

CHEMICAL ADULTERATION OF EDIBLE SUBSTANCES: UNVEILING PURITY BY EXPLORING THE POSITION OF LAW AND POLICY IN INDIA**Sherry Pant**

Assistant Professor, Lloyd Law College

ABSTRACT

The majority of the foods we eat are susceptible to food scams and chemical adulteration. In countries where there are few regulations concerning the safety of food, and where government oversight is minimal at best, food adulteration is widespread. This is a serious threat to public health from food adulterants such as toxic chemicals, contaminants, and inferior components. A nation like India, which suffers from a lack of proper nourishment, has an internal adversary that is, in some ways, more dangerous than an outwardly aggressive military. People are engaging in malpractices to increase the quantity of items using inexpensive replacements in order to profit in today's money-minded market, which is driven by an ever-rising population and their expanding requirements. These shady dealers care only about profiting from the harm they're doing to consumers' health. The new socio-political and economic order lacks the strict commitment to high norms of ethical behaviour essential to the efficient and trustworthy operation of the system. Through this research paper, the researcher while elaborating on the method of chemical adulteration of food, endeavours to highlight the existing laws and policies dealing with the issue of food adulteration in order to foster an environment where adulteration becomes increasingly difficult and unprofitable for unscrupulous manufacturers.

I. INTRODUCTION

The adulteration of food is a rising problem caused by dishonest merchants and manufacturers that target vulnerable populations in order to line their own pockets. Because of false advertising, misplaced media attention, and food adulteration, consumers have a hard time settling on a single food product. The ultimate victim of these malpractices is the customer, who unwittingly consumes tainted goods and suffers as a result. Adulterants are widely used in all free market cultures with lax or nonexistent legal control over government oversight of food quality. Adulteration is a problem that affects every country in the world. Food poisoning threatens the health of billions of people throughout the world. The Centre for Science and Environment estimates that in South Asia alone, food poisoning causes the deaths of 700,000 people every year, mostly due to diarrhoea¹. Despite India's enormous population, many incidents of chemical adulteration of food go unreported and undiagnosed. Additionally, pesticides and medicines pose substantial health risks if they are used without limits. Even after paying the reasonable prevailing retail prices, innocent consumers in India are being cheated due to sub-standards/poor quality of food products because of widespread adulteration in the food supply. This is especially true of products sold in urban-slum areas, semi-urban areas, and rural areas.

The elimination of hunger and poverty requires that all people, everywhere have access to enough food that meets their nutritional needs. The ingestion of unsanitary and contaminated food, such as the inclusion of water and detergent in milk, causes illness and death for millions of people every year, despite the fact that this is what everyone wants. At the same time as humanity has reached new heights thanks to advances in science and technology, new methods of food adulteration have emerged. Now is the time to handle food adulteration as seriously as the homicide. In general, every country should value discussions on food safety. India and other developing countries need to adopt the same standards for food safety that the West has established. While developing nations must follow the regulations and guidelines established by more advanced nations, they must also keep their citizens' wants and needs in mind.

¹ Centre for Science and Environment, Contamination of Food greatest challenge for food safety in India

<https://www.cseindia.org/contamination-of-food-is-the-greatest-challenge-for-food-safety-in-india-says-cse-on-world-health-day-april-7--5764> (Accessed 07 June 2023)

II. THE PHENOMENON OF CHEMICAL ADULTERY IN FOOD INDUSTRY

The incidences of food adulteration have skyrocketed recently. The issue of chemically adulterated food has risen to such forefront in recent years as consumers have grown more educated about the products they buy. This food fraud includes, but is not limited to, the intentional substitution, addition, tampering, or misrepresentation of food, food components, or food packaging, or the making of false or misleading assertions about a product for financial advantage. This particular kind of fraud is the malicious insertion of fake drugs or the fraudulent removal or substitution of genuine substances without the knowledge of the purchaser for the seller's financial advantage.

Causes of Chemical Adulteration

Frightening risks to public health and the legitimacy of our food system is presented by the chemical adulteration of food. The goal of increasing food production profits by diluting or replacing expensive components with cheaper substitutes is a primary economic driver of food adulteration. Another reason is the weak or insufficient food rules, limited enforcement, and poor testing facilities all contribute to the possibility of food adulteration due to a lack of control and monitoring. Apart from this, the complicated architecture of global food supply networks, from manufacturing to distribution also enhance the risk of adulteration at multiple points in the food supply chain.

FORMS OF CHEMICAL ADULTERATION**● Food colouring**

Artificial food colouring agents are one of the most often used methods of chemical adulteration. Food products are often artificially coloured or flavoured to make them appear more appetising to customers. In order to make their spices, sauces, and even fruits appear more vibrant, dishonest producers would often use inexpensive synthetic dyes like *Sudan Red*. Cancer and organ damage are only two of the many health problems that have been connected to these chemicals.

● Artificial Sweeteners

Many food and drink items labelled as 'diet' or 'low-calorie' alternatives employ artificial sweeteners like *Aspartame* and *Saccharin* as sugar replacements². However, studies have linked artificial sweeteners to a host of health problems, including metabolic abnormalities, weight gain, and even an increased risk of cardiovascular illnesses, when used in excess. Consumers can be duped into thinking they are making healthy decisions when in fact they may be putting themselves in harm's way due to misleading product labelling.

● Pesticide Residues

Chemicals which are pesticides are sprayed on crops to kill pests and increase harvests. However, pesticide residues might be present in our diets due to the overuse or abuse of pesticides in food production. Exposure to these residues over the long term has been related to a number of health problems, including neurological diseases, disturbance of hormones, and even cancer. It is especially important to choose organic or sustainably sourced products when it comes to fruits, vegetables, and grains due to their susceptibility to pesticide contamination.

● Preservatives

Preservatives are substances applied to food to prevent spoilage by microorganisms. While there are preservatives that are both safe and permitted for human consumption, the unchecked use of any preservative can have disastrous results. Overuse of the preservative *Formaldehyde* in fish and animal products, for instance, has been linked to gastrointestinal issues, breathing difficulties, and even cancer. *Sodium benzoate* is used as a preservative in many acidic beverages, but its overuse can cause allergic responses and other health problems.

² Manning, L., & Soon, J. M. (2014). Developing systems to control food adulteration. *Food Policy*, 49, 23-32.

● Food Additives

Processed foods frequently use chemicals like flavour enhancers, emulsifiers, and stabilisers to boost the quality of their textures, flavours, and visual appeal. However, excessive use of certain additives might be harmful to health. For instance, *Monosodium glutamate (MSG)* is a common flavour enhancer used in processed foods that, in certain people, can trigger unpleasant physical symptoms including headaches, dizziness, and excessive perspiration. High-fructose corn syrup, another common sweetener, has also been linked to weight gain, diabetes, and heart disease when used in excess.

Detection of Chemical Adulterants

The scientific detection of chemical adulterants plays a pivotal role in safeguarding public health and ensuring the authenticity of our food supply. The need to use cutting-edge scientific procedures to detect potentially dangerous compounds in our food has grown in tandem with the rising sophisticated adulteration techniques³.

● Mass Spectrometry

Mass spectrometry (MS) is a flexible analytical method for determining the molecular mass and fragmentation patterns of compounds for the purpose of identifying and characterising such substances. It is a potent instrument for the identification of chemical adulterants when coupled with chromatography techniques like gas chromatography-mass spectrometry (GC-MS) or liquid chromatography-mass spectrometry (LC-MS). Chemical analysis, compound identification, and structural property determination are all made possible by MS. MS's sensitivity and selectivity make it a powerful tool for detecting low concentrations of potentially dangerous adulterants.

● Chromatography

In order to separate and identify chemical substances, chromatography is a strong analytical method. Many laboratories use gas chromatography (GC) and liquid chromatography (LC) to identify chemical impurities. These methods enable researchers to detect and measure specific adulterants in food samples by dissecting them into their component parts. Chromatography, when coupled with suitable detectors and reference standards, allows for the precise detection of chemical adulterants⁴.

● Spectroscopic Techniques

Scientists use spectroscopic methods like Fourier Transform Infrared (FTIR) and Raman spectroscopy to detect chemical adulterants. Light's interaction with matter is at the heart of these methods, which provide details on the vibrations and structural properties of substances. FTIR spectroscopy is useful for detecting adulterants since it can pick out individual functional groups and chemical bonds. However, Raman spectroscopy provides invaluable information on the molecular make-up of materials. These non-destructive methods are useful for detecting adulterants on-site and in real-time since they allow for quick examination.

● Nuclear Magnetic Resonance Spectroscopy

The molecular structure, motion, and chemical characteristics may all be gleaned through the use of nuclear magnetic resonance (NMR) spectroscopy, a non-destructive analytical method. In order to analyse food samples and find chemical adulterants, NMR spectroscopy is often utilised. NMR spectroscopy may detect the presence of certain chemical substances like pesticides, additives, or pollutants by detecting their resonance frequencies in a magnetic field. It provides important information on the composition and quality of food goods, which helps to avoid adulteration and protects consumers.

³ Bansal, S., Singh, A., Mangal, M., Mangal, A. K., & Kumar, S. (2017). Food adulteration: Sources, health risks, and detection methods. *Critical reviews in food science and nutrition*, 57(6), 1174-1189.

⁴ Banti, M. (2020). Food adulteration and some methods of detection, review. *International Journal of Nutrition and Food Sciences*, 9(3), 86-94.

● Polymerase Chain Reaction

The molecular biology method of Polymerase Chain Reaction (PCR) amplifies target DNA sequences for genetic material identification in food samples. Detecting genetically modified organisms (GMOs), which might be deemed adulterants in some situations, is an area where PCR-based approaches shine.⁵ Scientists can test for the presence of GMOs in foods by looking for specific areas of DNA or genetic markers, which guarantees that labels are accurate and gives consumers the information they need. Since PCR-based techniques are so sensitive, even trace levels of GMOs can be found.

III. ROLE OF LEGISLATIONS IN COMBATING CHEMICAL ADULTERY

To prevent chemical food adulteration, legislation is essential. It is a really important tool in combating chemical adulteration of food since it helps make sure everyone in the food supply chain follows the regulations.

Regulatory Framework

To combat chemical adulteration, a robust regulatory structure must be based on legislation. Guidelines for food production, processing, labelling, and distribution are established by laws and regulations at both the national and international levels. Limits on the amounts of chemical additives, preservatives, and colourants allowed by these rules help guarantee that they are used safely and effectively. They provide a deterrence to dishonest producers by outlining fines and consequences for noncompliance.

Labelling Requirements

Food items must provide vital information to customers regarding their ingredients in a clear and accurate manner, as required by law. Consumers may make more educated decisions and avoid potential health hazards with accurate labelling, making it a crucial tool in the fight against chemical adulteration. Some laws mandate the labelling of products with information on allergies, genetic modification, and other potential contaminants. With the help of accurate labels, shoppers may avoid products containing dangerous ingredients and instead support businesses that use more sustainable practices.

Standards and Monitoring

The fight against chemical adulteration requires the creation of standards and monitoring mechanisms, both of which are facilitated by legislation. To determine what levels of chemicals are safe for use in foods, regulatory authorities like food safety agencies work with scientists. These guidelines help guarantee that the food people buy is safe and devoid of potentially harmful chemicals. Food adulteration may be easily detected by routine monitoring and testing, and breaches can be dealt with expeditiously thanks to this legislation.

Consumer Protection

Consumers need legal protections in the event of chemical adulteration. It guarantees that food producers are ethical and put the needs of their customers above their own. Consumers have legislative protections in place to ensure they are provided with healthy, unadulterated food. Legislation serves as a deterrent by making producers liable for their activities, which in turn discourages unethical practices and encourages responsible food production⁶.

⁵ Lopez-Calleja, I., Gonzalez, I., Fajardo, V., Martin, I., Hernandez, P. E., Garcia, T., & Martin, R. (2005). Application of polymerase chain reaction to detect adulteration of sheep's milk with goats' milk. *Journal of dairy science*, 88(9), 3115-3120.

⁶ Anklam, E., & Battaglia, R. (2001). Food analysis and consumer protection. *Trends in Food Science & Technology*, 12(5-6), 197-202.

IV. LAW AND POLICY FRAMEWORK DEALING WITH CHEMICAL ADULTERATION OF FOOD IN INDIA**Background**

The adulteration of food is a subject in the Concurrent List of the Constitution. There existed a number of state laws in place to ensure food safety before 1954. However, there were variations in the regulations of several states, which created obstacles to trade and commerce between various provinces. There was a need for central regulations. Therefore, the Union parliament passed the Prevention of Food Adulteration Act in 1954 to address the widespread issue of food adulteration. The Act included following aspects in the ambit of 'adulteration'⁷ :

- When a seller provides a customer with a food item that falls short of their expectations in terms of quality or quantity.
- When it has been found to contain a toxic, unnatural ingredient.
- If any artificial ingredient, however little, is blended into the final product.
- When something is unsafe to eat because it was kept, packaged, or prepared in an unsanitary manner.
- Any time an animal that is known to be sick is used in the food processing industry.
- When any type of poison is present in food.
- If there is a health risk associated with the material the food was stored in.
- If more of the food colouring than is allowed or if another material that is harmful to health is used to colour the meal.
- When an illegal drug is utilised for food preservation or when there is an excessive amount of a food preservative.

Food Safety and Standards Act, 2006

The Prevention of Food Adulteration Act, 1954 had several flaws. Thus, Parliament established the Food Safety and Standards Act, 2006 to rectify these problems and harmonise existing food safety and standards regulations. The Food Safety and Standard Act of 2006 is a comprehensive piece of law that addresses several facets of food safety regulation.

- **Defines 'Adulteration'**

A food item is considered adulterated if it meets the criteria laid down in Section 2(A) of the Prevention of Food Adulteration Act of 1954 and any low-grade or inexpensive substance that has been replaced wholly or partly in the article so as to affect injuriously nature, substance, or quality; Any essential component of the article that has been distracted wholly or partly so as to affect injuriously nature, substance, or quality.

- **Establishment of FSSAI**

Section 4 of the Act establishes the Food Safety and Standard Authority of India (FSSAI). It is the primary body responsible for monitoring and enforcing compliance with food safety and quality requirements. According to the Act, the organization's headquarters must be located in Delhi. The Food Safety and Standards Authority of India (FSSAI) is a legal entity in its own right, with the ability to acquire and transfer property independently⁸. The corporation has the same rights and liabilities as any other legal entity. A Selection Committee appointed by the Central Government appoints its twenty-two members and one chairperson. The Act further specifies that the

⁷ Prevention of Food Adulteration Act, 1954, § 2(ia).

⁸ FSSAI, C. (2017). Eat Right, india.

International Journal of Applied Engineering & Technology

Central Government may nominate an executive officer to serve in such capacity. He represents the Food Authority in legal matters.

● **Commissioner of Food Safety for the State**

For efficient execution of the provisions at the State level, the Act authorises the State Government to designate a Commissioner of Food Safety for the State. It is the responsibility of the Commissioner of Food Safety to nominate a Designated Officer for each region. The Commissioner can also choose new Food Safety Officers as needed.

● **Other Authorities**

According to the law, the Food Authority must create a number of sub-authorities. There will be a centralised advisory committee to facilitate communication between the Food Authority and law enforcement. To deliberate on particular issues in cooperation with the relevant business and consumer groups, scientists form expert panels. To provide the Food Authority with scientific assistance on a variety of subjects, the Scientific Committee has been formed.

● **Evaluation of eatables**

According to the law, it is the Food Authority's job to alert research facilities and laboratories that analyse food samples and have been approved by the National Accreditation Board for Testing and Calibration Laboratories or any similar body. Expert Food Analysts selected by the Commissioner of Food Safety conduct this evaluation.

● **Penalties & Offences**

The offences are defined in Section 48. It lays forth the circumstances under which a person is responsible for construing any food item as dangerous, including through the addition of an object or substance to it or the omission of certain necessities that undermine its quality⁹.

The Act penalises for selling food that does not meet quality standards set by Act regulations; producing, storing, selling, distributing, or importing food of substandard quality; producing, storing, selling, distributing, or importing food that is misbranded; using false or misleading claims in advertising; producing, storing, selling, distributing, or importing a food product that contains extraneous material; and manufacturing or processing a food product..

● **Remedies to the victims of Food adulteration**

In the event that a customer learns about or witnesses an act of food adulteration, he or she may submit a complaint with the producer or retailer; the State/UT Food Safety Authority District Commissioner or Local health authority in India; the Consumer Forum. The consumer forum exists on three tiers, including the local, state, and central levels. The district court has first jurisdiction over the complaints, while the high courts and supreme court have appellate authority.

The victims can seek the following relief under Section 65 of the Food Safety and Standards Act, 2006:

One who produces a food item that causes harm to consumers or even death, might be fined up to :

- Not less than five lakh rupees in case of death;
- Not less than ten lakh rupees in case of serious injury.
- In the event of severe damage, the amount will not exceed three lakh rupees
- In all other harm instances, not more than one lakh rupees.

⁹ Dhulia, A. (2010). Laws on Food Adulteration: A Critical Study with Special Reference to the Food Safety and Standards Act, 2006. ILI law review, 163.

International Journal of Applied Engineering & Technology

- If the victim dies before receiving full compensation, an interim payment of thirty days' worth of living expenses shall be delivered to the family.

● **Rules and Regulations**

The Act grants the Central Government the authority to promulgate regulations in Section 91. The government has established laws to control the quality of food items, including the following¹⁰ :

- Food Safety and Standards (Packaging and Labelling) Regulation, 2011
- Food Safety and Standards (Laboratory and Sampling Analysis) Regulation, 2011
- Food Safety and Standards (Licensing and Registration of Food Businesses) Regulation, 2011
- Food Safety and Standards (Food Product Standards and Food Additives) Regulation, 2011

Indian Penal Code, 1860

Sections 272-274 of Chapter XIV of the IPC establish the penalties for offences that endanger the public's health, safety, etc. Public health, safety, convenience, decency, and morality are each addressed in their own sections of the IPC. The adulteration of food and drink for commercial sale is addressed under Section 272 of the IPC. That's why it makes criminal sanctions for adulteration explicit.

The sale of adulterated food or beverages is a crime under Section 272 of the IPC, as is the possession of knowledge that such food is being sold or will be sold in the future. According to section 272 of the Indian Penal Code, those convicted of this offence face a maximum of six months in jail and/or a fine of up to one thousand rupees.¹¹ Section 272 of the IPC establishes a bailable, non-cognizable, and non-compoundable crime. Any Magistrate has jurisdiction over this case.

To reflect the gravity of the crime and the damage it causes to human health, states like Uttar Pradesh, West Bengal, and Orissa have mandated that the a crime of adulteration of food be punishable by life imprisonment in addition to a fine.

In *Parle Beverages Pvt. Ltd. v. Thakore Kacharaji*¹², the petitioners used to supply the complainant with 'Thumbs up' alongside the beverages they sold. The complainant's bottle of thumbs up was once purchased by a customer who discovered insects within. Complainant notified petitioners of this but received no response, prompting the filing of the complaint. Lawyers for the petitioners argued that the complaint could not be brought under sections 272 and 273 of the IPC since those sections have been repealed by Section 25 of the Prevention of Food Adulteration Act, 1954. The apex court ruled that since the penalties under Section 16 of the Prevention of Food Adulteration Act, 1954 are more severe than those under Section 272 of the IPC, the two sections do not constitute a 'corresponding law' to the provisions of the Prevention of Food Adulteration Act, 1954. The element of mens rea, necessary for a violation of Section 272, is sometimes lacking in Prevention of Food Adulteration Act, 1954 prosecutions. The court held that no question of repeal under Section 25 of Prevention of Food Adulteration Act, 1954 arises since the provisions of IPC are not repugnant to or inconsistent with the provisions of Prevention of Food Adulteration Act, 1954.

For the crime of adulteration, the Prevention of Food Adulteration Act, 1954 and either Section 272 or Section 273 of the Indian Penal Code apply; however, it must be ensured that the perpetrator is not penalised twice.

¹⁰ Shukla, S., Shankar, R., & Singh, S. P. (2014). Food safety regulatory model in India. *Food Control*, 37, 401-413.

¹¹ Indian Penal Code, 1860, § 272.

¹² *Parle Beverages Pvt. Ltd. v. Thakore Kacharaji*, (1988) 1 GLR 183

International Journal of Applied Engineering & Technology

The Supreme Court ruled in the case that the provisions of the Indian Penal Code (IPC) are not in conflict with the terms of the Prevention of Food Adulteration Act, 1954; nonetheless, a person must not be punished twice under distinct legislations. Since the penalty under the particular legislation is more severe than under the IPC, the State often favours it.

Although Section 273 does not directly address adulteration, it is reasonable to conclude that a person can be held accountable under this Section if he knows that the product is contaminated even if he did not conduct the adulteration. One should not allow contaminated goods to be marketed since they may be harmful to health. Therefore, Section 273 also makes it illegal to advertise an adulterated product with the knowledge that it contains harmful substances¹³.

V. COLLABORATION BETWEEN GOVERNMENT, INDUSTRY, AND CONSUMERS TO COMBAT FOOD ADULTERATION

The security and reliability of our food supply have risen to the top of the list of national priorities in this age of globalisation and interdependence. The deliberate use of dangerous chemicals in food items damages customer confidence, lowers food safety standards, and endangers human health in serious ways. To discourage the use of adulterants, it is necessary for regulatory agencies to maintain strict standards, perform frequent inspections, and issue harsh fines. As shoppers, we need to keep an eye out, learn as much as we can about the dangers, and back ethical farming methods. Protecting our food supply thus requires coordinated efforts. To solve this urgent problem, the government, businesses, and individuals must work together in harmony.¹⁴ Together, these groups have the power to adopt a preventative, all-encompassing stance against food adulteration that will benefit everyone.

Role of Government

The government's role in overseeing and policing the food business is critical. Strong laws and regulations must be in place and strictly enforced in order to fight food adulteration. Inspections, audits, and punishments that are both fair and effective must be strictly enforced. In order to rapidly and properly detect adulterants, the government should fund the construction of cutting-edge laboratories. In addition, it should promote openness by widely publishing data on food safety and periodically reviewing legislation to address new threats.

Industry Accountability

The onus of assuring the quality and safety of their products falls heavily on the shoulders of the food industry's producers, manufacturers, and distributors. Establishing and maintaining thorough quality control methods requires close cooperation between the industry and the government. Standardised testing methodologies, best practises, and information transfer may all benefit from the collaboration of regulatory agencies and industry groups. Using reliable supply chain management systems, we can monitor our food's journey from farm to fork and back again.

Consumer Empowerment

The people who will ultimately benefit and have a stake in the outcome of the battle against food adulteration are the consumers themselves. Common adulterants, the dangers they pose to human health, and how to spot them should all be the focus of public awareness efforts. Together, governments and businesses may use digital platforms, public service announcements, and community engagement initiatives to get the word out.¹⁵ A crucial early warning system that can facilitate rapid investigations and responses is provided when customers are given the ability to report suspected incidents of food adulteration.

¹³ Indian Penal Code, 1860, § 273.

¹⁴ Sharma, A., Batra, N., Garg, A., & Saxena, A. (2017). Food adulteration: A review. *International Journal for Research in Applied Science & Engineering Technology (IJRASET)*, 5(11), 686-689.

¹⁵ Ghosh, D. (2012). Food adulteration in India: Issue of policy or social system.

Moving Along with the Technological Advancements

The fight against food adulteration is aided by technological advancements. DNA testing, spectroscopy, and sensor technologies are all examples of cutting-edge methods that government agencies might use to better detect and eliminate adulterants. Using blockchain technology, businesses may build a system that cannot be altered, allowing for full accountability and transparency across the whole supply chain. Smartphone apps and QR codes allow buyers to instantly research a product's history, components, and quality. The community's effectiveness in fighting adulteration improves as new technologies are used.

VI. CONCLUSION

The food maker who adds unnecessary ingredients may see a financial advantage from this fraudulent practice, but the customers are the ones who suffer the consequences. Consumers, as a result of their purchases and consumption of contaminated goods may be prone to issues including, but not limited to, diminished nutritional absorption, potential health risks, and financial losses. The FSSAI, India's food safety authority, needs a mission that is laser-focused and results-driven. Nutrition and health promotion are not its purview and should be handled by other organisations. To expedite the food import process and lessen the compliance load on the food sector, a logical and focused mandate is the first step towards a rational and focused compliance ecosystem.

Cooperation between the government, the food sector, and the public is like a beautiful tune in the symphony of vigilance against food adulteration. Together, these groups have the clout to protect the public health and restore consumer trust by strengthening our food chain against adulteration. Transparency, quality control, and rapid response are fostered through a nexus of government regulation, industry responsibility, and consumer agency.