

# Food Safety and Food Quality in the Supply Chain: Bangladesh Perspective

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## Abstract

Maintaining food security has become unconditional when it comes to food trade and customer demand. The food put on the market has to be of good quality and safe for consumption, as well as not be a source of disease and infection. For this reason, securing food safety and quality is a matter of international significance and a responsibility of food producers and governments. During the process of distribution food products go through all stages of supply chain, i.e. all processes which describe how food travels from a farm to the consumers' tables. The aim of this strategy, called "from the field to the table", is to achieve full supervision of food safety in the modern world, because the journey leading from food production to the consumer is very time- and space consuming. Along this journey, there are many harmful of food contamination, be it in the very production, during the transport, food storage, or food preparation. In order to enable food quality and safety of food products, companies have to follow legislations, standards and norms at every stage of supply chain. The aim of this paper is to show how food safety and quality is legally regulated during the distribution in the supply chain, and the ways in which companies ensure a certain high level of hygiene and temperature levels that different kinds of food products require.

**Key words: supply chain, food safety; food quality.**

## INTRODUCTION

The thesis of this paper is to describe the way processes flow in the supply chain with the aim of preserving food safety and quality. Keeping in mind that food products are among most delicate products on the market, they require special conditions during distribution. Therefore, various details, like temperature, air quality, humidity etc., have to be considered. The food safety and quality is legally regulated during the distribution in the supply chain, and the ways in which companies ensure a certain high level of hygiene and temperature levels that different kinds of food products require.

The supply is a function of logistic management, input use regulations for product quality and market operation hazards (Cooper et al.1997 and Islam et al. 2017, Orris, and Whitehead, 2000). Different authors have different approaches to defining supply chain, so they have to be critically assessed. Supply chain management is a broader concept than logistics, which is defined as a process of strategic management of supply, movement and storage of materials, partially, or completely finished goods and information, through the organization and its marketing channels (Lund 2005. Nummer 2002. Rahman 2007. Kader et al. 1989Indira and Sudheer 2007) covering the historical and modern research priorities as per geographical needs.

Most of them defined and interpreted and make us understand supply chain as an organizational and informational integration of individual processes of supply of business functions in a company, which makes the internal part of supply chain, and their connection to the processes from outside directly involved in creating value, which makes the external part of supply chain, and all this with the aim to optimize the whole process of the flow of goods (materials, intermediate and finished products) and to increase possibilities of creating value. The system for supply chain management comprises a broader spectre of activities in relation to those comprised by logistics, for it includes time periods for resource allotment and various other activities dealing with the establishment of long-term relations with suppliers and customers.

According to Cooper, logistics deals with the flows of materials, supplies and information inside the supply chain, while supply chain management integrates all business processes between all companies involved. Despite different definitions of the supply chain, it is clear that the purpose of managing the supply chain as an integration function is to develop a competitive business model through connecting key business functions and processes inside and among economic subjects. Therefore, five elements crucial for achieving the supply chain results can be determined: production, supplies, location, transport and information. The coordination of these elements is needed in order to achieve the best combination of efficiency and profitability for the targeted market. The coordination of the flow of goods, information and finance between the involved companies along the journey from the raw material to the final consumer is in fact managing the supply chain. The term of supply chain relates to monitoring the process of supply from all the participants in the distribution channel, with the aim of assessing how consumers' demand influences the movement of product supply through a number of mediators. It was stated to be largely dependent on product process design, preservation and manufacturing systems (Rahman and Ahmed 2012, Karel and Lund 2003, and Jangam et.al 2010).

The members of supply chain are producers, manufacturers, distributors, wholesalers, dealers who cooperate in the process of supply, delivery, production and sales, all with the aim to meet the demand. When assessing the efficiency of supply chain, special attention needs to be given to the research of business relations between participants, because it defines the supply chain performance. A successful supply chain gives competitive advantage to all its members.

### Supply Chain Types

There are three types of supply chains, considering the number of members: direct, extended and final supply chain (Noémi, 2013:132). The direct supply chain is the simplest form, because only a supplier, a central company and a buyer are included. The extended supply chain includes the supplier, the company, the buyer, as well as the supplier's supplier, where the final chain includes all the members in all the flows of goods, services, information and capital, starting from the first supplier to the final consumer. Similar to the traditional supply chain, the final supply chain consists of the supplier, the central company and the consumer, and of the final supplier and the final buyer.

An important role in the final supply chain play the logistics, financial services providers and market researches. Logistics is a participant in the supply chain, which is in contact with the buyer and the central company, and its task is to deliver, distribute and plan all related logistics tasks. Payments and credit services between the central company and the supplier are performed by financial service provider, while market researchers collect the demand information and feedback on the consumers' demand. A supply chain can be longer or shorter. It is longer if more members are included and shorter if the producer sells a product or a service directly. The supply chains efficiency is assessed by measuring the performances of individual companies involved in the chain. During the measuring, economic indicators, flow of information, relations between the participants etc. are taken into consideration. Therefore, this assessment gives us the possibility of insight into the whole picture of where the chain functions well, and where there could be setbacks.

### Legal and Regulatory Framework

The existing food safety legal and regulatory regime of Bangladesh is governed by copious enactments and governmental bodies. More than dozen of laws deal with the food safety affairs excluding the common law provisions. The following 'Figure 1' will demonstrate a precise overview of the legal framework of food safety of Bangladesh.

**Figure 1**

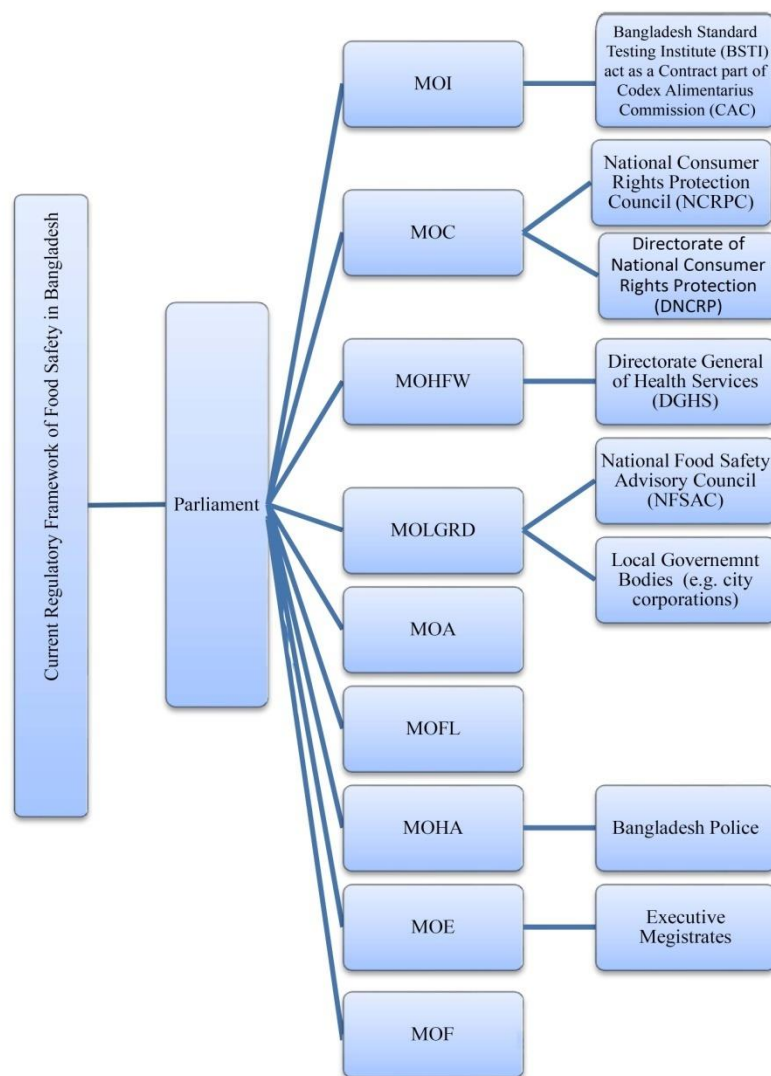
Current Legal Framework of Food Safety in Bangladesh

1. Penal Code, 1860 ('PC 1860')
2. Control of Essential Commodities Act, 1956 ('CECA 1956')
3. Food (Special Courts) Act, 1956 ('FA 1956')
4. Pure Food Ordinance, 1959 ('PFO 1959')
5. Cantonments Pure Food Act, 1966 ('CPFA 1966')
6. Pesticide Ordinance, 1971 ('PO 1971')
7. Special Powers Act, 1974 ('SPA 1974')
8. Fish and Fish Products (Inspection and Control) Ordinance, 1983 ('FFPO 1983')
9. The Breast-Milk Substitutes (Regulation of Marketing) Ordinance, 1984 ('BMSO 1984')
10. Bangladesh Standards and Testing Institution Ordinance 1985 ('BSTIO 1985')
11. Iodine Deficiency Disorders Prevention Act 1989 ('IDDDPA 1989')
12. Vokta Odhikar Songrokkhon Ain, 2009 [Consumers Rights Protection Act 2009] [author's translation] ('CRPA 2009')
13. Stanio Sarkar (City Corporation) Ain, 2009 [Local Government (City Corporation) Act 2009] [author's translation] ('LGCCA 2009')
14. Stanio Sarkar (Paurashava) Ain, 2009 [Local Government (Paurashava) Act, 2009] ('LGPA 2009')
15. Mobile Court Ain, 2009 [Mobile Court Act, 2009] [author's translation] ('MCA 2009')
16. Bangladesh Food Safety Authority Act, 2013.

It is worth to note that common law provisions and their practices will not be encompassed in the current article; it is an immense issue and hence it is saved for future endeavors. Among the statutory laws, some pieces of legislation are hardly used, some cover quite limited jurisdictions. Due to the volume limits of current study, the statutes that are frequently exercised for food safety in general will be discussed. The laws referred in 'Figure 1' are implemented by several ministries and their subordinate bodies. The relevant key bodies are the Parliament, MOHFW, Ministry of Agriculture (MOA), Ministry of Local Government, Rural Development and Co-operatives (MOLGRD), Ministry of Industry (MOI), Ministry of Fisheries and Livestock (MOFL), Ministry of Commerce (MOC), Ministry of Public Administration (MOPA), Ministry of Home Affairs (MOHA) and Ministry of Food (MOF).

'Figure 2' demonstrates a diagram that glimpses the regulatory authorities in Bangladesh for managing food safety issues.

**Figure 2**



## METHODOLOGY

Data were collected from the capital and the field level conducting interview, discussion and observation using primary source i.e. interview with the respondents from the selected study areas. Primary data were collected through interview. Researcher conducted the face to face interview with the respondents of the study areas. The variable selected for the studies are mentioned here. The specific data parameters were designed from similar research methodologies recommended by earlier workers indicating the need characteristics of the developing countries. (Ronald, et.al 2005, Sagar et.al 2010 and Baert, et.al 2005).

### Variables: A. Professional

a. Service Providers: b. Consumers: c. Technical: Scientists, supply chain holders

B. Sites/ Levels: a. National to micro levels

C. Commodities; a. Fruits: b. Vegetables: and c. Spices:

### Questionnaire guidelines

Respondents Categories: Professional, 2. Sites, 3. Name –and identity

Research Questions-

i. Major criteria of improving food safety and quality in Bangladesh?

Food Analysis: Setting Food Standards: Strengthening Agro-chemical Acts:

Controlling Food Filler and Conditioner use: Legal and licensing: National rationing:

ii. Awareness creation focus for ensuring food safety

Consumer awareness Medical service awareness Producer farmer awareness

i. Agri- input businessman awareness Agri-businessman awareness

ii. Street market chain smallholder awareness

National level focus for ensuring food safety

i. Institutionalization of Food Safety: Agriculture- Industries- Health

ii. Education- Farming System Community- Administration

4. Points for reducing the food risks as prevention ensuring food safety

i. Food Borne Illness Surveillance: Food Borne Illness spread

ii. Food Inspection and Enforcement: Value chains and Street Foods

iii. Prohibiting artificial materials: Defining and categorizing additives

**RESULTS AND DISCUSSION**

The results are presented here sequentially as per highlighted points of objectives and expected outputs and outcomes. It may be remembered here that the main objectives of the study were to i. Determining safety factors during production and preservation; ii. Managing the Supply Chain operations as regards use of preservatives during processing and packaging; and iii. Reducing the source and processing risks during production and in the supply chain for food items, constituents and the food.

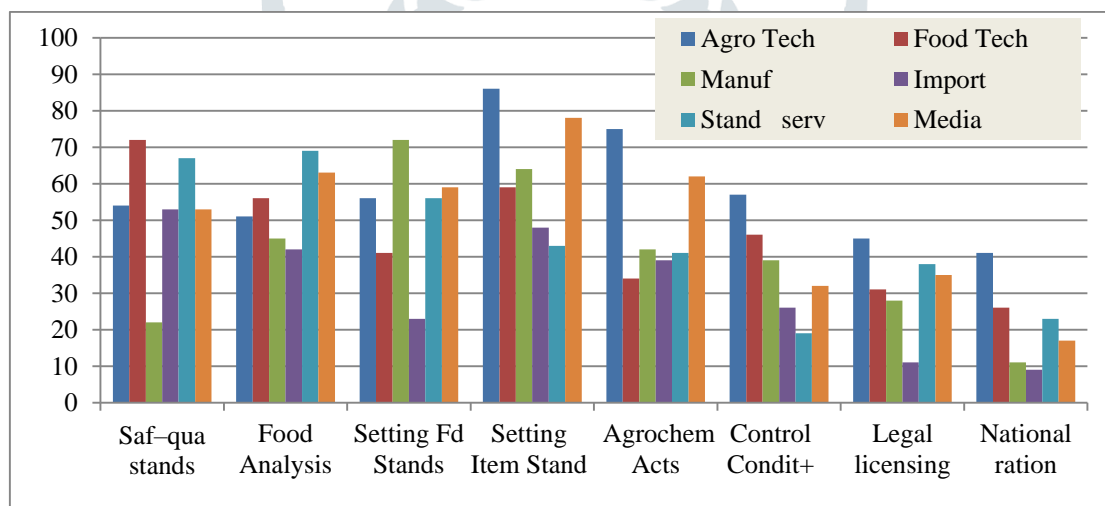
**Factors of Food safety**

The results found in the factors determining food safety matters are given in the Table 1 and Fig 3 and 4.

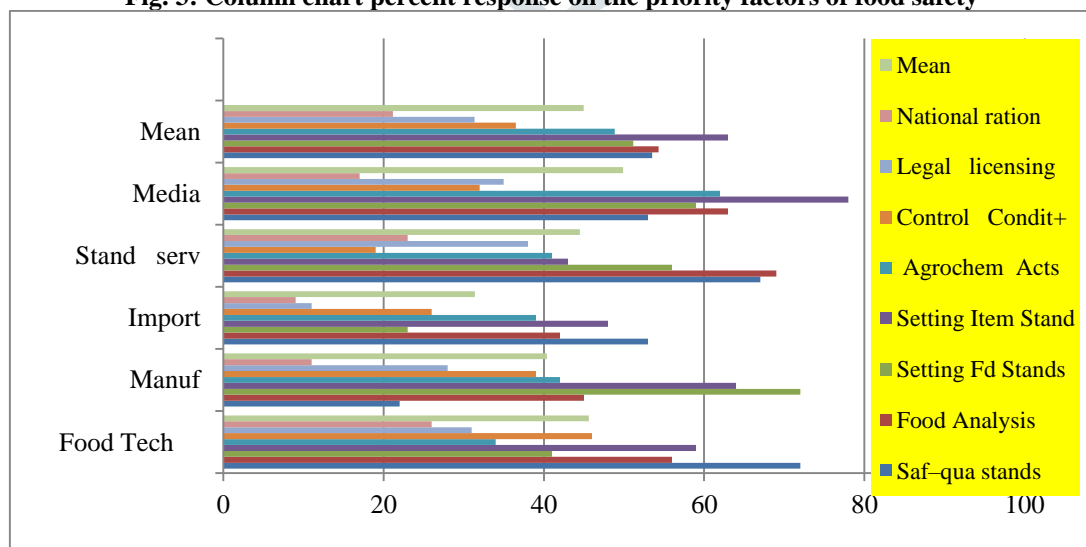
**Table 1: Percent response on the priority of related factors of food safety**

	Agro Tech	Food Tech	Manufacture	Import	Standard service	Media	Mean
Safety-quality standards	54	72	22	53	67	53	53.5
Food Analysis	51	56	45	42	69	63	54.3
Setting Food Standard	56	41	72	23	56	59	51.2
Setting Food Item Standards	86	59	64	48	43	78	63.0
Strengthening Agro-chem. Acts	75	34	42	39	41	62	48.8
Controlling Conditioner+	57	46	39	26	19	32	36.5
Legal and licensing	45	31	28	11	38	35	31.3
National rationing	41	26	11	9	23	17	21.2
Mean	58.1	45.6	40.4	31.4	44.5	49.9	45.0

The results show that the factor of highest importance was found to be the setting- up of food item standards as scored by 63%. As type of products and its handling mechanisms Agro-technical aspects dominated and its score was 58%. The national rationing system and the importers were found to be very reluctant as a factor of food safety as it was trade and government service dependent.



**Fig. 3: Column chart percent response on the priority factors of food safety**



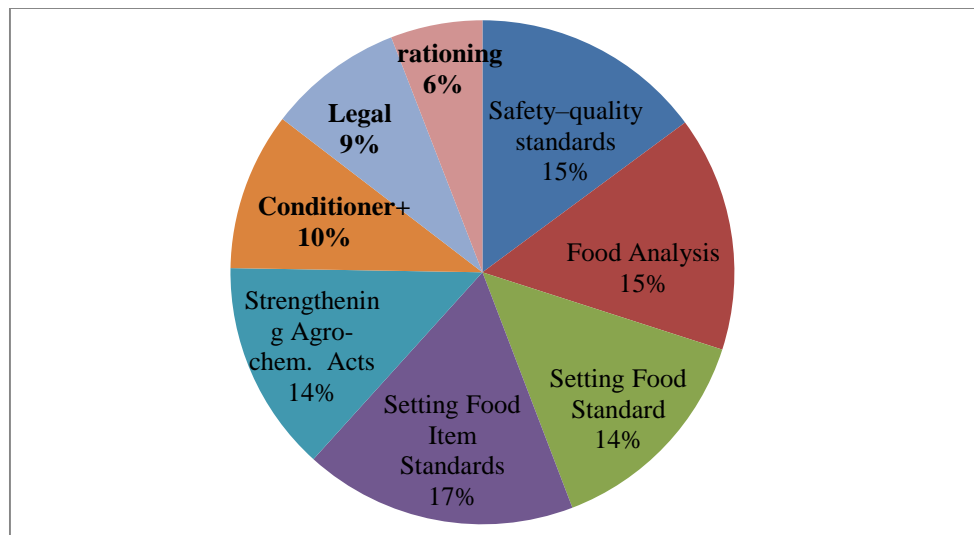
**Fig. 4: Bar chart showing the response on the priority factors of food safety**

The results given in Table 2 and Fig 5 show that the highest response factor was found to be setting food item standards, the score being 63%. While the lowest response factor was national rationing followed by legal and licensing.

**Table 2: Mean percent of the instrumental and operational factors of food safety.**

	Mean
Safety–quality standards	53.5
Food Analysis	54.3
Setting Food Standard	51.2
Setting Food Item Standards	63.0
Strengthening Agro-chem. Acts	48.8
Controlling Conditioner+	36.5
Legal and licensing	31.3
National rationing	21.2
Mean	45.0

Similar results were also reported from different countries with their respective agricultural industrial products early days (Velez-Ruiz and Rahman 1999) present Bangladesh (Kar 2014) and supply chain logistics (Christopher, 2011) from USA.

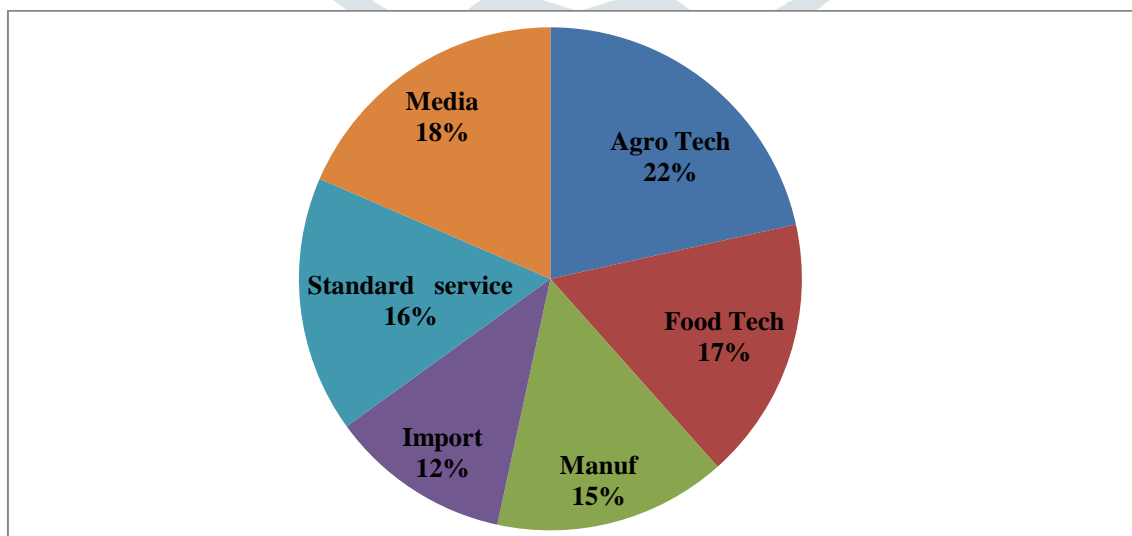


**Fig. 5: Mean percent pie chart of the operational factors of food safety**

**Table 3: Mean percent of the Technical and activity factors of food safety**

	Agro Tech	Food Tech	Manufacture	Import	Standard service	Media	Mean
Mean	58.1	45.6	40.4	31.4	44.5	49.9	45.0

The results given in Table 3 and Fig 6 show that the highest response factor was found to be setting Agriculture technical, the score being 58 %. While the lowest response factor was import followed by standard service.



**Fig. 6: Mean percent Pie chart of the activity factors of food safety**

The results given in the Table 4 show that the awareness creation focus should be given on Agri Officers as response by about 55% respondents followed by Consumers receiving 52% response.



**Table 4 Awareness creation focus for ensuring food safety**

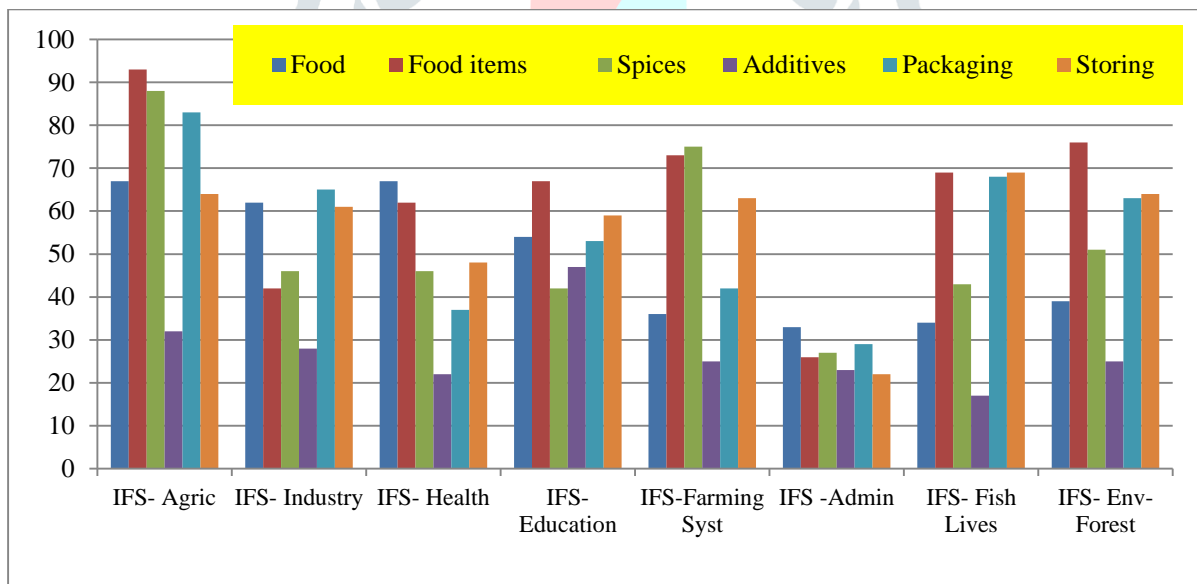
	Agro Tech	Food Tech	Manufacture	Import	Stand service	Media	Mean
Consumer awareness	84	72	22	43	37	53	51.8
Medical awareness	40	36	35	22	39	53	37.5
Producer awareness	56	41	72	23	36	69	49.5
Agri- input awareness	66	59	34	38	43	58	49.7
Agri-business awareness	71	34	32	39	25	62	43.8
Agri Officer awareness	87	46	39	56	39	62	54.8
Street market awareness	35	11	28	11	18	35	23.0
Agri scientist awareness	81	46	51	39	43	57	52.8
Mean	65.0	43.1	39.1	33.9	35.0	56.1	45.4

**National Ministry level focus prioritization % for food safety**

The results given in the Table 5 and Fig 7 and show that the National Ministry level focus prioritization % for food safety should be given on Institutionalization of Food Safety (IFS): agriculture followed by IFS education, the response being 715 and 54% respectively.

**Table 5: National Ministry level focus prioritization% for food safety**

Institutional Food Safety (IFS) Ministries	Food	Food items	Spices	Additives	Packaging	Storing	Mean
IFS- Agric	67	93	88	32	83	64	71.2
IFS- Industry	62	42	46	28	65	61	50.7
IFS- Health	67	62	46	22	37	48	47.0
IFS- Education	54	67	42	47	53	59	53.7
IFS-Farming Syst	36	73	75	25	42	63	52.3
IFS -Admin	33	26	27	23	29	22	26.7
IFS- Fish Lives	34	69	43	17	68	69	50.0
IFS- Env-Forest	39	76	51	25	63	64	53.0
Mean	49.0	63.5	52.25	27.4	55.0	56.3	50.6



**Fig 7. National Ministry level focus prioritization% for food safety**

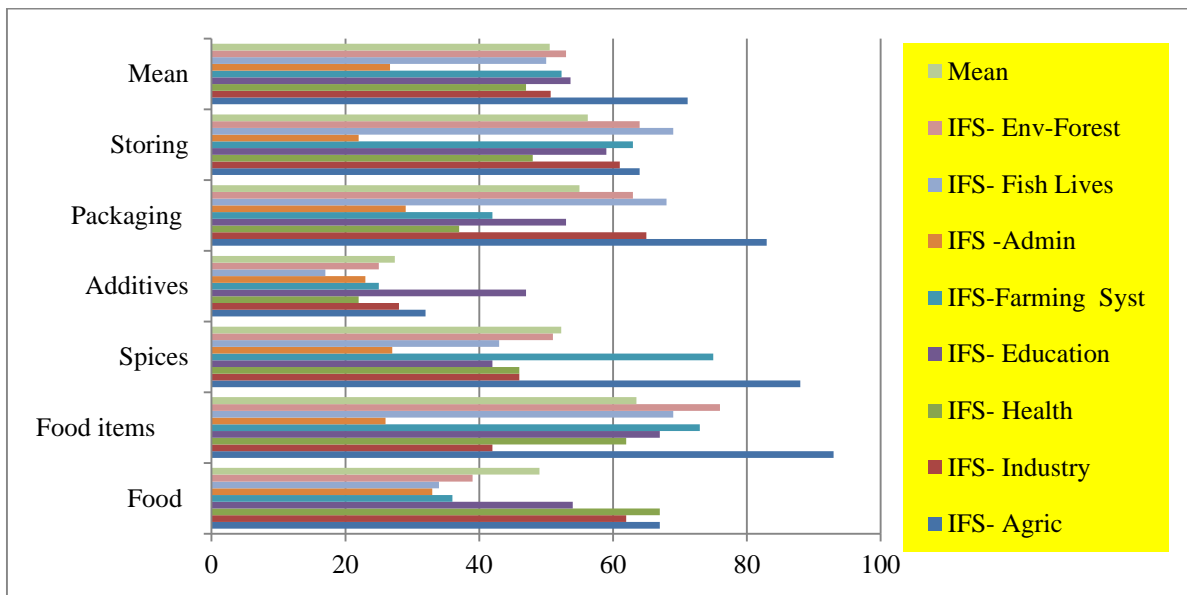


Fig 8. Bar chart showing the national level focus prioritization % for food safety

The results given in Fig 9 and 10 shows that the Food item dominated the IFS agriculture.

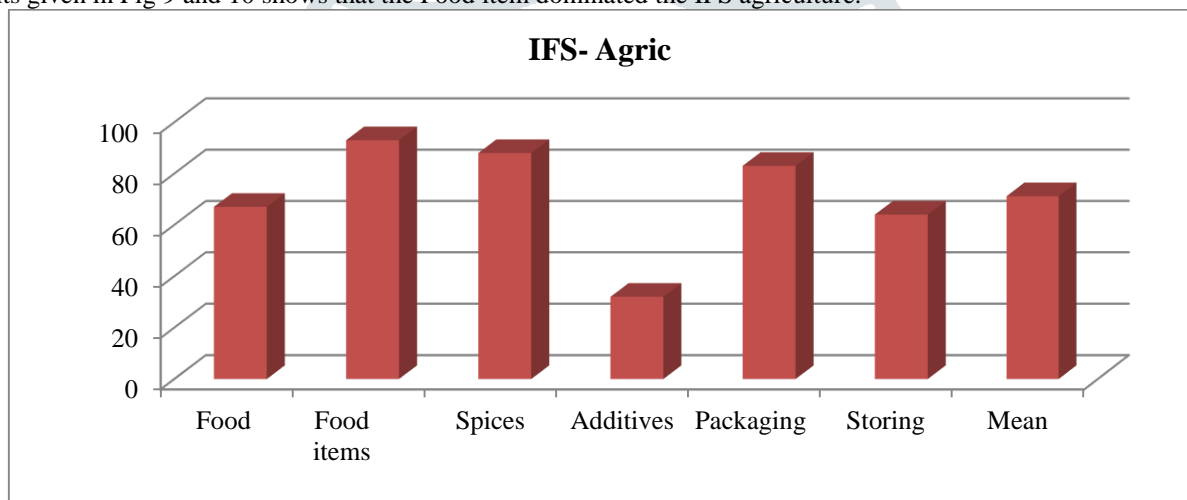


Fig 9. Component based column chart showing the national level focus prioritization % for food safety of IFS agriculture

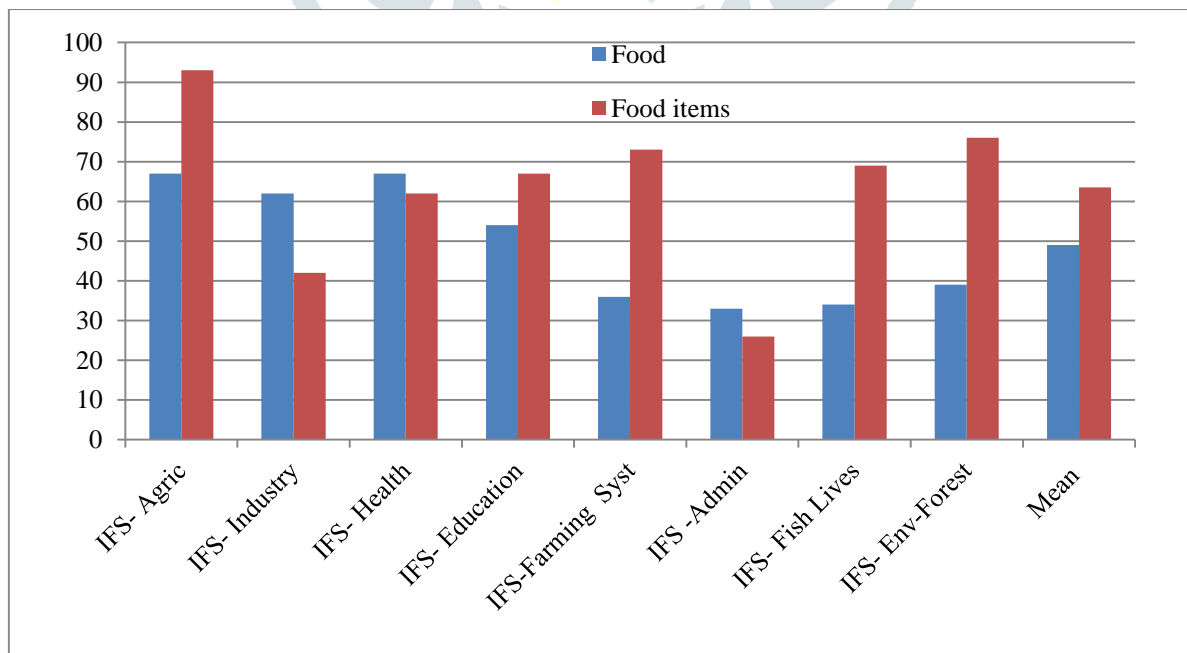


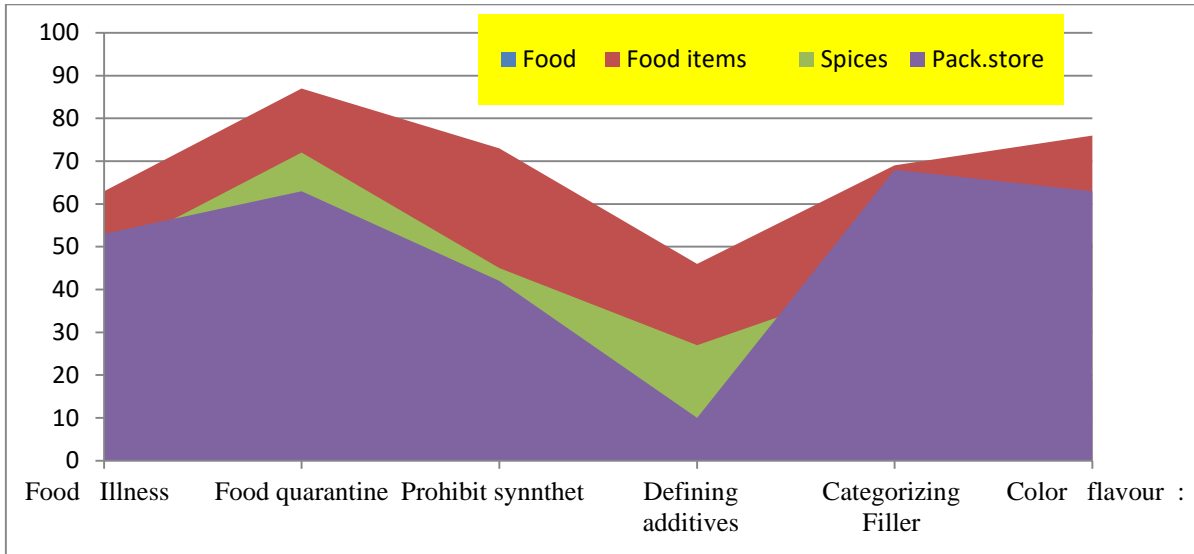
Fig 10. Component based column chart showing the focus prioritization% for food safety factors

Reducing the food risks as prevention factors for items and processes

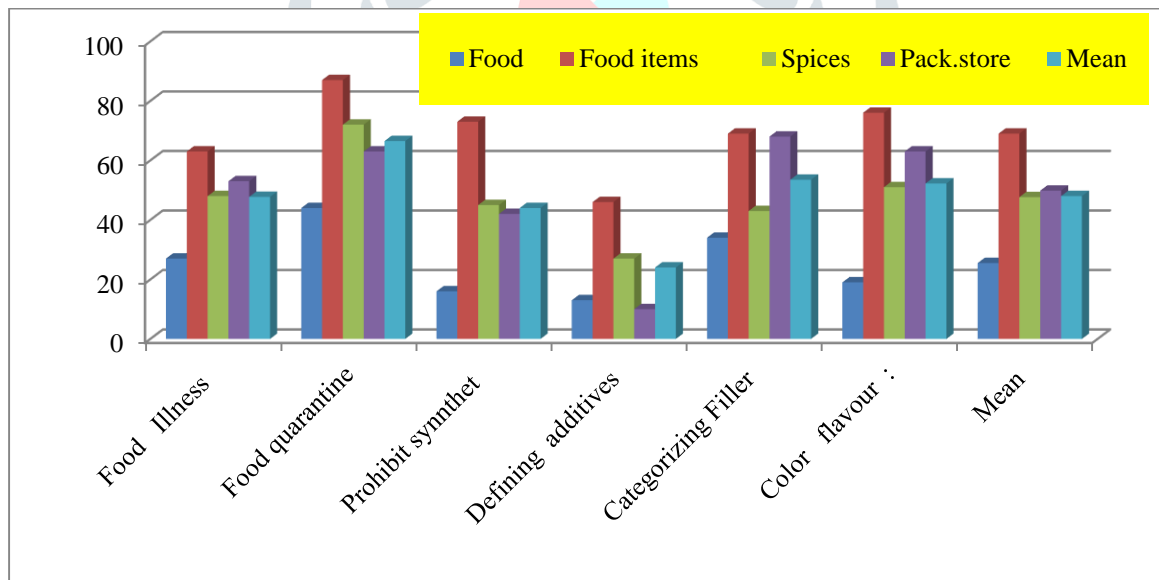
The results on the subject given in the Table 6 and Figs 11 and 12 show that the food quarantine scored highest as about 67 % followed by categorizing fillers as about 54%.

**Table 6: Points for reducing the food risks as prevention**

	Food	Food items	Spices	Pack. store	Mean
Food Illness	27	63	48	53	47.8
Food quarantine	44	87	72	63	66.5
Prohibit synthetic	16	73	45	42	44.0
Defining additives	13	46	27	10	24.0
Categorizing Filler	34	69	43	68	53.5
Color flavor	19	76	51	63	52.3
Mean	25.5	69.0	47.7	49.8	48.00



**Fig 11: Points for reducing the food risks as prevention as for items**



**Fig. 12: Points for reducing the food risks as prevention as for processes**

**CONCLUSION**

Bangladesh declares 17 food items as essential commodities 2012 Dhaka, Bangladesh (BBN) – The government has declared 17 food items as essential commodities considering the interest of the consumers, officials said. The essential commodities are onion, garlic, lentils, chickpeas, dried chilies, cinnamon/ cassia, clove, cardamom, seeds of coriander, seeds of cumin, ginger, turmeric, bay leaves, edible soybean oil, edible palm oil, sugar and edible salt as the essential commodities, according to a notification, issued by the ministry of commerce on Thursday. Earlier on July 16, the ministry took initiatives to include some more food items in the list of essential commodities. The commerce ministry has included those food items in the existing essential commodities act considering the benefit of the people, a senior official of the ministry said, adding that inclusion of those food items as essential commodities would ensure discipline in the market and curb monopoly of the unscrupulous traders.

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## BIOGRAPHIES



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