, Helminths, Klebsiella, Enterobacter etc.
- Chemical contamination
  - a. Pesticides residues
  - b. Artificial ripening agents: Calcium Carbide, Ethrel
  - c. Preservatives: Formalin
  - d. Environmental contamination: From polluted water during washing

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FOOD SAFETY SITUATION IN BANGLADESH

RISK FACTORS ASSOCIATED WITH FISH, MEAT, POULTRY AND THEIR PRODUCTS

- Microbial contamination:
  - Salmonella, Cryptosporidium, E. coli, Vero, Campylobacter jejuni, HIV, Anthrax, TB
- Chemical contamination:
  - a. Antibiotics: Tetracycline, Chloramphenicol, Nitrofurans, Veterinary Medication etc.
  - b. Hormones used for fattening
  - c. Environmental contaminants: Heavy metals like chromium (from feed using hide and skin from tannery industries)
  - d. Pesticides: DDT (particularly for dry fish), Aflatoxin
  - e. Preservatives: Formalin
  - f. Colouring matters: Particularly textile dyes
- Physical contamination: Fibres, dust

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FOOD SAFETY SITUATION IN BANGLADESH

RISK FACTORS ASSOCIATED WITH FISH, MEAT, POULTRY AND THEIR PRODUCTS

- Mycotoxins
- Veterinary drug residues
- Heavy metals

FOOD SAFETY SITUATION IN BANGLADESH

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*Scrupulous merchants are using— engine oil in the preparation of food
Urea in preparation of puffed rice*
Process contaminants:

- During heating or fermentation nitrosamines, polycyclic amines, histamine, acrylamide, furan, benzene, trans-fat, monochloropropanediol, semicarbazide, 4-hydrxynineal (4-HNE), ethyl carbamate, etc are produced. Heating processes that induce a surface dehydration of the food such as frying or oven baking process gives rise to appreciable acrylamide production.

- Acrylamide also occurs in many cooked starchy foods such as potato chips, French fries and bread that has been heated.

- Acrylamide is indicted for its carcinogenecity, neurotoxicity and reproductive toxicity.

BRIEF OVERVIEW OF THE CONTAMINANTS

1. Organic – most important is dioxin and dioxin like compounds (DLC). People are exposed to these although at low levels, particularly by eating animal fat in meat, dairy products and fish. Now a days it is said that plastic water container emits dioxin if kept in heated or chilled environment. Dioxin or DLCs cause skin damage, cancer, NIDD in adults, neurological and immune system impairments in infants and endocrine system disruption.

2. Inorganic

i. Arsenic

- Arsenic can enter into plants from soil. The terrestrial plants can accumulate a large amount of arsenic. On the other hand, marine plants and animals have arsenic detoxification system.

- In Bangladesh, water is contaminated by arsenic widely. Almost one in five tube wells is not providing safe drinking water. About 20 million people in Bangladesh are using tube wells with more than 50 ppb of arsenic. Arsenic is found in rice also in endemic areas. There are now almost 66000 patients with Arsenicism in Bangladesh.

- Long-term exposure to arsenic can cause cancer of skin, lung, bladder and kidney and in children it can cause cognitive development delay and disfigurement which ultimately creates social problem especially for women.

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Calcium carbide and ethrel are used as ripeners in fruits. Calcium carbide in contact with moisture produces acetylene which is analogue of natural ripening hormone ethylene. Acetylene reduces oxygen supply to the brain. In acute stage it causes headache, vertigo, dizziness, seizure and even coma. In the long term, mood disturbance and loss of memory.

Food additives and processing aids:

- Furan is found in cooked or heat-processed foods such as canned meat, baked bread, cooked chicken, caramel and coffee. Derivatives of furan are used as flavouring agents in food and tobacco products. Cancer, liver toxicity is detected in lab. Animals exposed to furan show increased risk of developing liver disease.\(^1\)

Different Policies Related to Food Safety

- National Agriculture Policy 1996
- New Agricultural Extension Policy 1996
- National Fisheries Policy 1998
- National Food and Nutrition Policy 1997
- National Food Policy 1996
- National Health Policy 2000
- National Livestock Policy 2007
- Product Labelling Policy 2006
- National Policy for Safe Water and Sanitation 1998
- Import Policy 2009-2012
- Export Policy 2009-2012
- National Plan of Action for Nutrition 1997
**FOOD-BORNE ILLNESS SURVEILLANCE**

Very little data are available. IEDCR (Institute of Epidemiology, Disease Control and Research) has developed a food-borne illness surveillance system based on recent food safety emergencies management:

- Anthrax (2010)
- Nipah outbreak (2010, 2011)
- Hepatitis E & A (2010)
- Contaminated Litchi poisoning (2012)

**FAO Report, 2010 On Food Safety Management System in Bangladesh**

<table>
<thead>
<tr>
<th>Area</th>
<th>Status</th>
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<tbody>
<tr>
<td>Food laws and regulations</td>
<td>- New Food Safety Act enacted</td>
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<tr>
<td>Food safety management system</td>
<td>- Complex but now trying to make simple</td>
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<td>Analytical facilities</td>
<td>- Insufficient</td>
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<tr>
<td>Inspection and enforcement</td>
<td>- Considerable gaps and overlapping responsibilities, Food safety authority will take more effort</td>
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<tr>
<td>Coordination, communication and exchange</td>
<td>- Limited among ministries</td>
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<td>Knowledge and awareness</td>
<td>- Insufficient use of resources</td>
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**Different Laws Related to Food Safety**

- The Bangladesh Food Safety Act 2013
- The Bangladesh Pure Food Ordinance 1959
- Bangladesh Food (Amendment) Act 2005
- The Cantonment Pure Food Act 1966
- The Bangladesh Pure Food Rules 1967
- The Prevention and Conservation of Fish Act 1950
- The Food and Food Product (Import and Quality Control) Ordinance 1983
- Animal Slaughter (Restriction) and Meat Control Act 1957
- Food Fraud and Animal Food Act 2010
- Agricultural Port Ordinance 1962
- The Pesticide Ordinance 1950
- The Bangladesh Pure Food Rules 1967

**PESTICIDE AND VETERINARY DRUG RESIDUE ANALYSIS**

- HPLC
- GC-MS
- LC-MS/MS

**HEAVY METAL ANALYSIS**

- Atomic absorption spectrophotometer

**FOOD ADULTERANTS, COLORS AND DYES**

- National Food Safety Laboratory
  - Sample preparation laboratory
  - Microbiology laboratory

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**NATIONAL FOOD SAFETY LABORATORY**

**HEAVY METAL ANALYSIS**

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Food Safety Emergency management plan developed.
Consumers’ Role

- Respecting refrigerating temperature during storage
- Respecting shelf-life of the product
- Preventing cross contamination during preparation of food
- No undercooking of raw fish, meat or vegetables

Role of Medical Associations

- Unsafe food is causing much harm to public health. Medical Associations should act as pressure groups to motivate the policy makers, bureaucrats and administrators to be active in executing the law and increasing effective surveillance.
- As doctors’ advice is expected to be heard by all the stakeholders, particularly the consumer, than anyone else, Medical Associations both national and international should take active part in the campaign for safe and healthy food.

Dissemination of food safety messages

- Sustained and intensive behavior change campaigns
- Use of traditional media (folk music, theatre), print and electronic media
- Targeting of special groups
  - Food chain participants such as producers, processors
  - Consumers such as women, school children
RECOMMENDATIONS

- Implement Food Safety Act 2013
- Formulate rules and regulations
- Establish linkages between international and national activities to mutually benefit
- Be prepared for emerging issues
  - Dealing with consumer perceptions
  - Emerging hazards and food technologies
- Involve stakeholders in food safety
- Share experiences
- Communication

Child Mortality Rate would decline more rapidly if safe food could be ensured.

Life Expectancy would be higher if safe food could be ensured.

THANK YOU FOR YOUR KIND ATTENTION!

Source: Bangladesh Statistical Year Book 2010