



Food Adulteration and Society

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INTRODUCTION -

Historically, the usage of adulterants has been common in societies from very ancient time with few legal controls on food quality due to poor or nonexistent monitoring by authorities; sometimes this usage has even extended to exceedingly dangerous chemicals and poisons. In the United Kingdom during the Victorian era, adulterants were quite common; for example, cheeses were sometimes colored with lead. Similar adulteration issues were seen in industry in the United States, until the passage of the Pure Food and Drug Act of 1906. More recently, adulterant use in the People's Republic of China has inspired much public attention.

Adulterant usage was first investigated in 1820 by the German chemist Frederick Accum, who identified many toxic metal colorings in food and drink. His work antagonized food suppliers, and he was ultimately discredited by a scandal over his alleged mutilation of Royal Institution library books. The physician Arthur Hill Hassall later conducted extensive studies in the early 1850s, which were published in *The Lancet* and led to the 1860 Food Adulteration Act and subsequent further legislation.

Food adulteration is fast growing worldwide as an industry. Global market of adulteration and fake goods is more than several hundred billion dollars which constitutes more than 10 percent of total trade. Indian market constitutes more than 30 percent of such trade, and rising very fast on day today basis. Urban markets are particularly flooded with fake and duplicate goods. You name any item: food or drinks, medicines or cosmetics, petrol or diesel, electronic or electrical, music or play, motor parts, books, stationary items, building material including postage stamps, currency notes or coins, we find ourselves surrounded by them. Adulteration in case of medicines is reported to the extent of 41 percent.

According to a survey, most commonly used cosmetic, e.g. parachute oil, fair and lovely cream, vicks and dabur amla oil have more than 100 duplicates in the market. Goat, donkey and dog skins after treatment are sold as tiger skins. Plastic and bones of different animals are used to make nails and limbs of tigers and leopards. Camel bones are used to make counterfeit ivory. It is a well organized profession and has covered almost all the items of daily needs. Adulteration is the most risky for life sustenance. It makes our existence unsecured. We are gulping slow poison through adulterated items. It is not consumer; even industry and government suffer equally because of adulterated, fake and duplicate goods. Adulteration starts at production level till it reaches to consumer level. It is of different kinds. The first, which contain natural toxin, e.g. khesari dal and harmful residues like pesticides in grains and vegetables and hormones and antibiotics in milk at production level. Second, the inadvertent adulteration where a product including food product has gone bad or its potency is lost (e.g. medicines) or is passed the expiry date. Third, the deliberately adulterated goods like adulteration with cheap chemicals in medicines and cosmetics. Fourth, the duplicates of popular brands with or without change in name. Fifth, the consumer is cheated not only in terms of quality but quantity also. Adulterants used in food items their adverse effects on health and protective measures have been discussed in the present paper.

FOOD ITEMS -

It is difficult to get a food items, may be flour, pulse, oil, fruit, vegetable, milk, sweet, spices, tea, coffee, honey, bakery item, chocolate, beetal nut including fruit juice which is free from one or the other adulterants. Our dinner thali (containing dal, roti, rice, vegetable and salad) is also not safe. Even animal feed like cake as protein supplement for lactating animals is adulterated. 90 percent of un-branded loose items are adulterated. Food contamination occurs from different sources, viz. overuse and illegal use of pesticides in agriculture, industrial sludge if

not treated before use, air pollution and use of pesticides for storing. Every input from water to manure and from pesticides to preservatives contributes to contamination.

ADVERSE HEALTH EFFECTS -

Health impacts of adulterants range from vomiting, abdominal pain, allergy, asthma, headache and even mental retardation, cardiac arrest and cancer is persistent. People dying after consuming adulterated food, children falling ill after eating food served in schools and thousands hospitalized after a wedding feast are common incidences. Food allergies are common due to adulteration with food additives. Use of banned pesticides like DDT and BHC for sprinkling on vegetables and fruits and also mixing with food grains as a preservative is rampant. According to an estimate, an average Indian eats about 40 times more pesticides through food than the average American or Englishman.

Pesticides and insecticides are used as food additives during production and post - production of different foods. Food additives are also used as colouring and flavouring agents, fresheners, preservatives and stabilizers during the manufacturing, processing and packaging of food items. The effects of food additives can be immediate or long-term. Common reactions are urticaria, runny nose, headache, asthma and bleeding, hyperactivity, irritability, contact dermatitis and skin eruptions. Long-term effects of food additives can result in damage to organs, birth defects and cancer. In spite of ban on use of several pesticides like aldrin, dieldrin, DDT and heptachlor, their use in food stuffs like cereals, pulses, oils, spices and meat products continues.

Synthetic colours used in different food items are harmful. Tartrazine is a synthetic lemon yellow azo dye primarily used as a food coloring. It is also known as E number E102, C.I. 19140, FD&C Yellow 5, Acid Yellow 23, Food Yellow 4, is a yellow colouring agent can cause itching, urticaria, runny nose and asthma. Saccharin and cyclamate, used as artificial sweeteners cause cancer of urinary bladder in long - run. Nitrates and nitrites, used as preservatives in packaged meat may cause stomach and gastrointestinal cancers. Mono - sodium glutamate (MSG) used as food flavour enhancer causes severe headache, nausea and occasionally chest tightness, burning sensation and asthmatic attack. Long-term use results in damage to brain. Sulphur dioxide and sodium meta bisulphate are used in dry fruits, wines and beers to prevent discoloration and spoilage. Sulphur dioxide is also used as preservative for fruits and vegetables. It may cause breathing and heart problems. Adulterants used in different food items and their adverse effects have been described below-

1. FOOD GRAINS -

Massive use of pesticides both at production and post - production level to protect food grains from the insects and pests is endangering the human and animal health. None of the pesticides is free from harmful effects. Mixing of khesari dal with pigeon pea dal is reported to cause lathyrism, a kind of paralysis. Colouring agents used in bad pulses especially tur dal and moong dal to make them appear good can cause allergic reaction and aggravate asthma.

2. EDIBLE OILS -

Adulteration of costly oils (e.g. groundnut oil, mustard oil) with cheap oils (palmolein, palm and argemone) is a common practice. Palm oil after cleaning- with chemicals is also mixed with deshi ghee. Use of palm oil increases incidence of heart problems. Vanaspati ghee has also been found adulterated with argemone. We all know mustard oil epidemics and last one was in 1998. The reason of epidemic was adulteration of mustard oil with argemone which caused severe dropsy. Essence of allyl isothiocyanate for characteristic pungency and butter yellow to impart the typical colour of mustard oil added to mustard oil are highly toxic, damages the liver and ultimately may lead to liver cancer in long run.

3. FRUITS AND VEGETABLES -

Most of the fruits and vegetables available in the market are adulterated and / or contaminated. Most commonly used contaminants are DDT, HCH, endosulfan, synthetic pyrethroids, carbamates, organophosphates, arsenic, lead, zinc, cadmium, copper and chromium and their health hazards are seizures, blood disorders, brain cancer (in children), breast cancer and movement disorders. Calcium carbide used for ripening of raw fruits like banana, mango and papaya has a carcinogenic effect. High levels of heavy metals like lead, zinc and cadmium in vegetables grown in suburban area have hazardous effects on human health. Seasonal okra (Bhindi) looking exceptionally green is not natural. Similarly sparkling white cauliflower is also not natural. It is because of malathion which is a potential poison. A solution of copper sulphate is used to make vegetables look green and fresh and acetylene gas for ripening of fruits. Sparkling brinjal in the market is due to Mobil oil. Sulphur meta bisulphite used to keep salad fresh is responsible for asthmatic attack. Massive use of pesticides to protect vegetables from insects affects the immune system and hormonal balance of the body. Oxytocin which has long been used for milk let down in animals is also used for fast growth and ripening of fruits and vegetables. It takes 24 hours for fruits and vegetables to ripe. Harmful effects of hormones on the body are well known.

4. SPICES -

Spices like chilli, coriander, turmeric, aniseed, black pepper and asafoetida, none is free from adulteration. A few adulterants are used to increase weight and others to give a good colour. All adulterants are harmful. Spices in powder form have more chances to be adulterated. Spices like chilli powder and coriander powder are adulterated with rice husk colour in castor oil base. Red chilli powder adulterated with Sudan-I is a carcinogenic agent. Papaya seeds in black pepper and gum in asafoetida is a common practice. Coconut powder is adulterated with suji, rice flour and sodium bicarbonate. These adulterants maintain whiteness of coconut powder. Use of low quality oil, sub-standard condiments, stale vegetables and decaying skins of lime in pickle preparation is very common. Tea, particularly loose tea mixed with saw dust, sand, iron fillings, used tea leaves besides several colouring and dyeing agents is a brisk business. Even catechu (kattha) is synthetically prepared.

5. MILK AND MILK PRODUCTS-

Incidences of adulteration in milk and milk products are at increase over the years. Milk is adulterated at two stages: production and post-production. Use of hormones, viz. growth hormone to boost milk production and oxytocin for milk letdown is rampant. Both the hormones have adverse effects on animal and human health.

Oxytocin affects fertility of animals whereas consumption of oxytocin induced milk may cause cancer and heart problems. High pesticide content in the food and water makes even mother's breast milk unsafe. Mother's milk in India has the highest DDT levels in the world. Milk from animals suffering from mastitis is highly infectious and can lead to asthma, allergy and diarrhoea. Normally, milk from such animals should be discarded. Dairywomen rather than discarding such milk, mix with other milk and supply to consumers. Ammonium compounds, NaOH, Na₂CO₃, NaHCO₃, hydrogen peroxide, formalin, sodium sulphate and poster paints are common adulterants in milk for increasing the shelf life. According to a report from World Bank supported National Agricultural Technology Project, 27 percent milk samples collected from Uttar Pradesh, Haryana, Delhi, Punjab and Rajasthan were found to be adulterated with one or more adulterant(s). Water is the common adulterant to increase the volume of milk. Adulteration of loose milk with water is very simple. Even poly packed milk is not safe from such adulteration. The ingredients used in the manufacture of synthetic milk are caustic soda, very low quality refined oil, common salt, sugar, urea, detergent powder and water. Some time even stale milk powder will also be used

All the ingredients used for production of synthetic milk are harmful. Consequent use damages the intestines, makes them prone to diseases such as gastroenteritis, diarrhoea and malnutrition. Children are more prone for such damages. The practice of synthetic milk preparation is widespread and more prevalent in Western Uttar Pradesh, Haryana and Himachal Pradesh. The source of adulteration of milk products is twofold: (1) use of adulterated milk and (2) adulteration during product preparation. Adulteration of skimmed milk powder with chalk powder is prevalent in many parts of the country. Antibiotics are added to milk and milk products to increase the self life. Consumption of milk

and milk products adulterated with antibiotics can build up antibiotic resistant organisms in the body. Ingredients used in synthetic mawa (khoa) are refined oil or vanaspathi ghee or any other oil, blotting paper, maida, suji, milk powder, potato, sweet potato, ground rice and chestnut powder. Much of the cottage cheese used in making rosogolla has muriatic acid which is used as toiletry item to sparkle the toilets. Soapy taste in ice cream is due to washing soda which causes gastric ulcers. A recent case of milk powder adulteration with melamine, an industrial chemical used in plastic industry was a big scandal in China. Chinese milk products like milk powder, chocolate, biscuits and butter are easily available in Indian market. The melamine causes illnesses including kidney stones. Two to three year old children are more prone to such ailments if they are fed with this chemical cocktail of milk powder.

6. SWEETS -

Mouth watering sweets are also not safe. Use of sub-standard and non-edible oils for preparation of sweets is rampant. Synthetic mawa or mawa prepared from synthetic milk is an important ingredient in most of the sweets. Silver foil used for sweets adulterated with nickel, aluminium etc is very dangerous and sometimes may lead to cancer and memory loss. Excessive use of food colours particularly synthetic colours in sweets has harmful effect on the body. For example, metanil yellow used to colour jalebis and ladoos may cause cancer in long run. High nickel content in Indian chocolates, nearly 4-10 times more than the accepted levels may cause cancer. Hydrogenated vegetable oils (HVO) used in Indian chocolates may be the reason of high nickel content.

FOOD SAFETY MEASURES-

The Ministry of Health and Family Welfare is responsible for ensuring safe food to the consumers. Keeping this in view, a legislation called "Prevention of Food Adulteration Act, 1954" was enacted. The objective envisaged in this legislation was to ensure pure and wholesome food to the consumers and also to prevent fraud or deception. The Act has been amended thrice in 1964, 1976 and in 1986 with the objective of plugging the loopholes and making the punishments more stringent and empowering Consumers and Voluntary Organizations to play a more effective role in its implementation.

The subject of the Prevention of Food Adulteration is in the concurrent list of the constitution. However, in general, the enforcement of the Act is done by the State/U.T Governments. The Central Government primarily plays an advisory role in its implementation besides carrying out various statutory functions/duties assigned to it under the various provisions of the Act.

The laws regulating the quality of food have been in force in the country since 1899. Until 1954, several States formulated their own food laws. But there was a considerable variance in the rules and specifications of the food, which interfered with inter-provincial trade. The Central Advisory Board appointed by the Government of India in 1937 and the Food Adulteration Committee appointed in 1943, reviewed the subject of Food Adulteration and recommended for Central legislation. The Constitution of India provided the powers to Central Government for making such legislation as the subjects of Food and Drugs Adulteration are included in the concurrent list. The Government of India, therefore, enacted a Central Legislation called the Prevention of Food Adulteration Act (PFA) in the year 1954 which came into effect from 15 June, 1955. The Act repealed all laws, existing at that time in States concerning food adulteration. Safety of food stuffs is an important issue. The present food safety measures, their shortcomings and what should be the approaches to avert this menace in future are given below -

1. At present, food quality through 'Inspector Raj' where a dozen of ministries are involved and in case of any dispute, they keep on passing the buck on each other. Therefore, it is important to have one empowered body, fix responsibility and accountability rather than involvement of several agencies.
2. The enforcing departments, which at present are ill equipped to tackle adulteration related problems, should be strengthened.
3. If anybody is suspected for adulteration in a food item, collect a sample from the concerned shop and send for testing in the designated laboratory.
4. The use of pesticides in agriculture and preservative to protect the food items from insects should be restricted. The banned pesticides should not be used. Only permitted food colours, dyes and preservatives specified quantities should be used in foodstuffs.

5. Persons found to deal with adulteration and fake items should be strictly viewed under "Prevention of Food Adulteration Act".
6. More and more food products should be brought in the ambit of quality Agmark certification. At present, it is 10-15 percent only.
7. Food standards and regulations for manufacture, import, export, storage, distribution and sale should be developed.
8. Easy to use, portable, simple to perform home testing kits for detecting adulterants are available in the market. A provision of testing laboratory at least at block level should be made.

CONCLUSION-

The menace of adulteration of food items is very serious. Adulteration has grown into monstrous proportions, and there is no full proof mechanism to prevent such kind of illegal activities. Food adulteration, and for that matter any type of adulteration should be stopped at any cost. The practice of injecting chemical substances to ripen the fruit has caught the attention of many people. Even though they are practiced day in day out, there is no mechanism or legislation to prevent such kind of acts. Adulteration has grown in terms of business volumes and people behind this go to any extent to achieve their ends. It's beyond the control of governments. Only alternative to this problem is to protect ourselves, and consumers should be aware of certain tips to check the purity of the purchased content.

The Prevention of Food Adulteration Act is a Central legislation. Rules and Standards framed under the Act are uniformly applicable throughout the country. Besides, framing of rules and standards, the following activities are must be undertaken by the Ministry of Health and Family Welfare.

- Keeping close liaison with State/local bodies for uniform implementation of food laws.
- Monitoring of activities of the States by collecting periodical reports on working of food laws, getting the reports of food poisoning cases and visiting the States from time to time.
- Arranging periodical training programme for Senior Officer/Inspector/Analysts.
- Creating consumer awareness about the programme by holding exhibitions/seminars/training programmes and publishing pamphlet.
- Approving labels of Infant Milk Substitute and Infant food, so as to safeguard the health of infants.
- Coordinating with international bodies like ISO/FAO/WHO and Codex.
- Carrying out survey-cum-monitoring activities on food contaminants like colours.
- Giving administrative/financial/technical support to four Central Food Laboratories situated in Kolkata, Ghaziabad, Mysore and Pune and providing technical guidance to the food laboratories set up by the States/Local Bodies.
- Holding activities connected with National Monitoring Agency vested with powers to decide policy issues on food irradiation.
- Formulation of Manual on food analysis method.
- Strict punishments for adulterants even capital punishment will also be awarded to the persons involved in the food adulteration.

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