

Food Adulteration: Its Implications and Control Approaches in India

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1. INTRODUCTION

Adulteration in food products in India has been rampant especially in the products that are sold in Urban- Slum areas, semi-urban as well rural areas where the innocent consumers are cheated due to sub-standards/poor quality of food products even after paying the reasonable prevailing retail prices [7]. Adulteration of food is an age old problem. It consists of a large number of practices e.g. Mixing, substitution, concealing the quantity, putting up decomposed foods for sale, misbranding or giving false labels and addition of toxicants[3].

Food laws play an important role in quality control strategy. A number of laws have been enacted in the country control for the purpose of laying down quality standards. There are various other supportive acts made for a healthy business in the food line and consumer welfare and stability of law and order regarding supply of food, quality, and quantity. There are two kinds of food laws and orders in our country .first one is for monitoring safety standards mandatory, compulsory in nature and second quality standards mostly voluntary. Anyway the overall aim of food laws is to maintain food quality and quantity keeping all pros and cons of welfare and harm to consumer first and which may not be interfering in fair trade or food procedure business .it is constituted duty of every Government to care about health and living status of the public and at the same time to allow food business to grow and develop according to increasing demands [12].

ABSTRACT

In this modern era of globalization India is growing rapidly in almost all the areas but at the same time one of the most important issues which need more attention is food safety, because food adulteration has become a major problem of our society. This research work is an attempt to study different types of food adulteration such as unintentional, metallic contaminant and incidental, its reasons, health hazards and its control measures. To adulterate food items toxic substance are added to gain profit like Metanil yellow (non-permitted artificial colour) is used to intensify the colour of turmeric powder, chalk powder and brick powder in chili powder but its health implications can lead anaemia, paralysis, brain damage, stomach disorder and cancer also. The bacterial and fungal contaminated cereal, dairy products, fermented foods have been reported to cause certain foodborne illness and spoilage. As a solution consistency between domestic and international food policy measures without reducing safeguards to public health and consumer protection is the demand of time. The control approaches in India can lead with the help of government authorities, industries, scientific community and awareness of consumers. Beside this school education, research and development, industry and government regulatory authorities can also play a vital role.

KEYWORDS: Food Adulteration, Types of adulteration, implications and Adulteration control approaches.

Food safety is of primary concern to food agricultural organization (FAO) and world health organization (WHO). Food safety providing assurance that food will not cause harm to the consumer when it is prepared and /or eaten according to its intended use (FAO, 1996). Food safety is as an area requiring priority attention to safeguard the economic interests of small holder farmers and the poor .there is a glaring lack of relevance of private sector, agricultural research in developing countries to the genuine needs of the poor. Food safety is a function of the nature of the technology used to produce and process food .it can be manipulated through genetic improvement, agronomic practices and postproduction storage and processing.

Food adulteration has negative impacts on public health. The causes for food adulteration are; profit margin by the increasing volume of the products and dishonesty of producers, retailers and processors. Consumption of adulterated food causes serious diseases like cancer, diarrhea, asthma and ulcers. And the adulteration of food has become one of the serious problems. The main challenge of food adulteration is lack of acceptance in the market due to distrusting its originality [1, 5].

Objectives of this research work are to impart knowledge, to study the knowledge and awareness of common food adulterants, health hazards and its control measures. Adulterations is one of the biggest problems faced in the present time, consumer awareness and are able to

understand and create awareness to select quality food products through this study.

1.1. Food Adulteration

The addition, replacement and removal of adulterant/other ingredient are called adulteration the usage of adulterants has been common in societies with few legal controls on food quality and poor /nonexistent monitoring by authorities, dangerous chemicals and poisons. Food additives are not adulterants if present within the specified limits. And exceeded limits they become significant adulterants and can cause serious health hazards to the consumer's .food adulteration are chemical substance added to processed foods (i) to enhance /retain quality attributes such as texture, physical properties, taste, flavor etc. (ii) to control the spoilage and enhance shelf life of the processed foods. The first category of food additives include Antioxidants, emulsifiers/stabilizers, preservatives, anti-caking agents, artificial sweeteners, bulking agents, acid regulators, leavening agents, flavoring agents, glazing agents [1].

Adverse health effects of adulterants range from acute symptoms such as vomiting, abdominal pain, allergy, asthma, and headache and to even mental retardation, cardiac arrest and cancer [6,13]. According to Dr. Poonam Khetrapaul (2015), food adulteration is still a problem in countries of the South East Asia region where internal food production and distribution systems are deeply entrenched at the community level. Examples of adulteration includes the contamination of mustard oil with argemone oil in 1998 and imported milk and infant formula with melamine in 2008. The new adulterants include the legumes such as imported toxic lentils marketed as local lentils, veterinary drug residues in milk, flours made from mouldy wheat, animal fat in bakery products and industrial contamination in vanaspathi. Ginger is used widely in culinary practice in India in the fresh or dry form. Dry ginger is often coated with blue-colored dye ultramarine blue to prevent insect infestation. It is an inorganic pigment used as laundry whitener [7,8].

In India, Every consumer wants to get the maximum quantity of a commodity for an as low price as possible. This attitude of the consumers being coupled with the intension of the traders as well as the manufacturer to increase the margin of a profit as high as, the variable market demand permits generates a vicious circle. Where the quantity of the commodity gets reduced through the addition of non-permitted foreign matter and/or removal of vital elements, and the process is defined as adulteration [9]. Food is adulterated to increase the quantity and make more profit. milk is mixed with water and vanaspathi is used as an adulterant for ghee. Some of the common adulteration practices are - ergot is mixed in cereals, chalk powder in flour, chicory and tamarind seed powder is mixed in coffee powder, papaya seeds in pepper, brick-powder is added to chili powder, Metal yellow is added in turmeric for bright color and wood powder to dhaniya powder, the list is endless[10].

1.2. Existing and Emerging Food Safety Problems

A variety of chemical, biological and physical hazards are the major causes of food safety problems. Among these the bacterial contaminants, environmental contaminants including pesticide residues, mycotoxins and adulterants

have been reported to be responsible for causing large-scale outbreaks of food poisoning and smaller incidents. These include various "food poisonings" reported in newspapers in India from time to time, outbreaks of Lathyrism, epidemic dropsy, venoocclusive disease, various mycotoxicoses and foodborne disease due to chemical toxins [1]. Although not all food incidents are injurious to health, nevertheless they undermine consumer confidence in food safety and are costly to individual companies and national economies. Novel foods, such as unapproved varieties of genetically modified foods (e.g. star link variety of maize) have in the past posed problems of food allergenicity [2, 14].

1.3. Types of adulteration [11, 14, 17].

There are three types of adulteration namely:

Intentional adulterants	Metallic contamination	Incidental adulterants
It includes sand, marble chips, stone, mud, chalk powder, water, mineral oil and coal tar dyes. It causes harmful effects on the body.	It includes arsenic from pesticides, leads from water, and mercury from effluents of chemical industries, tin from cans etc.	It includes pesticides and its residues, D.D.T and marathon residues present on the plant product, tin from can droppings of rodents, larvae in foods. Metal contamination with arsenic lead, mercury. Rodents and excreta, bodily secretions and spoilage through microorganisms.

1.3.1. Examples of common Food Adulteration in different food commodities:-

Now a day several reports were accounted in various food items such as milk spices, ghee, and oil and fats. In India normally the contamination/adulteration in food is done either for financial gain or due to carelessness and lack in proper hygienic condition of processing, storing, transportation and marketing. However, adequate precautions taken by the consumer at the time of purchase of such produce can make him alert to avoid procurement of such food .it is equally important for the consumer to know the common adulterants and their effect on health. Adulteration most often includes artificial colours, sand, marble chips, stones, mud, another filthy material talc, chalk powder, water, mineral oil, vegetable oil argemone seeds etc. There are various techniques to detect the adulterants such as a chemical method or with the help of sensitive instruments.

Generally, food security for the urban people is closely related to many factors like their age, religion, marital status, economic status, scarcity of clean water for cooking, drinking, washing lack hygienic aspects, due to lack of awareness and improper sanitation in food preparation has a great impact on health. Besides this, bad practices, poor hygiene environments and lack of awareness lead to the spread of various communicable diseases via the food system. Table 1 shows the common food adulteration found in different food commodities [6-9].

According to the annual report of FSSAI, the percentage of adulterated samples has reached 23.3% (2016-17) from

12.8% (2011-12) are shown in Table 2 [16]. In India, generally, it is the responsibility of the female homemakers to buy and prepare the food for the family. Thus in a country like India, the awareness of female homemakers regarding

food adulteration is very important. They can play a very important role in eliminating the problem of adulteration as generally female homemakers used to buy the foodstuff for home [17].

Table 2: FSSAI Laboratory Testing Reports on Food Adulteration [16]

Sr. No	Year	Sample analyzed	%adulterated/ Misbranded	No. of Cases Launched Criminal/ Civil	Penalties in (Rs lakhs)*
1	2012-13	69949	14.8	5840	525
2	2013-14	72200	18.7	10235	734
3	2014-15	70688	19.7	13679	1099
4	2015-16	65057	21.79	14179	2101
5	2016-17	60671	23.28	14130	1480

Source FSSAI

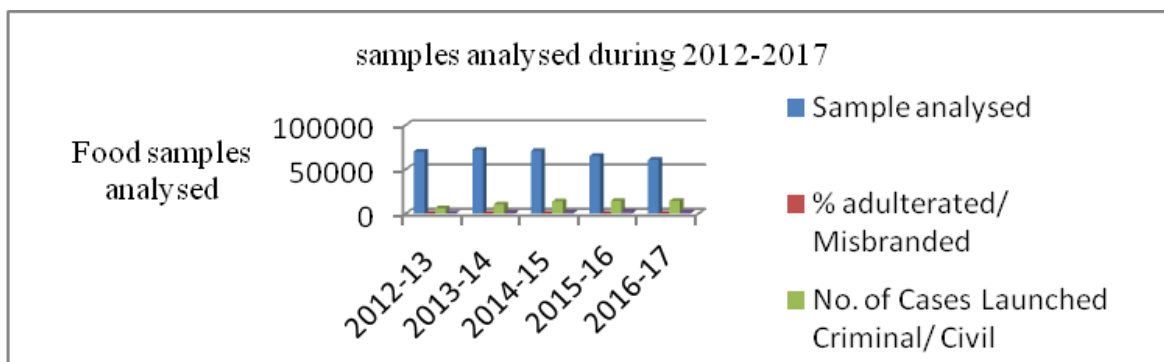


Fig1: Fssai sample analyzed, adulterated, penalties during 2012-2017 in India

1.4. Reasons of food adulterations [11, 19]

A food article (product) would be considered adulterate due to anyone from the following reasons-

- If the product sold by a vendor is not of nature, substance or quality demanded by the purchaser or which it purports to be.
- If the product offered contains any substance or if it is so processed as to injuriously affect its nature, substance, or quality.
- If any inferior or cheaper substance has been substituted wholly or partly in the product, or any natural constituent has been wholly or partly abstracted from it, to affect its quality.
- If the product had been prepared, packed, or kept under unsanitary conditions, has become contaminated, injurious to health or is unfit for human consumption.
- If the container of the product is composed of any poisonous or deleterious substance which renders its contents injurious to health.
- If the product contains any prohibited colouring matter, preservatives, or contains any permitted colouring matter or preservative in excess of the prescribed limits.
- If the quality or purity of the product falls below the prescribed standard, or its constituents are present in proportions other than those prescribed, whether or not rendering it injurious to health.

1.4.1. Another reason for food adulteration [8]

The causes of adulteration may be as follows

- Increase the value of commercial attributes/characteristics of the products.
- Sometimes adulteration, even though not hazardous, may lead to severe contamination issues, e.g. spraying of water on dry chilies to cope with excess weight loss may lead to Aflatoxins.
- Blending is not adulteration, unless origin of the product is significant
- When supply is less than demand, to earn more profits.
- Shortage of authentic ingredients at affordable prices
- Inadequate knowledge on the consequences and associated food safety risks.
- Lack of awareness and updating of the information on the adulteration related food safety outbreaks.
- Availability of too many products in the market
- Poor buying practices of consumers.
- Consumer mentality of bargaining,
- Consumer psyche.
- Availability of adulterants.

Now a day, "Adulteration is health menace". Thus, food adulteration takes many forms: mixing, substitution, abstraction, concealing the quality sale of decomposed foods and using false labels. The Indian consumer has become accustomed to live with adulteration. Even educated consumers do not pay attention to the menace of adulteration. Many of the spices, ready to eat ground masalas and commonly used products are found contaminated/adulterated. The adulteration problem in India has attained massive dimensions and some common Food Adulteration in different food commodities are shown in Table 1.

Table 1 Common Food Adulteration in different food commodities [4, 12, and 19]

Sr. No.	Food stuff	Adulterants	Health Hazard
1	Milk	Water, skim milk, neutralizers, calcium hydroxide, sodium bicarbonate/carbonate, sodium pyrophosphate, urea, Vanaspati, Starch, Detergent, invert sugar/glucose, synthetic milk, ammonium sulphate, hydrogen peroxide, boric acid, removal of fat, sodium chloride, melamine (resin).	Indigestion kidney stone and renal failure in children(melamine in milk)
2	Khoa, Chhana, ice-cream	Starch, substandard fat, non permitted colour ,blotting paper, vanaspati/margarine,	Toxic
3	Butter	Mashed potatoes, other starches, vanaspati /oleomargarine/lard	Economic loss
4	Ghee	Vegetable oil, cheaper animal fat	Economic loss
5	Edible oil (vegetable oil)	Cheaper oil, linseed in mustard oil, coconut oil with ghee, argemone Mexicana oil, white mineral oil, prohibited colour, castor oil, mineral oil, Karanja oil, Neem oil.	Erythema, epidemic dropsy, hepatitis odema (skin and liver disease)
6	Vanaspati	Cheaper fat ,groundnut, cottonseed and linseed oil	Economic loss
7	Coffee powder	Mug dad coffee (senna occidentalis) ,roasted powder of wheat, gram, date seed, chicory and tamarind husk, corched persimmon stone powder	Economic loss
8	Tea dust leaves	Artificial colour, tea wastes, gram husk, coffee husk, cashew nut endosperm, by product of leather industry, tamarind seed powder, sawdust, exhausted tea, chicory powder, iron filling	Cancerous
9	Soft drink alcoholic and other beverages, fruit products	Non permitted colour, Artificial sweeteners as saccharin, dulcin	Toxic /carcinogenic
10	Chilies powder	Sawdust, brick powder, non permitted colour, salt, talc powder	Toxic
11	Turmeric powder	lead chromate, foreign starch, common salt, husks, earthy matter, Metanil Yellow, Other aniline dyes (Non permitted colour)	Cancerous, carcinogenic
12	Dal whole and spilt pulses (Food grains)	Dust, pebble, stone, straw, weed seeds, damaged grain, weevil led grain, hidden insects, rodent hair & excreta, kernel bunt, ergot (bajra), khesari dal, clay ,gravels, webs, non -permitted colour	Toxic, Incurable paralysis
13	Maida, suji (rawa)	Resultant Atta, cheaper flour, boric acid, sand, soil, insects, webs, lumps, iron fillings ,rodent hair and excreta, excess bran, chalk powder,	Abdominal pain
14	Asafoetida	Soap stoner, or other earthy material, starch, foreign resin, Other resin Colophon residue obtained after the distillation of turpentine oil.	Abdominal pain
15	Jaggery	Chalk powder, sugar solution, sodium carbonate, washing soda, non permitted colour.	Economic loss
16	Cinnamon	Cassia bark of chichi dalchini	
17	Cumin seeds	Grass seeds colored with charcoal dust	
18	Saffron	Dried tendrils of maize cob	Economic loss
19	Iodized salt	Common salt, white powdered	Abdominal pain
20	Whole spices	Dirt, dust, straw ,insect, damaged seeds ,other seeds, rodent hair and excreta	Economic loss
21	Black pepper	Papaya seeds, light black pepper, coated with mineral oil, black pinheads	Economic loss
22	Cloves	Volatile oil extracted Exhausted or De-oiled Cloves.	Economic loss
23	Dhania powder	Starch, cow dust or horse dung, powder, sawdust	Micrological toxication
24	Pithi sugar	Washing soda, chalk powder, yellow colour(non permitted)	Economic loss
25	Wine	Diethelyne glycol	Toxic
26	Honey	High Fructose corn syrup, sucrose, invert sugar, cane sugar solution, gur, starch, glucose, wax, water.	Economic loss

		Bacterial and fungal contaminant	
1	Cereal products, custards, sauces	Bacillus cereus	Nausea, vomiting, abdominal pain, diarrhea
2	Meat and meat products, egg and egg products ,raw vegetables, salads	Salmonella spp.	Fever and chills (Salmonellosis)
3	Milk, potato, beans, poultry, shrimp, moist mixed foods	Shigella sonnel	Bacillary dysentery (Shigellosis)
4	Fermented food, canned foods, meats, smoked packed fish etc.	Clostridium botulinum	Double vision, muscular paralysis,
5	Dairy products, baked foods, meat and meat products, frozen foods etc	Staphylococcus aureus	Vomiting, abdominal cramp, diarrhea, severe thirst, prostration
6	Groundnut and cottonseed	Aflatoxins (Aspergillus flavus contamination)	Liver damage and cancer
7	Bajra, rye meal, bread	Ergot alkaloids	Itching of skin, Ergotism, peripheral gangrene
8	Yellow rice	Fusarium,Rhizopus,Aspergillus Toxins	Mouldy rice disease

The practices like in-process quality control rather than product testing, compliance rather than prosecution, compounding of minor/technical violation, high Power Screening Board to examine cases before prosecution, Periodic quality audits of food factories, etc. were also observed by the commission. It is interesting to note that FSSA, 2006 is mainly based on the recommendations of the member secretary of the Law Commission [2].

2.1. Food Safety Standards and Acts 2006 (34 of 2006), Rules 2008, Regulations 2011

Government of India, held extensive deliberations and approved the proposed integrated food laws with certain modifications. the integrated food laws has been named as "food safety and standards bill 2005 and this bill enacted by parliament and known as food safety and standards Act 2006, Rules 2011 and Regulations 2011". (34 of 2006) on 23rd August 2006. An act to consolidate the laws relating to food and to establish the food safety and standards authority of India for laying down science -based standards for articles of food and regulate their manufacture ,storage, distribution, sale and import, to ensure availability of safe and wholesome food for human consumption and for matters connected therewith or incidental thereto.

Food safety and standards Act 2006 includes 101 sections, first and second schedule ,various Regulations, definition of food, unsafe food under section 3(zz), standard, substandard ,Adulterant, contaminants, extraneous matter, food additives, hazard identification ,hazard characterization ,claim, consumer etc. are taken from codex, food authority, establishment of the scientific panel and committees, food safety audit, Misbranding food, unsafe food, risk analysis, risk assessment, communication management, Food safety management system, Provision for food recall, improvement notice, Surveillance, New enforcement structure, Envisages large network of appropriate recognition and accreditation of food laboratories from national accreditation board for laboratories, Food Safety Appellate Tribunal a new justice dispensation system for fast track Disposal of cases, graded punishment, mandatory standardization for food

Harmonization of domestic standards with International food Standards, covering Health Foods etc. The main features of the Act are to establish an integrated line of control and response, decentralization of licensing, single reference point, self-compliance, making the business food operators to ensure the quality at all the stages and the act claims to be contemporary, comprehensive, and having standards based on science and transparency [2,13,19].

3. Control approaches and future requirements for food Adulteration control and food safety [15, 18, and 19]

Establishment of food safety policy provides guidance as to the appropriate level of protection and the scope of the food safety. While establishing food safety policy, it should be carried through an open and transparent process. Increased transparency also protects the interests of consumers, as well as of trading partners. The local regulatory bodies/authorities have limitations and been ineffective even though the regulations have been tightened recently after the enactment of FSSAI (Food Safety and Standards Authority of India).and also to drawing experts on food safety from Government (local government, state and central regulatory agencies) industry, consumer organization, academia, professional societies, representatives of farmers including dairy, fishery, animal husbandry and other food producers, food processors, manufacturers, distributors, consumer groups, public health community, health care providers, trade associations, media). It is possible to control the food adulteration and food safety through proper approaches by statutory and regulatory authorities; industry, scientific community and consumers i.e. end users.

3.1. Statutory and regulatory authorities (FSSAI)[11, 18, 19]

Some of the initiatives schemes are establishment of mega Food Park, integrated cold chain facilities, modernizing abattoirs, upgrading food testing and quality control laboratories, upgrading hygiene and quality of street foods, more focus on developing quality and safety standards of food products, organizing awareness programmes on food

safety and quality also launching postage stamp to commemorate food safety and quality. The following are the points for the control approaches of food safety and food adulteration.

1. Shifting the primary responsibility for food safety to industry
2. By adopting a “production-to-consumption” approach to food control
3. By giving industry more flexibility in implementation of controls
4. By ensuring the cost-effectiveness and efficiency of government control functions
5. Increasing the role of consumers in decision making
6. Recognizing the need for expanded food monitoring
7. Epidemiologically based food source attribution
8. Adopting a more “integrated” approach to working with related sectors (such as animal and plant health)
9. Adopting risk analysis as an essential discipline to improve food safety.
10. Integrated approach throughout the food chain involving all the stake holders, statutory and regulatory authorities, industry, scientific community.
11. Through regular updates of information regarding reported outbreaks of food safety issues pertaining to adulteration.
12. Stipulating the practically feasible rules, requirements and regulations on the adulterants and updating them at regular intervals.
13. Stringent monitoring of the implementation.
14. Regular interactions with the industry to understand their concerns.
15. Central agency is facilitating and coordinating work across all stakeholders as well as providing support and encouraging the sharing of best practices.
16. Successful implementation of policy programme throughout the country uniformly would ensure safe, hygienic and quality food both for domestic consumption and for export.
17. Regular need of value addition by food processing which is much required for agricultural development, need for uniformity of standards, uniformity of quality, uniformity of regulations.

3.2. Industry

1. To feel more ethical and moral responsibility as food business operator to supply and serve wholesome food to the society.
2. Regular update on the process and allergen related outbreaks in the world.
3. Risk assessment (probability, severity) for all the ingredients, additives and processing aids and processing techniques with respective to adulteration.
4. Frequent testing of vulnerable ingredients, additives and processing aids for positive clearance with respective to allergens.
5. Third party auditing of the process to identify existing and probable lacunae of the system.

3.3 Scientific community

1. To develop validated simple, quick and authentic test procedures to a can the ingredients additives and processing aids for positive clearance
2. To share the knowledge with the statutory bodies and industry.

3. Popularization of food safety concept through mass media (food safety, quality and hygiene literacy movement).
4. Increased education of producers, processors and consumers through food inspectors.
5. Strengthening educational opportunities for stakeholders such as food inspectors, catering personnel to acquire knowledge on food safety through Open University education system.
6. Strengthening of infrastructure on food safety including Legal frame work and support structures.
7. Introduction and implementation of effective food labelling
8. Harmonize with international regulations but keep national interests in mind.
9. Emphasis on enforcement of regulations including stricter vigilance of imported foods.
10. Strong involvement of state governments in implementation with uniform and effective enforcement in various states.
11. Greater involvement of rural sector is food safety issues.
12. Creation of food safety related jobs especially in the rural sector.
13. Harmonising relevant sector policies such as food security and nutrition policy, food processing policy etc with food safety policy.
14. Fixing clear responsibilities.
15. Sound and continuous research base to investigate new food borne diseases, innovate methods of detection of adulterants, contaminants, and carry out risk assessments of existing and emerging problems e.g. genetically modified foods.
16. Hazard analysis critical control point (HACCP) measures relevant to each sector are identified after a carefully study and implemented rather than purely relying only on obtaining certificates
17. Food safety prevention programmes are introduced at the food production, processing and distribution chain.
18. Guidance to stakeholders for implementation of preventive food safety measures needs to be provided.
19. Preparation of specific guidelines for Good agricultural practices (GAP), Good manufacturing practices (GMP), Good hygienic practices (GHP), (GVP), and (GTP) relevant to local scenario is essential.
20. Provide technical support to the key personnel in the use of non-regulatory options such as guidelines, advice and education. A mechanism for its dissemination among the stakeholders needs to be developed.
21. Potential food hazards can be minimized along the food chain through the application of good practices.
22. Identification of key personnel at the grass root level for implementing the food safety preventive measures is essential.

3.4. Consumers/End users

1. Proper understanding of the adulteration issues.
2. To know difference between the natural and aesthetic attributes [texture, appearance and taste] of foods and accepting the natural ones to the extent possible.
3. To know the common adulterants their effect on health.
4. To educate and alert them on safe consumption of food articles as well as for their good health.
5. The codex and the committees have suggested confidence building measures among the consumers.

6. To know the provision for compensating the consumer who gets any injury or incur any health hazard, along with the penalty or punishment given to the perpetrator.

4. RECOMMENDATIONS

1. In developing countries, adequate laws, funding and staffing should be appeared to control Challenges
2. Different stakeholders should play great role to develop appropriate sampling programs based on statistical validity and sound sampling methodologies
3. Further study should be conducted on quantification of adulterants and
4. Effective analytical techniques to detect frauds must be there.
5. Proper food laws should be formulated by the government and rigid testing procedures should be adopted for standardizing the food products. Low quality products should be completely eradicated by the government.
6. Manufacturers these days are largely focused on increasing the profit and they care least about the wellbeing of the consumers. This attitude among the producers should be avoided and they work on the principles involving business ethics.
7. It is mandatory that the wholesalers choose quality products and stock them under clean and hygienic environments.
8. Retailers should choose wisely and purchase the best quality products. Since they are the closest channel to the consumers and they should take the initiative and suggests them the best products.
9. Consumers being the ultimate users of the food products should be fully aware of the adulteration practices that are prevalent among a large number of manufacturers. They should educate themselves with the standardizing techniques and select products with the AGMARK symbol.
10. The consumer should avoid buying food from places which do not maintain proper hygiene conditions. Both Local and branded food stores should be inspected by government bodies.

5. Conclusions.

Adulterants in food articles can decrease quality of food and as a result these adulterated food articles can affect our health very dangerously. Adulteration cause many diseases like cancer, Lathyrism, liver disease, cardiac failure, kidney diseases, and nervous system related disease. Now a day's edible oils are adulterated by using argemone oil that can cause of very dangerous disease 'Epidemic dropsy'. All the food articles like milk and milk products, vegetable oils, ghee, spices and condiments, beverages like coffee, tea etc are adulterated from many ways. Many efforts or rules have been initiated by the Government but still more efforts are needed in this direction. To achieve food safety, the public health sector must play a crucial role in building a community of various stakeholders and partners, who share common goals and responsibilities for the betterment of consumer and school education, science and research, agriculture and fishery, tourism, trade, industry as well as regulatory authorities.

6. References

- [1] Bhat (2004), Bhat, R.V. Food safety-Overview. Paper presented at Regional training-cum- workshop on food

- safety organized by Dept. of Foods and Nutrition, The MS University of Baroda, Vadodara, India,
- [2] Pardeshi (2012), S. Pardeshi, Food safety standards and Acts 2006 (34 of 2006), Rules 2008 and Regulations 2011- review, Journal of science, Technology and Management ,Tiruvalla Pathanamthitta, Kerala, India ISSN No.0974-8334, V.5(1).55-59.
- [3] Park (2007), Park, K. Preventive and Social Medicine, M/S Banarasi Banot, Jabalpur , 526.
- [4] Sitaram (2003), Sitaram Dixit, "Identifying common food Adulterations ", consumer Guidance society of India.
- [5] Sudershan et al (2009), R.V. Sudershan, Pratima Rao and Kalpagam Polasa ., Food safety research in India: a review, Asian Journal of Food and Agro-Industry., 2(03), 412- 433.
- [6] Alauddin (2012), Alauddin S. 2012. Food adulteration and society, JCIRA, 1(7): 3-5.
- [7] Poonam (2015), Lakshmi Khetrapaul Singh, From Farm to Plate Make Food Safe, World Health Day Message accessed on www.searo.who.int/mediacentre/features/2015/rds in.
- [8] Abbot (2015), Abbot Kramer, Quality of Food, Article accessed on www.webzeest.com/article/2428/ in
- [9] Arvind (2014), Arvind Gupta, Food Adulteration Article accessed on <http://www.arvindguptatoys.com/arvindgupta/vp-food-adulteraion>.
- [10] Lakshmi (2012), Lakshmi V. Food Adulteration, International Journal of Science Inventions Today. 1(2), 106-113.
- [11] Anita et al (2012), Anita Singh, Sheelendra M Bhatt, Shuchi Rai Bhatt , Food Adulteration and practices in urban Area of Varanasi, National Journal of Community Medicine, 3(4), 581- 88.
- [12] Bhat (2003), Bhat R.V., Food quality and safety hazards in India: The way ahead 30th Kamlapuri Sabharwal Lecture, Published by Department of Food and Nutrition, Lady Irwin College, University of Delhi, Delhi, 32.
- [13] FSSAI (2014), Food safety and standards Act 2006, Rules 2008, Regulations 2011, 8th edition , Professional book publishers, New Delhi, India.
- [14] JPR (2004), Joint Parliamentary Report on Pesticide Residue, Govt. of India, New Delhi, India.
- [15] Nidhi et al (2009), Nidhi Gupta and Priti Panchal, Extent of Awareness and Food Adulteration Detection in Selected Food Items Purchased by Home Makers, Pakistan Journal of Nutrition 8 (5): 660-667.
- [16] FSSAI, Annual report Food Safety and Standards Authority of India (FSSAI). Retrieved from fssai.gov.in/home/FSSAI-Annual-Reports.html. (Retrieved on- 02/03/2018).
- [17] Khapre et al (2011), Khapre MP, Mudey A, Chaudhary S, Wagh V, Dawale A. Buying practices and prevalence of adulteration in selected food items in a rural area of Wardha district: a cross-sectional study. Online Journal of Health and Allied Sciences, 10(3).
- [18] Vasireddi (2013), Vasireddi S. P. Food Adulteration and Control Mechanism, Workshop on Food Defence Awareness for Food Business Operators and Exporters, Hyderabad.
- [19] WWW.FSSAI.GOV.IN.