



# **The Indian Journal for Research in Law and Management**

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Editor-in-Chief – Dr. Muktai Deb Chavan; Publisher – Alden Vas; ISSN: 2583-9896

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## **GMO Labelling in India: Consumer Awareness, Risk Perception and Regulatory Challenges**

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**DECLARATION**

This is to declare that the empirical research titled ‘GMO Labelling in India: Consumer Awareness, Risk Perception and Regulatory Challenges.’ is a bona fide work which is undertaken by me under guidance and supervision of guide assigned at Symbiosis Law School, Pune for the partial fulfillment of the requirements for the degree of LLM.

I further declare that to the best of my knowledge and belief that this empirical report or any part of it thereof, has not been submitted in part or full to this or any other university for any degree or diploma or any similar title.

**Date: 10<sup>th</sup> October**

## **PREFACE**

This empirical report investigates public perceptions and attitude towards Indias and loss through a survey structure of diverse respondents, including law students, legal professionals, academicians, and members of the public. The study aims to understand the current labelling system that is present in India. The mechanism of right to information and also to understand the consumer behavior with regards to genetically modified products and their demand from the government to implement better labelling system. This study also tests if the consumers are happy with the current regulatory body.

## List of Abbreviations:

<b>GMO</b>	Genetically Modified Organism(s)
<b>GM</b>	Genetically Modified
<b>RTI</b>	Right to Information
<b>GEAC</b>	Genetic Engineering Appraisal Committee
<b>FSSAI</b>	Food Safety and Standards Authority of India
<b>EPA</b>	Environment (Protection) Act, 1986
<b>WTO</b>	World Trade Organization
<b>rDNA</b>	Recombinant DNA
<b>EU</b>	European Union
<b>FDA</b>	Food and Drug Administration
<b>BE</b>	Bioengineered

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**Abstract:** The regulation of genetically Modified Organisms raises critical questions about transparency, public participation and the scope of the Right to Information (RTI) in democratic governance. As GMOs increasingly enter food systems, agriculture, and commercial markets, the public's ability to access accurate and timely information becomes essential for safeguarding health, environmental integrity and informed consumer choice. This paper examines the legal and policy framework governing GMO disclosure, particularly in relation to the RTI laws in the country. In India, this debate is exacerbated by regulatory ambiguity, weak enforcement, and the absence of a robust mandatory labelling regime under authorities such as the GEAC and FSSAI. The resulting opacity denies millions of Indian consumers their right to informed consent, undermines trust in the national biotechnology framework, and creates significant public health and trade vulnerabilities due to unregulated mixing of GM and non-GM crops.

Key words: GMO, RTI, Labelling, Transparency, consumers

### 1. Introduction:

The war between GMOs and the Right to Information is one of modern history's most epic informational battles. It probes at its essence the social contract between buyer and seller. At one end are GMO crops and food made genetically with precision biotechnology instruments. GMOs have the potential to bring relief to our generation's most frightening issues: the spectre of global hunger and a warming planet. We can raise plants that are healthier and more robust, requiring fewer inputs of water and fertiliser and performing in harsh environments. It is exactly this power to edit, revise, and 'improve' the code of life itself, however, that has alarmed consumers globally and sparked a fierce hunger for knowledge. The tinderbox: The demand for mandatory labeling. It is not enough that regulators stamp a product 'safe' on a label. The public needs to know, period, so that they can make an informed choice based on their own ethics. On the other hand are industry participants oppose mandatory labelling, at times on economic and scientific bases. They say such a label is not only unnecessary but also deceptive, given the enormous expense to the industry. A label would be nothing more than a yellow 'cancer' sticker on a product that has been scientifically verified safe and nutritionally identical to non-GMO alternatives. So the battle for a mere label on a box is something more: Its an indirect conflict between transparency, corporate hegemony, and the ultimate sovereignty of the consumer over what he or she places into his or her body. Statement of problem The crux of the Indian issue is the failure to fully accept the Right to Information, the right of consumer choice in the midst of historical fast-tracking and willing ambiguity on the existence of Genetically Modified (GM) food products. This is through the medium of a regulatory gap and enforcement deficiency on a mandatory labeling regime of packaged foods that may potentially contain GM content, thereby denying crores of Indian Btconsumers their right to informed consent and an informed choice over what they eat, sowing seeds of doubt regarding Indias whole biotechnology regulatory system (GEAC, FSSAI) and creating an Indian public health and trade problem out of unregulated and widespread mixing of GM and non-GM crops.

**1.1. Hypothesis:**

Due to the structural imperative of market efficiency and the asymmetric influence of agro-industrial stakeholders, the consumers fundamental Right to Information on GM foods is systematically undermined, resulting in unbridled non-labeling across the Indian food supply chain.

## **1.2. Research objective:**

- 1) To analyse the deficiencies in India's dual regulatory mechanism (FSSAI/GEAC) by identifying the precise gaps in mandated labelling thresholds and corresponding enforcement protocols that perpetuate non-disclosure of GM ingredients.
- 2) To evaluate the economic and infrastructural impediments to mandatory labeling by quantifying the identity preservation (IP) costs and logistical demands of implementing a low-level threshold (e.g., 1%) traceability system within the import and domestic supply chains for key processed foods.
- 3) To map the political economy of non-labeling by empirically assessing the lobbying influence of agro-industrial stakeholders and correlating their positions with governmental policy decisions on regulation, market stability, and food price management.
- 4) To establish the empirical extent of non-compliance by conducting a targeted market assessment/testing of packaged foods for undeclared GM content, thereby validating the practical failure of current regulatory oversight.
- 5) To formulate policy alternatives that propose a pragmatic regulatory equilibrium between the fundamental consumer Right to Information (RTI) and the tested economic and infrastructural realities of food production and trade in India.

## **1.3. Research Questions**

- 1) What specific, unenforced provisions (e.g., labelling thresholds) in the FSSAI/GEAC framework allow the non-disclosure of GM ingredients in Indian processed foods?
- 2) What are the quantifiable cost increases for traceability/IP required to implement a mandatory low-threshold GM labelling system in key food sectors?

- 3) How effectively do agro-industrial stakeholders influence regulators to prioritize market efficiency over the consumers Right to Information (RTI) regarding GM food?
- 4) What is the empirical rate of undeclared GM content in packaged Indian food, and how does this correlate with the absence of a strict legal labeling threshold?
- 5) What policy or technological models offer the most practical balance between mandatory GM labeling and minimizing adverse economic impact on food prices and supply stability?

#### **1.4. Research Methodology**

##### **1.4.1. Methods**

The study is partly empirical and partly doctrinal in nature to meet the objectives listed. Primary Sources include questionnaire responses from respondents, legislation, etc. Secondary sources involve books, reports from research organizations, journal articles, newspaper reports, etc. A structured questionnaire was used in order to collect empirical data, which comprised analytical questions. The tool used for data collection is Google Forms. The researcher has adopted a random sampling method to identify unfiltered responses from the participants of the survey. In order to present the study, the researcher has used the Bluebook: A Uniform System of Citation (19th ed.) as it is the most convenient and reliable citation method to accredit the primary and secondary sources in legal research.

##### **1.4.2. Time and Place of Data Collection**

The structure and planning of the questionnaire consumed four days. The data was collected in the month of October 2025 through online mode with the help of Google Forms. The data collection and analysis were completed in a span of one month.

##### **1.5.1. Scope and Limitation of the Study**

The major limitation that the researcher faced was restricted movements in the region to conduct a physical survey of respondents. However, the survey responses collected from the entire nation.

### **1.6.1 Significance of the Study**

The significance of this study is its ability to directly resolve the policy gridlock preventing mandatory GMO food labeling in India. It moves beyond abstract debate by empirically quantifying the trade-off between the consumers fundamental Right to Information (RTI) and the practical, high economic/logistical costs of enforcing strict traceability across Indias fragmented supply chain. By analyzing regulatory gaps and the asymmetric influence of agro-industry, the research aims to provide policymakers with a realistic and implementable model for disclosure, thereby strengthening regulatory compliance, fostering market transparency, and ultimately upholding the citizens right to informed choice.

### **1.7.1. Plan of the study**

**The researcher visualizes this study into 5 different chapters.**

- 1) **Introduction:** The first chapter includes the hypothesis, the Research Questions, Research

Methodology, which will describe the Methods and tools used in the completion of this study. The chapter also intends to provide the timeline of data collection along with the scope and limitations of the present study.

- 2) **Review of literature:** The second chapter presents the concept of social construction and its relevance to the present research problem. It further reviews the existing problem of mandatory labelling and regulations that are currently present for the same.

- 3) **International and India:** Indias approach to GM food labeling is a regulatory paradox: it strictly bans almost all domestic GM food cultivation (following a precautionary principle), but it has an unenforced and ambiguous mandatory labeling policy for imported, processed GM foods. This contrasts with the international landscape split between two models: the EUs stringent, process-based approach (mandatory labeling even if DNA is undetectable, with a 0.9% threshold) and the USs product-based approach (mandatory labeling only if GM-DNA is detectable in the final product, with

a 5.0% threshold). Consequently, Indias lack of a robust traceability system and clear regulatory coordination means a significant volume of GM-derived products enters its market unlabeled, undermining consumer rights and its own precautionary stance.

- 4) **Empirical Analysis of GMO and mandatory labelling:** To empirically investigate the policy conflict between the consumers right to mandatory GM food labeling and the structural imperatives of market efficiency and industry influence within Indias regulatory environment, and subsequently to develop a practicable and cost-effective regulatory model for mandatory disclosure.
- 5) **Conclusion:** The final chapter of the present study summarizes the findings, gives areas of future research and recommendations.

## **2. Review of the Literature**

### **2.1The Genetically Modified Food Landscape: Scientific Consensus Versus Public Perception**

Genetically modified foods, produced from organisms whose genetic makeup has been manipulated through biotechnology, have been a presence in the worlds food supply since the 1990s, with potential advantages such as higher yields, nutritional content, and lower pesticide use through characteristics such as herbicide tolerance and resistance to insects. To supporters, these developments are an essential means for enhancing global food security.

Scientifically, there exists a broad scientific and technical consensus across the world from prominent scientific and technical institutions such as the American Association for the Advancement of Science (AAAS) and the European Food Safety Authority (EFSA) supporting the safety of GM crops for human consumption and their environmental impact, if subjected to rigorous regulatory clearance and safety assessment. The central argument in favor of not labelling some products is the doctrine of substantial equivalence: if the GM food item in question is not significantly different from its conventional equivalent in composition and nutrient content, it does not deserve special disclosure

However, public perception often diverges significantly from this scientific consensus. Surveys consistently show a knowledge gap, with a large percentage of the public expressing concern

about GM food safety or believing they are less healthy.<sup>1</sup> This anxiety is fueled by several factors, including the novelty of the technology, a loss of trust in official risk assessments and authoritative scientific advice, and a general wariness toward new food technologies following past food-related problems.<sup>2</sup> Opponents raise concerns about potential risks such as the production of new allergens or toxins, gene drift to wild relatives, and the long-term environmental impact on biodiversity and ecosystems. This persistent social and political controversy over safety, despite scientific assurances, is the primary driver for the demand for mandatory labeling.

## 2.2. The ‘Right to Know’ and Consumer Autonomy

The demand for mandatory labeling is fundamentally rooted in the ethical and moral argument of the consumers right to know (RTK). This right is seen as essential for upholding the principle of consumer autonomy and the ability to make informed consent regarding what one consumes.

## 2.3. Ethical Foundations

Scholarly work frames the ‘right to know’ as a mechanism to empower consumers to exercise their freedom to choose (and avoid) foods based on their values and beliefs.<sup>10</sup> These choices extend beyond basic health and safety to encompass non-product-related factors, such as:

- Moral and ethical concerns about intervening with nature or ‘playing God.’<sup>3</sup>
- Religious or cultural traditions of food preparation and consumption.<sup>4</sup>
- Environmental or political concerns about the agricultural production process, including the potential monopolization of the food supply by seed companies.

The debate posits that a label that merely conveys an equivalent end-product is insufficient because it neglects the consumers profound interest in the process by which their food was

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<sup>1</sup> *Just a moment...* [Online]. Available at:

<https://www.tandfonline.com/doi/full/10.1080/21645698.2024.2318027> (Accessed: 7 October 2025).

<sup>2</sup> *ResearchGate* [Online]. Temporarily Unavailable. Available at:

[https://www.researchgate.net/publication/227972097\\_Labelling\\_Genetically\\_Modified\\_Food\\_The\\_Right\\_to\\_Know](https://www.researchgate.net/publication/227972097_Labelling_Genetically_Modified_Food_The_Right_to_Know) (Accessed: 7 October 2025).

<sup>3</sup> [https://www.researchgate.net/publication/227052085\\_Ethics\\_and\\_Genetically\\_Modified\\_Foods](https://www.researchgate.net/publication/227052085_Ethics_and_Genetically_Modified_Foods)

<sup>4</sup> *ResearchGate* [Online]. Temporarily Unavailable. Available at:

[https://www.researchgate.net/publication/279282275\\_Labeling\\_of\\_genetically\\_modified\\_food\\_and\\_consumers\\_rights](https://www.researchgate.net/publication/279282275_Labeling_of_genetically_modified_food_and_consumers_rights) (Accessed: 7 October 2025).

created. Proponents of mandatory disclosure argue that labeling provides the necessary transparency to honor all these concerns.<sup>5</sup>

#### **2.4. The Autonomy Debate: Information versus Signal**

The concept of autonomy, however, introduces a crucial counter-argument in the labeling debate. Opponents of mandatory labeling, and some ethical scholars, contend that an informational label may inadvertently function as a warning or a negative signal, rather than a neutral disclosure of fact. The concern is that if the label is misinterpreted by the consumer as an implicit government warning of heightened risk (despite no scientifically proven difference), it could influence or ‘signal’ individual preferences and behavior *against* GM foods, thereby restricting consumer autonomy instead of enabling it.

Studies have explored this very phenomenon, suggesting that mandatory ‘presence-claimed’ labels (e.g., ‘Contains GMO’) can make consumers more sensitive to the GMO attribute, less sensitive to price, and more reluctant to purchase within the category, indicating a strong negative signaling impact. Conversely, one perspective holds that for the majority of consumers who use a GM label, the disclosure serves purely as an information cue that allows them to reveal their preferences, thus validating the core autonomy argument.

#### **2.5. Mandatory Labelling: Market Dynamics and Economic Implications**

The implementation of mandatory labelling shifts the debate from ethical philosophy to practical market economics and consumer behaviour.

##### **2.5.1. Market Separation and Policy Effects**

Mandatory labelling is intended to resolve the problem of asymmetric information in the market, allowing for the clear separation of GM and non-GM food streams.<sup>20</sup> Without a mandate, producers of non-GM products must voluntarily label to signal their difference, which is costly. With a mandatory ‘presence-focused’ labeling policy, firms producing GM ingredients are required to disclose.<sup>6</sup>

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<sup>5</sup> *ResearchGate* [Online]. Temporarily Unavailable. Available at: [https://www.researchgate.net/publication/227240104\\_Consumer\\_Autonomy\\_and\\_Availability\\_of\\_Genetically\\_Modified\\_Food](https://www.researchgate.net/publication/227240104_Consumer_Autonomy_and_Availability_of_Genetically_Modified_Food) (Accessed: 7 October 2025).

<sup>6</sup> (2015). *FS\_1501\_GELabelCost-update-FINAL.pdf* [Online]. Available at: <https://foodandwaterwatch.org/wp-content/uploads/2021/03/GMO-Labeling-Cost-FS-Jan-2015.pdf> (Accessed: 7 October 2025).

Economic analysis of implemented mandatory labeling regulations worldwide reveals a tendency toward a ‘corner solution’, where the market sees either only non-GM labeled or all GM-labeled products, often resulting in a *de facto* loss of consumer choice for GM products. This shift is driven by a pronounced consumer aversion to GM labels and a corresponding increased preference for non-GM alternatives, especially those with pre-existing voluntary non-GMO labels.

### **2.5.2. Cost, Price, and Competition**

A major point of contention centers on the cost of mandatory labeling. Opponents argue that it imposes substantial costs on the food industry, including adjustment, implementation, and monitoring costs associated with segregating supply chains to avoid cross-contamination and verify content. These costs, they contend, are ultimately passed on to consumers through higher retail prices. Estimates of this price increase vary widely, but for some regions, the production costs have been documented to rise.

However, alternative studies suggest that the cost of labeling for consumers may be minimal, especially for pre-packaged foods where label changes are a routine part of business, countering the industry's more dire cost projections.

Importantly, the market response to labeling provides a key insight:

- Mandatory labeling creates a market incentive for firms to add premium-priced, non-GM products to their portfolio.
- Because mandatory disclosure makes consumers less sensitive to price (as their focus shifts to the GMO attribute), firms gain an opportunity to charge a premium for non-GM products.

In essence, while mandatory labeling can reduce market share for GM manufacturers, it can also facilitate a more differentiated, albeit potentially more expensive, non-GM market segment.

## **2.6. The Role of Information and Trust**

Regardless of the labeling regime, the literature highlights that consumer knowledge and trust are critical determinants of attitudes and purchasing decisions regarding GM foods.

## Knowledge, Subjectivity, and Trust

Scholars distinguish between objective knowledge (the factual information a person possesses about GM food) and subjective knowledge (the individuals self-perception of their knowledge, shaped by personal values). Both types of knowledge, along with individual values, influence attitudes toward GM foods. Consumers with strong negative views, driven by subjective knowledge and personal values, are often resistant to new information.

However, the acquisition of knowledge is reliant on the presence of trust in the information source. The widespread public disenchantment with official risk assessments and a net loss of trust in ‘authoritative scientific advice’ is a significant backdrop to the demand for labeling. This lack of trust means that, for many consumers, the GM food debate is less about a scientific product characteristic and more about accountability and transparency from government authorities and industry.<sup>7</sup> In the case *Centre for Public Interest Litigation vs. Union of India and Others* (2013) The Supreme Court affirmed that any food item hazardous or injurious to health and it imposes any potential danger to the Fundamental right that is Article 21. Then it is the paramount duty of the state to ensure and promote public health. *In MC.Mehta vs. Kamal Nath* the court reaffirmed the public trust doctrine where the state is deemed to have a fiduciary relationship and it is the duty of the state to be diligent about the health of the citizen and act in accordance with that.

### 2.7. The Unintended Consequences of Legislative Activity

A surprising finding in the literature is that the legislative process itself surrounding mandatory labeling can have a profound impact on consumer behavior, separate from the actual implementation of the law. Studies have shown that the public debate and legislative activity associated with a mandatory labeling proposal can significantly raise consumer awareness about the GMO topic. This heightened awareness, in turn, can lead to an increase in demand for products already bearing voluntary non-GMO labels, before any mandatory law is even enforced. This suggests that the public discourse around the ‘right to know’ argument serves as a potent, indirect mechanism for informing consumers and driving market change.

### 2.8. Conclusion

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<sup>7</sup> *Just a moment...* [Online]. Available at: [https://www.iatp.org/files/Genetically\\_Modified\\_Organisms\\_Consumers\\_Food\\_.htm](https://www.iatp.org/files/Genetically_Modified_Organisms_Consumers_Food_.htm) (Accessed: 7 October 2025).

The debate over GM food mandatory labeling is a nexus of conflicting values. On one side, a broad scientific consensus affirms the product-based safety of GM foods, arguing against mandatory labels that might be misinterpreted as a warning. On the other side, the moral imperative of the consumers right to know demands disclosure to uphold autonomy, allowing for choices based on process-related, ethical, and environmental concerns.

The scholarly literature consistently demonstrates that mandatory disclosure regimes, while satisfying the demand for transparency, can exert a significant negative signaling effect that shifts market dynamics away from GM products and creates an environment for premium-priced non-GM goods. Crucially, the public's perception of risk and their demand for information are often less a reflection of scientific fact and more a function of subjective values and a widespread erosion of trust in institutional authorities. The evidence suggests that for an informed choice to be truly autonomous, policymakers must not only provide information but also navigate the complex psychological and economic externalities that disclosure introduces into the marketplace.

### **3. Theoretical Framework of laws prevalent to Genetically modified products: International and India**

#### **3.1. India's Dual-Control Framework for GMOs and GM Foods**

The governance of GMOs in India rests on two primary legislative pillars: the Environment (Protection) Act, 1986 (EPA), which handles environmental and large-scale release, and the Food Safety and Standards Act, 2006 (FSSA), which governs food safety and consumer protection. This architecture reflects India's early commitment to a precautionary principle by mandating exhaustive regulatory oversight at every stage, from research to market.

##### **3.1.1. The Environmental and Cultivation Regulatory Pillar: EPA, 1986**

This pillar is based on the Environment (Protection) Act, 1986, a parent legislation that gives the statutory power to control substances that are 'hazardous' to the environment or to human health. Based on this Act, the government issued the notification of the Rules for the Manufacture, Use, Import, Export and Storage of Hazardous Micro Organisms/Genetically Engineered Organisms or Cells, 1989 (commonly referred to as the 1989 Rules). These regulations extend from contained laboratory experimentation to the field testing and commercial release of Genetically Engineered (GE) crops. The philosophy is that any

intentional environmental release of a live modified organism, as a potential risk, should be subject to strict step-wise approval. In the case of Bt Brinjal however, the commercial release was given a green signal by the GEAC in 2009 but a later oratorium was directed by the health minister. A. The 1989 Rules and the Precautionary Classification of GMOs

The 1989 Rules formally classify all Genetically Engineered Organisms (GEOs) and products derived from them as potential hazards, immediately triggering the highest level of regulatory scrutiny.<sup>8</sup> This process-based classification focusing on *how* the organism was made rather than simply its final properties—is the foundation of India's stringent biosafety stance. The Rules assign implementation responsibilities to multiple agencies, including the Ministry of Environment, Forest and Climate Change (MoEFCC) and the Department of Biotechnology (DBT), leading to a system of multi-authority, sequential clearances. This reliance on a 1980s environmental law to govern cutting-edge biotechnology is often cited as a source of regulatory friction, as the law was not originally designed for the nuances of agricultural gene technology.

### **B. Multi-Tiered Regulatory Hierarchy: From Research to Release**

The 1989 Rules establish a six-level regulatory structure designed to manage risk progressively:

1. **Institutional Biosafety Committee (IBSC):** Operates at the laboratory or research institution level, ensuring compliance with DBT guidelines for research and small-scale experiments.
2. **Review Committee on Genetic Manipulation (RCGM):** Under the Department of Biotechnology (DBT), the RCGM oversees all ongoing Recombinant DNA (rDNA) projects, monitors large-scale contained experiments, and approves small-scale, confined field trials (the initial stages of testing). It is responsible for generating and revising biosafety guidelines.
3. **Genetic Engineering Appraisal Committee (GEAC):** Under the MoEFCC, the GEAC is the apex body with the authority to grant final clearance for large-scale production, environmental release (commercial cultivation), and import/export of GMOs and products thereof. The GEAC's approval, which follows a rigorous process of multi-location BRL-I and BRL-II trials, is a mandatory step for any GE crop to reach

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<sup>8</sup> (2015). [Online]. Available at: [http://www.geacindia.gov.in/resource-documents/13\\_2-Regulatory\\_Framework\\_for\\_GE\\_Plants\\_in\\_India.pdf](http://www.geacindia.gov.in/resource-documents/13_2-Regulatory_Framework_for_GE_Plants_in_India.pdf) (Accessed: 7 October 2025).

the Indian farmer. Its decisions are subject to intense public and political scrutiny, and it is empowered to revoke approvals based on new information about harmful effects.

4. **The remaining committees**—the Recombinant DNA Advisory Committee (RDAC), State Biotechnology Coordination Committee (SBCC), and District Level Committee (DLC)—play advisory, monitoring, and local surveillance roles, respectively, providing a check-and-balance system down to the local administrative level. *Sources for this section include the 1989 Rules and the administrative guidelines published by the DBT and MoEFCC.*<sup>9</sup>

### 3.1.2. The Food Safety and Consumer Protection Pillar: FSSA, 2006

The second key pillar is the Food Safety and Standards Act, 2006 (FSSA), which created the Food Safety and Standards Authority of India (FSSAI). The FSSA's mandate is to ensure the availability of safe and wholesome food for human consumption. This Act provides the legal basis for regulating GM foods and is entirely separate.

rate from the GEACs jurisdiction over environmental release, creating a crucial dual-clearance mechanism for GM crops intended for food use (such as the unapproved GM mustard).<sup>10</sup>

#### A. FSSAI's Prior Approval Mandate for GM Food and Ingredients

The FSSA explicitly mandates that no person shall manufacture, store, distribute, sell, or import any food or food ingredient derived from Genetically Modified Organisms (GMOs) without the prior approval of the FSSAI. This makes any GM food item illegal in India without express, independent clearance from the food regulator, irrespective of whether the GEAC has approved its cultivation. The FSSAI's safety assessment is focused on the food and health risks, including allergenicity, toxicity, and nutritional changes. This provision ensures that even if a GM crop is approved globally or environmentally released in India, its entry into the food supply chain is subject to a distinct, health-focused review. *Sources for this section include the text of the Food Safety and Standards Act, 2006, particularly Section 22 on GM foods.*<sup>11</sup> In *Gene*

<sup>9</sup> (2015). [Online]. Available at: [http://www.geacindia.gov.in/resource-documents/13\\_2-Regulatory\\_Framework\\_for\\_GE\\_Plants\\_in\\_India.pdf](http://www.geacindia.gov.in/resource-documents/13_2-Regulatory_Framework_for_GE_Plants_in_India.pdf) (Accessed: 7 October 2025).

<sup>10</sup> *About | HeinOnline* [Online]. Available at: <https://fssai.gov.in/cms/food-safety-and-standards-act-2006.php> (Accessed: 7 October 2025).

<sup>11</sup> *About | HeinOnline* [Online]. Available at: <https://fssai.gov.in/cms/food-safety-and-standards-act-2006.php> (Accessed: 7 October 2025).

*Campaign & Another vs. Union of India & Others (Supreme Court of India)* the court asked the regulatory body to maintain a status quo on the release of these products.

### **B. Mandatory $\geq 1\%$ Labeling Standard and Scope of Application**

In a significant consumer rights measure, the Food Safety and Standards (Genetically Modified Foods) Regulations, 2022 (draft or final) specify stringent labeling requirements. These regulations mandate that all pre-packaged food products must be labeled with the words ‘Contains genetically modified organisms’ if the product contains one percent ( $\geq 1\%$ ) or more of any GM ingredient, considered individually. This 1% threshold is highly stringent and reflects a strong policy choice in favor of consumer right-to-know, aligning India more closely with the EUs cautious approach than the US model. The labeling requirement is applicable even to the adventitious or technically unavoidable presence of GM ingredients that cross the threshold. Crucially, however, the labeling rule does not apply to products where the modified DNA is no longer detectable in the final food product (e.g., highly refined oils, sugars, or purified food additives derived from GM crops), a compromise that acknowledges the principle of substantial equivalence in the final product. *Confédération paysanne a.o. v. Ministre de l’Agriculture, de l’Agroalimentaire et de la Forêt*<sup>12</sup> Challenged the regulatory status of organisms acquired through novel mutagenesis approaches (such as gene editing/CRISPR) under the EUs current GMO Directive.

### **Comparative Global Regulatory Models**

Understanding Indias position requires comparing it to the two dominant global models: the precautionary, process-based approach of the European Union and the product-based, risk-proportionate approach of the United States.

#### **3.1.3 The Process-Based Approach: The European Union (EU)**

The European Unions framework is globally recognized as the most stringent. It is entirely driven by the Precautionary Principle, which holds that if a product poses a threat to human health or the environment, protective measures may be taken even if scientific evidence is inconclusive.

#### **A. Reliance on the Precautionary Principle and Rigorous Centralized Review**

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<sup>12</sup> (European Court of Justice, C-528/16)

In the EU, a product is regulated simply because it was produced using genetic modification, regardless of its final characteristics. This process-based regulation requires that every single genetically modified food, feed, or organism must undergo a rigorous, centralized, **pre-market** authorization process managed by the European Food Safety Authority (EFSA). EFSA conducts the scientific risk assessment, which is then subject to political review and approval by the European Commission and Member States, making the decision process lengthy and complex. This institutional design prioritizes comprehensive safety over speed of market access.

### **B. 0.9% Threshold and Comprehensive ‘Farm-to-Fork’ Traceability**

The EU mandates labeling for all products derived from GMOs, including highly refined products where the modified DNA is undetectable, if the derived ingredient is not substantially equivalent or if the parent crop was a GMO. The mandatory labeling threshold is set exceptionally low at **0.9%** for the adventitious or technically unavoidable presence of approved GM material. To enforce this low threshold, the EU implements a comprehensive ‘farm-to-fork’ traceability and identity preservation system. This legal requirement mandates documentation and transmission of information on GM status at every stage of the supply chain, ensuring that enforcement is possible and allowing for product recalls and monitoring.

#### **3.1.4. The Product-Based Approach: The United States (US)**

The US regulatory system is fundamentally different, focusing on the characteristics of the final product rather than the process used to create it. This is a product-based approach.

##### **A. Substantial Equivalence as the Regulatory Benchmark**

The cornerstone of US regulation is the principle of Substantial Equivalence. If a GM food is found to be chemically, nutritionally, and toxicologically equivalent to its conventional counterpart, it is generally treated the same way as any conventional food, meaning it is not subject to special pre-market safety reviews by the FDA. The developers primarily consult with the FDA to ensure the product is safe, and the burden of demonstrating safety remains with the developer. The regulatory action is only triggered if a modification results in a ‘material change’ that renders the new food *not* substantially equivalent, such as increased allergenicity or a significant change in nutrient profile.

##### **B. Multi-Agency Oversight and the Bioengineered (BE) Disclosure Standard**

GMO regulation is shared among three agencies: the Food and Drug Administration (FDA) for food safety, the United States Department of Agriculture (USDA) for plant pest risk and agronomic impact, and the Environmental Protection Agency (EPA) for the use of GM crops as Pesticide Producing Plants (PPs), such as Bt corn. Historically, labeling was voluntary. However, the National Bioengineered Food Disclosure Standard (NBFDS), effective from 2022, now mandates the disclosure of 'Bioengineered (BE)' food. This is a positive disclosure requirement, but it exempts highly refined ingredients where the modified genetic material (DNA or protein) is no longer detectable in the final product.

### **3.1.5. International Harmonization Principles: Codex Alimentarius**

The **Codex Alimentarius Commission (CAC)**, established by the FAO and WHO, plays a crucial role in international trade by setting voluntary standards and guidelines used as references under the World Trade Organization (WTO) Sanitary and Phytosanitary (SPS) Agreement.

#### **A. Science-Based Risk Assessment and Food Safety Guidelines**

Codex guidelines promote a step-by-step, science-based risk analysis for food products from modern biotechnology, including risk assessment, risk management, and risk communication. The regulations suggest an internationally agreed-upon procedure for food safety assessment with a concern for compositional analysis, nutritional effect, and possible toxicity/allergenicity. Such a strategy is designed to harmonize global trade and provide global food safety.

#### **B. Labeling Recommendation: Focus on Significant Alterations**

In contrast to the EU and India's strict labeling regulations, Codex is not advocating mandatory labeling of GM foods based on derivation from biotechnology alone. Labeling is justified only when the GM food product is substantially different in composition, nutritional quality, or if a known allergen is introduced. This is at the heart of the WTO perspective that generic, non-scientific labelling requirements can be technical barriers to trade. .

### **Policy Gaps and Strategic Adoption for Indian Reform**

India's present system, as much as it represents a culture of extreme caution, is weighed down by structural flaws and is in trouble keeping up with new technologies such as gene editing. Taking on selective elements from global regulatory regimes can bring modernity to its method.

### **3.1.6. Critical Gaps in Indias Current Regulatory Structure**

The fragmentation of the Indian system and legal age result in strong barriers to speedy, transparent, and efficient approvals that frequently result in stalemates, as in the case of food GM crops such as mustard.

#### **A. Institutional and Jurisdictional Fragmentation**

Authority division between the GEAC (under MoEFCC) for release into the environment and the FSSAI (under Ministry of Health) for food safety results in a disjointed clearance process. This overlapping jurisdiction frequently creates delays, conflicting data requirements, and confusion in the public sphere over accountability. In addition, depending on the 1989 Rules—a non-statutory administrative notification under an environmental act—can mean the regulatory system suffers from a lack of strength and transparency associated with a primary, stand-alone statute. The systems operational sophistication quite often generates suspicion among the public rather than trust.

#### **B. Lack of Explicit Statutory Liability and Modern Protocols**

The current framework is notably weak on explicit provisions for **statutory liability** in the event of unforeseen environmental or health damage caused by a released GMO. This contrasts with the concept of strict liability often applied in environmental law. Moreover, the risk assessment protocols are often criticized for not being sufficiently transparent and for lacking clear, standardized guidelines for **post-release monitoring** of effects like gene flow, biodiversity impact, or pest resistance evolution in the Indian context of small, diverse farms. The absence of modern, specific guidelines for novel breeding techniques like **Genome Editing (GE)** further compounds the gap.

## **4. Empirical Analysis of right to information and Mandatory Labelling**

### **4.1. Introduction:**

In this Chapter, the author has represented the first-hand information collected from the respondents with the help of a Google form Questionnaire. The questionnaire involved 17 analytical questions, apart from the preliminary questions. On the basis of the result, the researcher is able to understand the awareness among the Indian citizens and also able to understand the further policy changes that would be required to be enacted to solve this

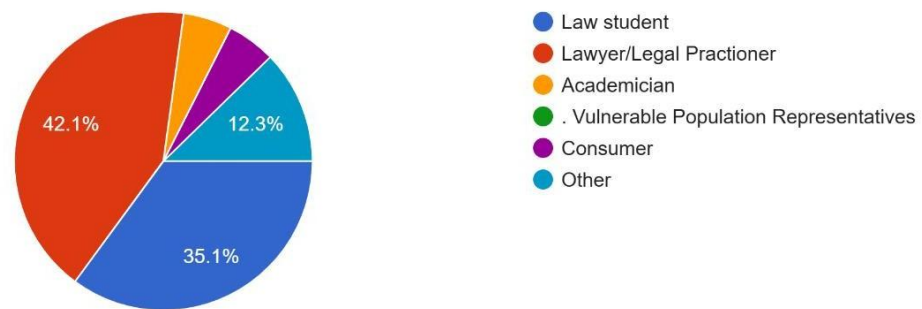
problem, we will also be able to understand how the consumers react after they get information about the product that they are consuming.

#### 4.2 Classification of Respondents:

The respondents in this study have been divided into Law students, Lawyer, academicians and Vulnerable population representation and consumers as they would be the prime stakeholders for the same. I have chosen them because people with a legal background will have a better knowledge of the existing regulations and understand the right to information much better. However, we tried to incorporate the consumer perspective with regard to the same.

What is your occupation/Background?

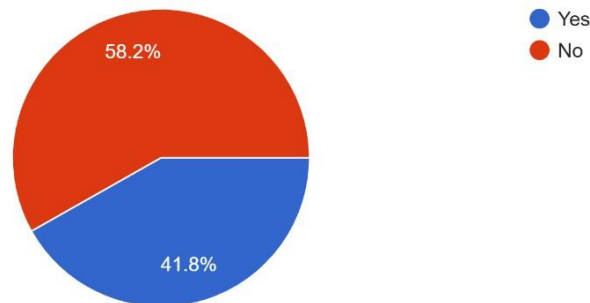
57 responses



*Figure 1: The stakeholders of the study*

Primary Shopper: Are you the person primarily responsible for purchasing groceries and food for your household?

55 responses

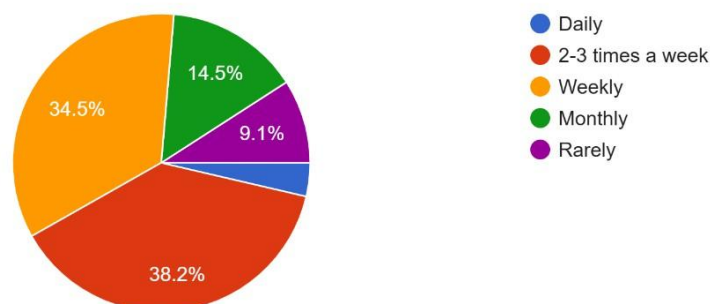


**Figure 2: Are the respondents the primary shoppers**

This figure is trying to analyse that the awareness of the people who are primarily shopping in their household, it is primarily trying to analyse if the people who are shopping food and aware of the labels and existence of such products in the market and even if they are aware of the existence are they willing to buy the same or they are refraining from buying the same.

Shopping Frequency: How often do you purchase pre-packaged food items (e.g., snacks, biscuits, instant mixes)?

55 responses



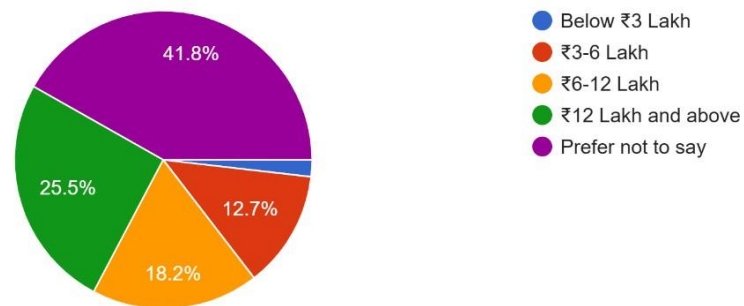
**Figure 3: Addresses the frequency of shopping**

The figure tries to analyse the frequency which consumer tends to buy packaged products that have a high possibility of the product being genetically modified. With this data, we will also

be able to deduce the amount of risk each and every household is exposing themselves to frequently and we will also be able to analyse if the consumers who buy these product will continue to buy these products once they are aware of the ingredients of the same.

Annual Household Income (in ₹): Which range best represents your total household income before taxes in the past year?

55 responses

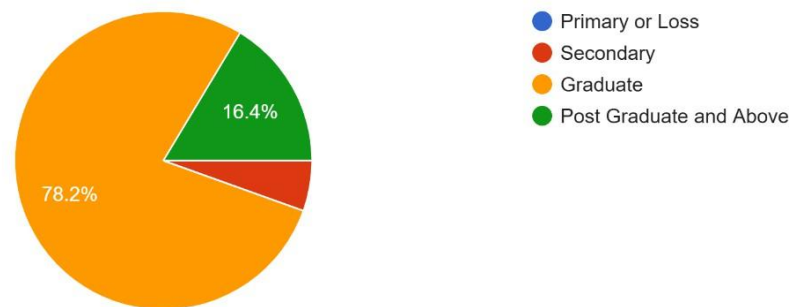


**Figure 4: Income of the household**

The household income question is used to deduce the socio-economic impact of Indias GMO regulations. Lower-income groups price sensitivity makes them more likely to consume cheaper, potentially GM- driven foods, testing the equity of the FSSAIs consumer safety mandate. This data helps us determine which economic strata are most affected by the regulatory fragmentation and informs the feasibility of adopting stricter measures like EU-style Traceability.

Education Level: What is the highest level of education you have completed?

55 responses

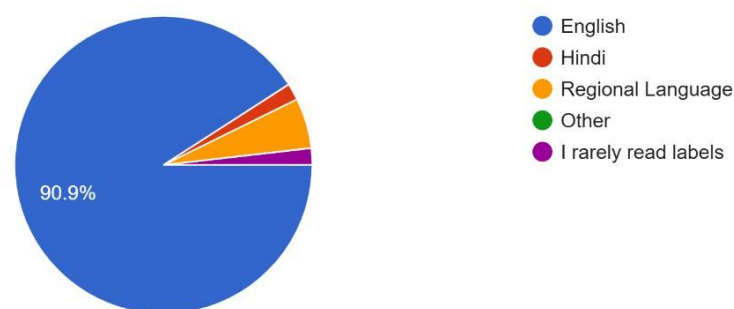


**Figure 5: Education level of the respondents**

The question regarding Education level primarily allows us to deduce consumer awareness, risk perception, and policy engagement regarding the highly technical issue of GMOs and their regulation in India. Higher education levels typically correlate with a better understanding of the scientific concepts involved. Analysis of this data helps assess the effectiveness of India's risk communication strategies, lower education level acts as a barrier to utilising regulatory information, highlighting a crucial policy implementation gap.

Primary Label Language: In which language do you primarily read food labels?

55 responses



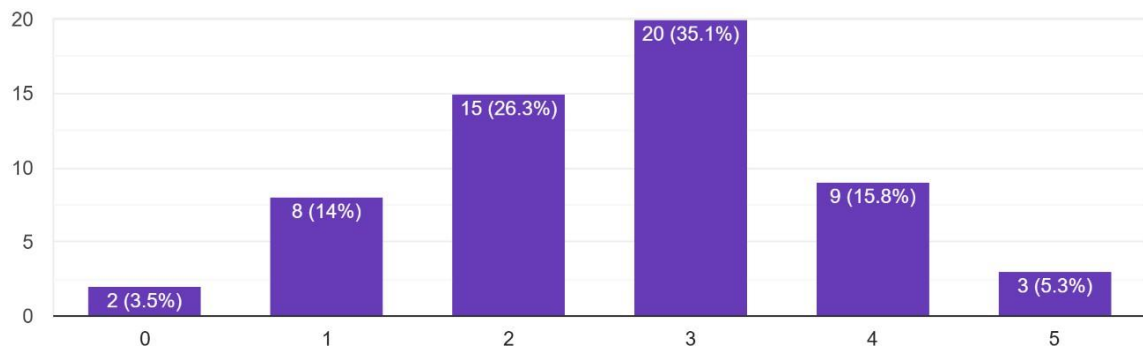
**Figure 6: Primary language used in the labels**

The primary label language question assesses the real world efficacy and equity of the FSSAI's GMO labelling policy. If official labels are not in the consumers' primary language, the

mandatory 1% disclosure becomes functionally ineffective. This reveals a critical policy implementation gap and perpetuates information asymmetry across linguistic groups. The data supports the need for mandatory multilingual labelling to make regulatory compliance and consumer rights universally accessible. Especially in a country like India where 70% of the population lives in the villages and are not very familiar with the English language they are forced to risk themselves as there is no provision for vernacular language labelling.

How would you rate your personal knowledge regarding Genetically Modified (GM) foods and crops in India?

57 responses

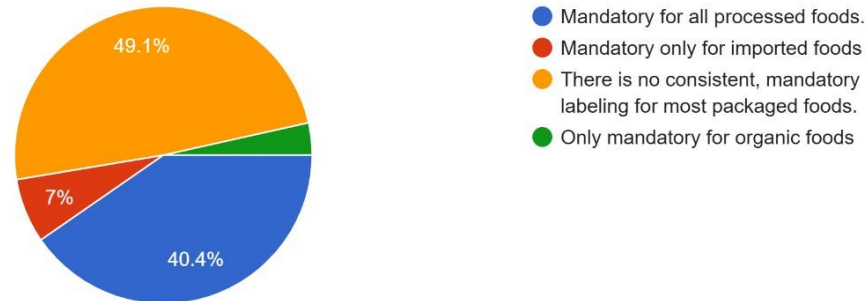


**Figure 7: Awareness of people with regards the GM Foods and crops**

This question will help us analyse the raw nature of how aware people are with regards to the subject matter of research, with the sample size of 55, it is very clear from the graph chart that the majority of the people are neutral, which means that they lack in- dept knowledge about the same (36.4%) however there is some population who are absolutely clueless about the topic and are the population who have exposed themselves highly to the danger because lack of awareness increases the amount of risk. The Graph makes it clear that the population who are unaware of the same are of a huge percentage when compared to the people who are aware about the same.

Which of the following is true about mandatory GMO(Genetically Modified Organism) labeling on packaged foods currently sold in Indian markets?

57 responses

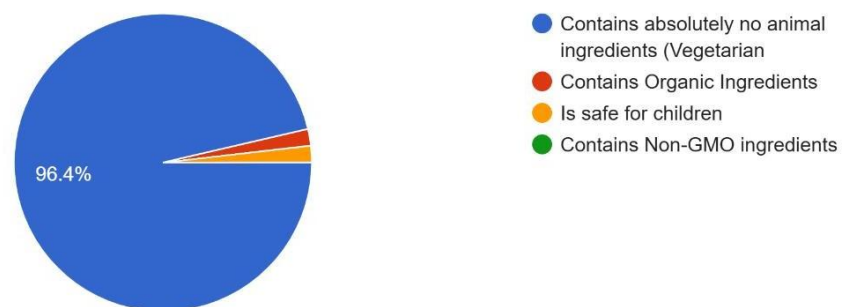


**Figure 8: Mandatory Labelling on packaged foods in Market**

The Knowledge self-assessment question primarily allows us to deduce the perceived effectiveness of risk communication and the public's current understanding of India's complex GMO regulatory framework. A low rating highlights a critical failure by bodies like The GEAC and FSSAI to translate technical, fragmented policies into clear needs greater transparency to build informed public trust and bridge the information asymmetry. The blue and the yellow portions of the pie chart are such that one should be worried about because the blue portion is almost equal to the yellow part this indicates how the people are unaware about the labelling policy.

What does this specific symbol legally mean about the product?

55 responses



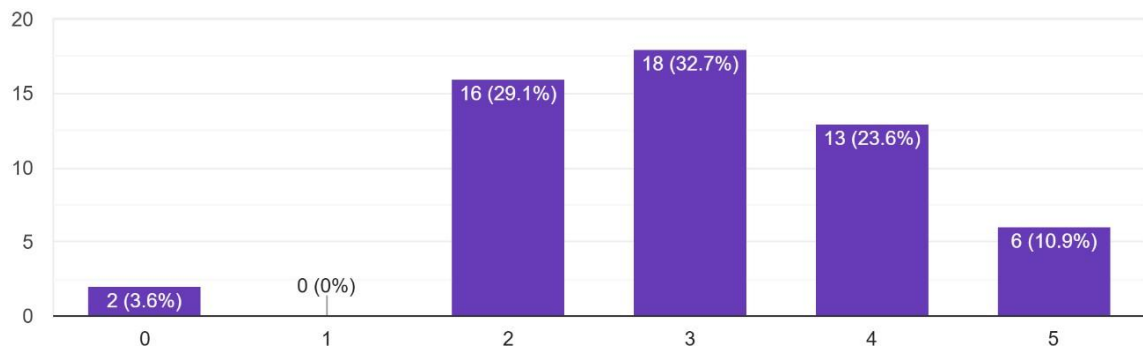
**Figure 9: Awareness on FSSAI symbol indication**

The Green Dot question assesses labelling literacy under FSSAI by checking if consumers understand the Vegetarian symbol. This gauge of basic compliance is crucial because the

simple, well understood green dot contrasts with the complex textual GM labelling requirement. Correct identification suggests FSSAI's capacity for enforcement exists, supporting the feasibility of implementing EU style traceability to back up the technical GM disclosure.

I find the various required food labels in India (FSSAI symbols, ingredient lists, etc.) clear and easy to understand.

55 responses

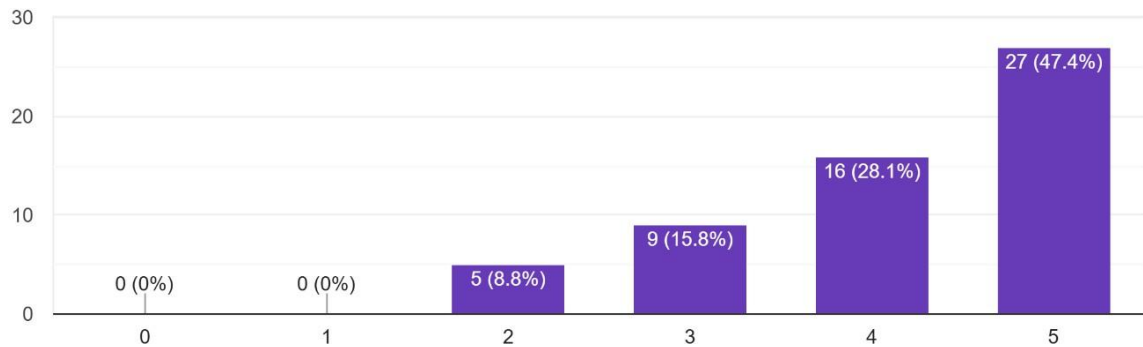


**Figure 10: Ease of understanding of the FSSAI labelling system**

This question helps us understand that the consumers in the Indian market and their perspective on the labelling system, this survey helps us to analyse that most of consumers are not very confident in interpreting and analysing the labels given on the products thus making them unaware of the ingredients and other very essential information with regards to the product. This indicates that there is significant failure in FSSAI's communication strategy, this is a functional gap and the current regulatory framework needs to be changed or amended so that the labels and policies are readily understood.

Demand for Mandatory GMO Labeling: The Indian government should make it mandatory for all packaged foods containing GM ingredients to carry a clear label

57 responses

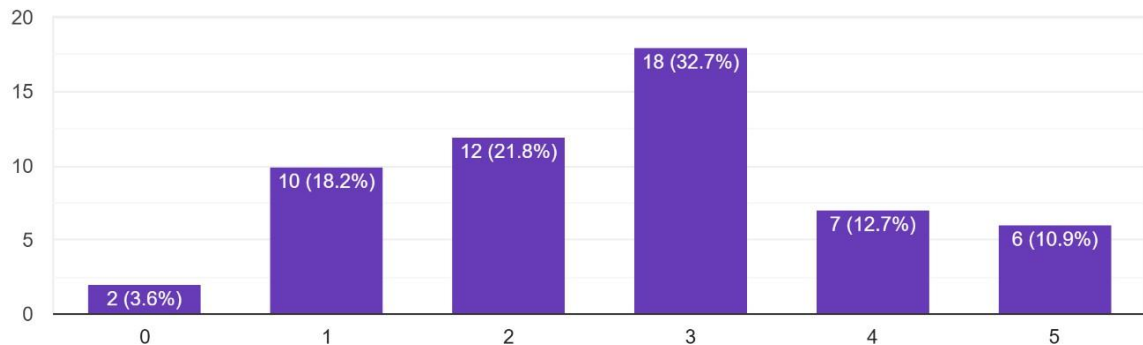


**Figure 11: Demand for Mandatory labelling**

The mandate for clear labelling on all packaged foods containing GM Ingredient in India is justified as it is necessary to uphold the consumers fundamental right to information and autonomy. The policy directly addresses the critical issue of more than or equal of standard being ‘unenforceable and ambiguous’ The maximum number of population that is 48% agrees and demands for a mandatory labelling of these products. Moreover the mandatory labelling policy makes these companies more accountable and more transparent, and gives the citizen a fair opportunity to make an informed decision. This also solves the problem of unmonitored mixing of GM products and non-GM products.

The existing food labeling system gives me the necessary information to make a truly informed choice that aligns with my values.

55 responses

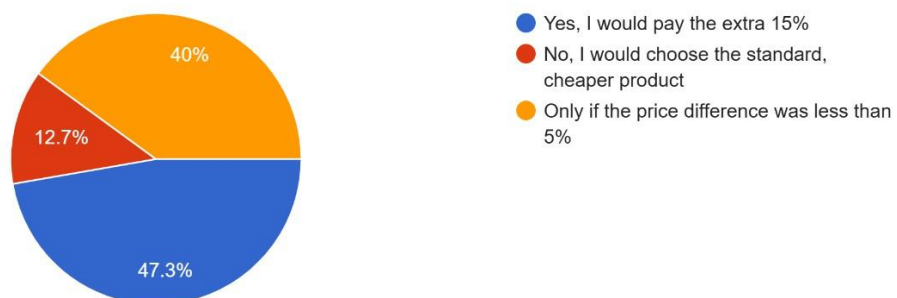


**Figure 12: Satisfaction level with the current labelling system**

This question aims to understand the satisfaction level of the consumers as well as informed citizen with respect to the current system of the labelling. This is primarily to understand that if the current labelling system and the system of dissemination of information regarding the products are sufficient or are consumers are expecting a scope of improvement. Contextually, this failure stems from the unenforced and ambiguous nature of India current labelling regulations, which results in the absence of GM disclosure. The response is usually neutral in nature, however the large portion of ratings between (0-2) explains that current regulations are definitely not sufficient for the same.

If an essential food item (like cooking oil) was guaranteed non-GMO but cost 15% more than the standard product, would you buy the non-GMO option?

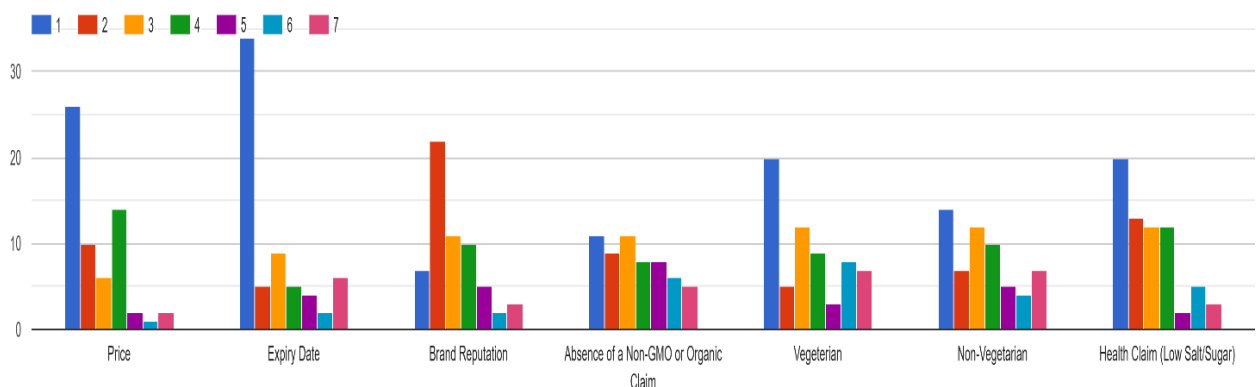
55 responses



**Figure 13: Social experiment on what do people prioritise**

This question conducts a social experiment where, we have tried to analyse people's mindset, where their priorities have been analysed and it is to understand if people prefer good quality or they are likely to ignore the quality of the products even after being aware about the ingredients of the product and still choose to put their life at risk. However according to the survey maximum people tend to prioritise their health and they are ready to pay an extra amount of 15%, whereas 40% people have chosen a middle ground where they are ready to pay 5% extra for a healthier product, which is considered to be a healthy choice.

When shopping, which factors are the most important in your final purchase decision? (Select most important as 1 and then in Descending order)

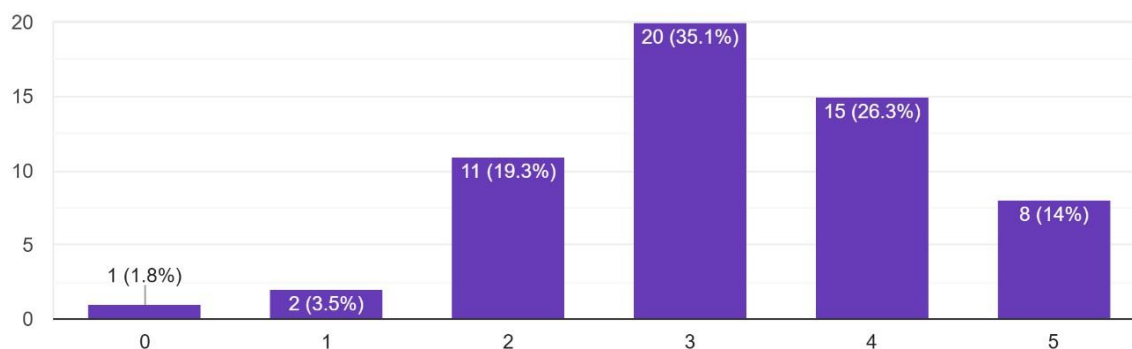


**Figure 14: Explains the priority factor that consumers look into before buying**

This graph indicates the two most important factors that are essential and that the consumer look into before buying a product the blue bar represents the first most important factor that is the price that the consumers take into account before buying a product whereas the red bar represents the second most important factor that they take into consideration that is the Brand reputation, we can see that the consumer gives their first preference to the economic factor and then the brand reputation because they trust the brand that they buy from.

I trust the Food Safety and Standards Authority of India (FSSAI) to effectively ensure the safety of GM crops and foods and enforce future labeling.

57 responses



***Figure 15: Need for a future regulatory authority to ensure food safety standards***

This question was solely posted because it directly measures the credibility and the legitimacy of India's primary food regulator. The survey sets out that public pressure to make labeling compulsory is due to a 'widespread erosion of trust in institutional authorities', and this question exists to empirically establish that trust deficit. The findings whereout the most dominant group is neutral (36.4%) and the majority shows explicit distrust (25.4% rated 0-2) outshout the actual reason why consumers are calling for compulsory labeling: they want to make the ultimate choice themselves because they do not trust that FSSAI will protect their interests and implement future regulations. Therefore, the answer to this question is central to justifying the necessity of a new, open regulatory model that responds to the current collapse of public trust.

## **5) Conclusion**

### **5.1. Findings:**

**On the basis of doctrinal and empirical research undertaken, following are the findings of this study:**

1. **Critical Information Asymmetry:** With most of the population not having sufficient information about GM products (a collective score of ‘neutral’ as in 36.4 and a substantial chunk still ‘absolute clueless’), there is a serious failure in risk communication behaviour by agencies like the GEAC and FSSAI etc.
2. **Deficiency in Regulatory Information:** The low rating of subjective knowledge shows that the reality is, an insufficient transformation from the technically complex content by fragmented regulation system with double-control on aspect has not been made to clear and simple public information and that hasnt serve as a bridge to fill in-between asymmetry.
3. **Disconnect on labeling literacy :** It shows that consumers have a basic level of labelling literacy, so they get extreme-simple mandates like the FSSAIs Green Dot (Vegetarian symbol) right. This is in strong contrast to the observed ignorance on the scientific/technical topics, indicating that complex textual ` 1% GM labelling will be functionally ignored.
4. **Socio-Economic vulnerability:** Lack of knowledge and awareness leaves a vast sector of consumer population (probably low income and less educated section) to be at higher risk on the grounds that they may be coerced due to budgetary restrictions to opt for cheaper food products from GM sources without understanding its consequences or applying the labeling stipulations.
5. **Policy Response Needed:** The results highlight the urgent need for the government to enact EU-style traceability and mandatory multilingual disclosure so that FSSAIs labelling rules can be enforced, accessible and equitable across all demographic and linguistic sections of population.
6. **Major Knowledge Gap Remains (Risk Communication Failure):** Most responded that they were not knowledgeable at all or only somewhat knowledgeable about GM foods, with 36.4% responding ‘neutral’ (rating 3) and an additional 18.1% rating their

knowledge as a 0 or a 1. This is an enormous information asymmetry, a fatal flaw in risk communication by regulators such as the GEAC and FSSAI.

7. **Strong demand for government involvement in labelling:** An overwhelming majority opposes the prospect of voluntary labels, with 47.3% strongly and an additional 27.3% somewhat agreeing that the government should mandate clear GMO labelling on all packaged foods.
8. **Labeling Literacy Exists but is Simple:** Consumers demonstrate a high ability to recognize simple regulatory mandates, as **96.4%** correctly identified the **FSSAI's Green Dot** as meaning 'Contains absolutely no animal ingredients (Vegetarian)'. This high compliance with a simple symbol contrasts sharply with the low knowledge of the complex GM issue, confirming that the simple textual GM label will likely be functionally ineffective without further policy clarity.
9. **Linguistic and Socio-Economic Bias in Data:** The vast majority of respondents (**90.9%**) primarily read food labels in **English**. This points to a significant linguistic bias in the respondent base, suggesting the **FSSAI's** labeling mandates will fail to be equitable for the large population of regional language speakers, thereby exacerbating the **information asymmetry** across India.

## 5.2. Recommendations

### Policy Recommendations

The recommendations aim to fill the regulatory, informational, and equity gaps detected in the analysis:

- **Enact Mandatory Multilingual Labeling with Symbolic Clarity:**

The FSSAI needs to issue the proposed GM food warning (for ingredients  $\geq 1\%$ ) stated, not just in English, but also in the prevailing regional language of the selling state. This is a point-blank reply to the equity gap presented by the fact that 90.9% of the respondents read English labels primarily, while most of India operates in regional languages.

Introduce a clear, universally recognizable symbol (such as the Green Dot) of GM presence to facilitate the transmission of the complex scientific discovery and overcome the low public awareness barrier.

- **Implement a Unified National Biosafety/Food Act:** The current fragmentation between the GEAC (environmental release) and the FSSAI (food safety) creates regulatory ambiguity. There must be a Dedicated National Biosafety and Food Act to consolidate authority under one roof, streamline approval processes, and clearly establish the ‘right to information’ on GM foods, as sanctioned by the global acceptance of the current lack of uniform labeling.
- Such legislation must include provisions to give public access to safety dossiers in a comprehensible format to offset the information asymmetry.
- **Implements EU-Style Traceability:** With the widespread availability of high percentages of imported packaged foods with GM ingredients, the FSSAI must move beyond labeling the final product and put in place an EU-style ‘process-based’ traceability system. This would follow GM ingredients from the time of import or manufacture, and be able to correctly verify the  $\geq 1\%$  level, with enforcement being tight, as the FSSAI has proven capability of enforcing basic rules of labeling.
- **Launch a Targeted Public Awareness Campaign:** Directly tackle the huge knowledge deficit (with 36.4% of respondents being neutral/clueless in their knowledge) with a national-level campaign. The campaign has to be led by the FSSAI and scientific bodies, done in regional languages and plain visual formats to make: (a) what is GM technology, (b) why the new GM food label, and (c) what is the distinction between GM crops (GEACs domain) and GM foods (FSSAI domain).

### **5.3 Future Scope of Research:**

The following topics need to be the target of future research to advance knowledge and guide evidence-based policy:

- **Wider Demographic and Geographic Sampling:**

Future research needs to aim at a sample with much higher representation from poor households (responding to the 41.8% of the present sample who chose not to report income) and Tier 2 and Tier 3 city residents who read mostly regional languages. This

is required in order to be able to fully evaluate the equity and socio-economic effect of labelling.

#### •Objective vs. Subjective Knowledge Testing

Avoid self-assessment ('How would you rate your knowledge.')

 and add a quiz-like section to test objective factual knowledge on GM crops, food law, and the GEAC/FSSAI's functions. Comparison between objective and subjective knowledge will reveal if low self-rating is genuine knowledge deficiency or merely undue caution.

#### • Economic Cost-Benefit Analysis:

Conduct an economic analysis to quantify the possible increase in home food costs of implementing traceability and multilingual labeling requirements against the benefits to society from choice by consumers based on information, especially for basic foods like cooking oil. This is necessary to set the optimum threshold and range of any eventual regulation.

#### 5.3 Concluding Remarks:

Empirical evaluation clearly demonstrates that India's current dual-control system, the GEAC and the FSSAI, is struggling to reconcile the interests of the biotechnology sector with the consumers' right to information at its most basic level. The system suffers from a high level of information asymmetry, as reflected in the majority of the population having neutral or uninformed perception of GM foods, and suggesting risk communication failure.

While consumers are seen to possess a high degree of labeling literacy for simple FSSAI mandates such as the Green Dot (accurately identified by 96.4%), such literacy fails to be transferred to the complex technical data available in the text-based GM warning. Moreover, the highly skewed survey sample towards English-reading respondents (90.9%) signifies a critical equity deficit, i.e., the proposed compulsory labeling will turn out to be functionally ineffective for the bulk of citizens who read local languages.

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# An Empirical Assessment of Consumer Autonomy and the Right to Information: Demand for Mandatory GMO Labeling in the Indian Market.

## An Empirical Assessment of Consumer Autonomy and the Right to Information: Demand for Mandatory GMO Labeling in the Indian Market:

This empirical study, conducted by **Arya Anushree** from **Symbiosis International (Deemed University), Pune** investigates the critical intersection of **food information rights, consumer autonomy, and equity** within the context of the Indian packaged food market, with a specific focus on **Genetically Modified Organism (GMO)** labeling.

India, with its diverse population and complex dietary landscape, relies on mandatory labeling systems—such as the established FSSAI symbols for Vegetarian/Non-Vegetarian status—to uphold the consumers **Right to Information**. However, the lack of a standardized, mandatory GMO labeling policy for packaged goods creates a significant transparency gap.

A Genetically Modified Organism (GMO) is any plant, animal, or microorganism whose genetic material (DNA) has been altered in a lab using genetic engineering techniques, such as introducing a gene from a different species to give it a new, desirable trait.

This research is conducted by **Arya Anushree** from **Symbiosis International (Deemed University)**. Your participation is entirely **voluntary**. **All** data will be analyzed in **aggregate form** (group totals) for academic purposes only (thesis and publication). By proceeding, you confirm you understand this and consent to participate.

\* Indicates required question

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1. Email \*

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2. Name \*

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3. I have read and understood the information above regarding the study's purpose, confidentiality, and voluntary nature, and I agree to proceed with the survey \*

*Mark only one oval.*

Yes

No

4. What is your occupation/Background? \*

*Mark only one oval.*

Law student

Lawyer/Legal Practitioner

Academician

. Vulnerable Population Representatives

Consumer

Other

5. **Primary Shopper: Are you the person primarily responsible for purchasing groceries and food for your household?** \*

*Mark only one oval.*

Yes

No

6. **Shopping Frequency: How often do you purchase pre-packaged food items (e.g., snacks, biscuits, instant mixes)?** \*

*Mark only one oval.*

Daily

2-3 times a week

Weekly

Monthly

Rarely

7. \*

**Annual Household Income (in ₹): Which range best represents your total household income before taxes in the past year?**

*Mark only one oval.*

Below ₹3 Lakh

₹3-6 Lakh

₹6-12 Lakh

₹12 Lakh and above

Prefer not to say

8. **Education Level: What is the highest level of education you have completed?** \*

*Mark only one oval.*

- Primary or Less
- Secondary
- Graduate
- Post Graduate and Above

9. **Food Assistance/PDS: Do you or anyone in your household currently rely on the Public Distribution System (PDS) or other government food/ration schemes?** \*

*Mark only one oval.*

- Yes
- No
- Prefer not to say

10. **Primary Label Language: In which language do you primarily read food labels?** \*

*Mark only one oval.*

- English
- Hindi
- Regional Language
- Other
- I rarely read labels

11. **Regional Language (Conditional): If you selected Regional Language above, please specify which one.**

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12. **How would you rate your personal knowledge regarding Genetically Modified (GM) foods and crops in India?** \*

Mark only one oval.

0 1 2 3 4 5

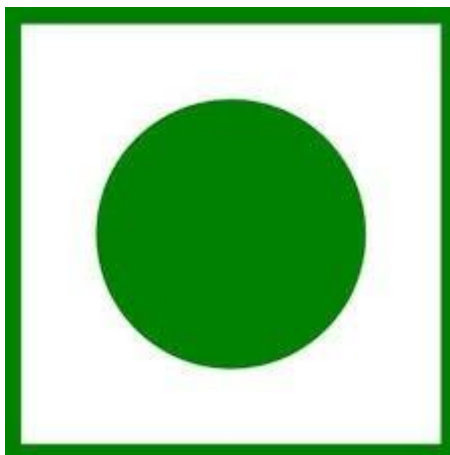
Not       Very Confident

13. **Which of the following is true about mandatory GMO (Genetically Modified Organism) labeling on packaged foods currently sold in Indian markets?** \*

Mark only one oval.

- Mandatory for all processed foods.
- Mandatory only for imported foods
- There is no consistent, mandatory labeling for most packaged foods.
- Only mandatory for organic foods

14. **What does this specific symbol legally mean about the product?** \*



Mark only one oval.

- Contains absolutely no animal ingredients (Vegetarian)
- Contains Organic Ingredients
- Is safe for children
- Contains Non-GMO ingredients

15. **I find the various required food labels in India (FSSAI symbols, ingredient lists, etc.) clear and easy to understand.** \*

Mark only one oval.

0 1 2 3 4 5

Stro       Strongly Agree

16. **Demand for Mandatory GMO Labeling: The Indian government should make it mandatory for all packaged foods containing GM ingredients to carry a clear label** \*

Mark only one oval.

0 1 2 3 4 5

Stro       Strongly Agree

17. **GMO Risk Perception: I perceive foods that may contain genetically modified ingredients to be riskier for my familys health than conventional (non-GM) foods.** \*

Mark only one oval.

0 1 2 3 4 5

Stro       Strongly Agree

18. **The existing food labeling system gives me the necessary information to make a truly informed choice that aligns with my values.** \*

Mark only one oval.

0 1 2 3 4 5

Stro       Strongly Agree

19. **If an essential food item (like cooking oil) was guaranteed non-GMO but cost 15% more than the standard product, would you buy the non-GMO option?** \*

Mark only one oval.

- Yes, I would pay the extra 15%
- No, I would choose the standard, cheaper product
- Only if the price difference was less than 5%

20. **When shopping, which factors are the most important in your final purchase decision? (Select most important as 1 and then in Descending order)** \*

Tick all that apply.

	1	2	3	4	5	6	7
Price	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expiry Date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brand Reputation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Absence of a Non-GMO or Organic Claim	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vegetarian	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-Vegetarian	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health Claim (Low Salt/Sugar)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. **I trust the Food Safety and Standards Authority of India (FSSAI) to effectively ensure the safety of GM crops and foods and enforce future labeling.** \*

*Mark only one oval.*

0 1 2 3 4 5

Stro       Strongly Agree

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