

Original Research Article

A Comparative Study on the Adherence to Codex Alimentarius Guidelines of Packaged Foods Available In Indian and United States

*Meghna Pareek¹, Nikita Sharma¹, Naavya Dangi³, Ankita Sharma¹, Richa Chaturvedi², Nimali Singh¹

1 Department of Home Science, University of Rajasthan, Jaipur, 2 Kanoria P.G. Mahila Mahavidyalaya, 3 Rock Hill High School, USA

Received: 6 March 2026 - Accepted: 20 March 2026 - Published: 30 March 2026

Abstract

Food labelling plays a crucial role in helping consumers make informed food choices and in ensuring transparency within the food system. The present study provides a comparative analysis of packaged food labelling regulations in India and the United States in relation to the standards established by the Codex Alimentarius Commission. The study examines the regulatory frameworks governing packaged food labelling in both countries and evaluates their alignment with Codex guidelines. A sample of packaged food products from each country was systematically reviewed to assess their compliance with Codex Alimentarius labelling standards. The analysis focuses on identifying key similarities and differences in labelling practices between the two countries and evaluating the extent to which existing regulations reflect internationally recognized standards. The findings indicate that packaged food products in the United States demonstrate a relatively higher level of compliance with Codex Alimentarius guidelines, whereas variations in compliance were observed within the Indian packaged food sector. The study highlights important areas where improvements in labelling practices may be required to enhance transparency and consumer understanding. The outcomes of this research provide useful insights for policymakers and regulatory authorities in both India and the United States to strengthen their food labelling regulations and improve alignment with global standards. Additionally, the study emphasizes the importance of increasing awareness among consumers and the food industry regarding the role of nutritional labelling in promoting healthier food choices.

Keywords: Codex Alimentarius, packaged food labelling, comparative analysis, India, United States, consumer protection, international standards, nutrition information, allergen declaration

*Correspondence

Meghna Pareek

Research Scholar, Department of Home Science, University of Rajasthan, Jaipur
Email: meghnapareek18@gmail.com

Citation for the paper: Pareek M, Sharma N, Dangi N, Sharma A, Chaturvedi R, Singh N. A Comparative Study on the Adherence to Codex Alimentarius Guidelines of Packaged Foods Available in Indian and United States. International Journal of Nutrition & Lifestyle 2026; 6(1): 19 -29. DOI: 10.69859/ijnl.2026.v6i1003



Copyright: © 2026 by the authors. Licensee: Research Thrive Publications. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Introduction

Nutrient profiling is a scientific approach used to evaluate the nutritional composition of foods and beverages. It involves assessing the nutrient content of a product and classifying it according to its nutritional quality. Such systems are designed to provide consumers with clear and simplified information that can assist them in making healthier dietary choices (Donga and Patel 2018).¹

The primary objective of nutrient profiling is to guide consumers towards healthier food selections while simultaneously encouraging the food industry to develop and promote nutritionally improved products (Dunford et al. 2015).² By providing accessible information about the nutritional quality of foods, these systems help consumers make more informed dietary decisions and potentially reduce the risk of diet-related chronic diseases such as obesity, hypertension, and type 2 diabetes (Pandav et al. 2021; Kamboj et al. 2022).^{3,4}

The criteria and methodologies used for nutrient profiling differ across countries and regulatory bodies. Some nations have developed their own nutrient profiling systems, while others rely on international frameworks and recommendations, including those provided by the World Health Organisation (WHO) (Kamboj et al. 2022).⁴ These systems may also incorporate both mandatory and voluntary labelling requirements to improve consumer awareness and promote healthier food environments.

Globally, a large number of nutrient profiling models have been developed to support nutrition policies and food regulation. A systematic review conducted in 2016 identified hundreds of such models designed for various regulatory and public health purposes (Stockley et al. 2008; about et al. 2018).^{5,6} Prominent examples include the Food Standards Australia New Zealand (FSANZ) model, Nutri-Score, the Health Canada

Surveillance Tool (HCST), the Pan American Health Organisation (PAHO) model, and the Health Star Rating system.

Among the international frameworks guiding food regulation, the Codex Alimentarius holds a central position. Codex Alimentarius, commonly referred to as “Codex,” is a collection of internationally recognised food standards, guidelines, and codes of practice developed jointly by the Food and Agriculture Organisation and the World Health Organisation. These standards aim to protect consumer health and facilitate fair practices in international food trade.

The development of Codex standards is a collaborative process that involves member countries, scientific experts, and observer organizations. Through this process, comprehensive guidelines are created to support food safety, quality, and transparent labelling practices (FAO 2006).⁷ Codex guidelines therefore serve as an important global reference for national food regulatory frameworks.

However, the level of compliance with these international guidelines may vary between countries depending on factors such as national regulatory systems, enforcement capacity, economic conditions, and public awareness (Jones et al. 2017).⁸ Food regulations cover several important aspects including food safety, nutrition labelling, food additives, and pesticide residues.

Compliance with food packaging and labelling regulations is particularly important because it directly influences consumer safety, product transparency, and trust in the food supply. Clear and accurate labelling enables consumers to understand the nutritional quality of foods and supports informed decision-making in increasingly complex food markets.

Objective

- The study aimed to compare the compliance of food labelling in Indian and American packaged food according to Codex Alimentarius.

Research Methodology

For this study, seven major categories of packaged foods were selected for analysis. These categories included beverages, ice cream and frozen desserts, soups, chocolates, sauces and spreads, ready-to-prepare foods, and protein supplements. These categories were chosen as they represent commonly consumed packaged food products and are widely available in both the Indian and American markets. A total of **200 packaged food products** were selected for the study from both countries. The products included items from well-known and widely distributed food brands that are commonly available across national retail markets. The selection aimed to ensure representation of popular packaged food products that are frequently purchased by consumers.

The **Indian data** for the study was collected from **Jaipur**, located in the state of **Rajasthan**, India. For systematic data collection, the city was divided into four geographical zones based on the administrative divisions used by the Government of Rajasthan. From each zone, major retail outlets, supermarkets, and grocery stores with high consumer traffic were identified. A market survey was conducted in these selected stores, and packaged food products belonging to the identified categories were examined. Relevant labelling information from the product packages was recorded and later tabulated for analysis.

The American data was collected from supermarkets located in **Lesslie**, South Carolina, United States. Similar product categories were selected from major retail outlets in the region. The labelling information from the selected packaged food products was recorded using the same criteria as applied to the Indian sample to ensure consistency in data collection. The collected data were subsequently organised and tabulated to facilitate comparative analysis of packaged food labelling practices in both countries with reference to the guidelines established by the Codex Alimentarius. The collected data from the selected packaged food products were systematically examined to assess their compliance with the guidelines established by the Codex Alimentarius Commission. A structured checklist based on

Codex labelling standards was developed to evaluate the presence and adequacy of key labelling components such as product name, ingredient list, nutrition information, allergen declaration, net quantity, manufacturer details, and other mandatory labelling elements. Each product label was carefully reviewed and compared against the Codex guidelines to determine whether the required information was clearly provided. The observed data were recorded and organised into tabular form to facilitate comparison between products from India and the United States.

Descriptive statistical methods were used to summarise the compliance patterns within each food category. The results were then analysed to identify similarities and differences in packaged food labelling practices between the two countries and to evaluate the level of alignment with internationally recognised Codex standards.

Results

A total of 200 packaged food products were collected, which include beverages, soup premixes, ice-creams and frozen desserts, sauces and spreads, chocolate, protein supplements and ready to prepare, were collected and compared. In these 200 products, 100 products were of Indian brands and 100 were of American brand products. Each category contains 40 products in which 20 are of Indian origin and other 20 are of American Brands.

The comparison was done on the compliance of the mandatory and voluntary nutrient labelling in American and Indian Packaged foods according to Codex Alimentarius.

Nutrient Facts on the Label of Beverages

Figure 1 provides a comprehensive comparison of compliance with mandatory and voluntary nutrient labelling requirements in American and Indian Beverages. A total of 40 products were examined, comprising 20 Indian and 20 American beverages. Notably, there was complete compliance (100%) for Energy, Protein, Carbohydrates, and Fat labelling in both Indian and American beverages (N=40). Turning to the nutrient table for packaged foods, American beverages showed a compliance rate of 63.64% for saturated fat, Trans fat, cholesterol, vitamins,

and minerals on their labels. In contrast, Indian beverage products exhibited the following compliance rates: 39% for saturated fat, 32.5% for

trans fat, 22% for cholesterol, 24.5% for

variations in compliance between the two countries, with American products generally displaying higher compliance for these nutrients.

vitamins, and 56.5% for minerals. This indicates

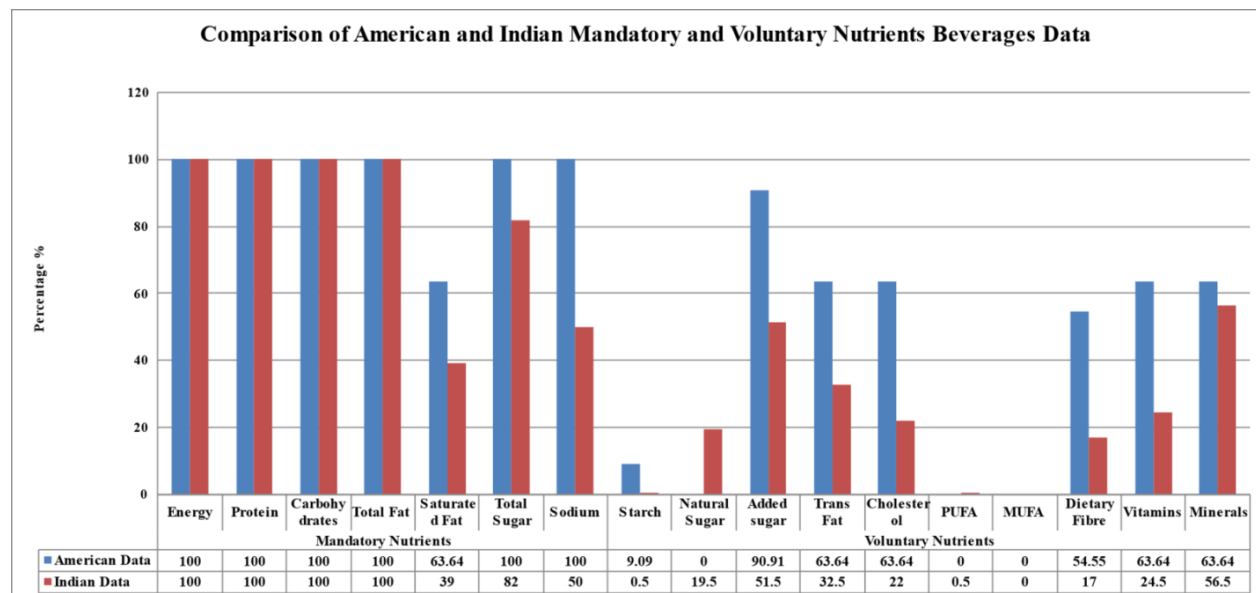


Fig. 1. Comparison of American and Indian Mandatory and Voluntary Nutrient Beverages Data

In terms of total sugar (comprising all mono-saccharides and disaccharides) and sodium, American packaged beverages achieved 100% compliance in displaying both of these crucial nutrients. In contrast, Indian beverages exhibited a compliance rate of approximately 82% for total sugar and only 50% for sodium. This highlights a substantial difference in the labeling practices between the two countries.

The display of natural sugar, PUFA, and MUFA in American products was absent (n=0), whereas Indian products included natural sugar information on 19.5% of labels, PUFA on 0.5% of labels, and

MUFA on 0% of labels. When considering Starch labeling, it was found on 9.09% of American beverage labels and only 0.5% of Indian beverage labels.

Finally, with regard to Added Sugar, 90.91% of American beverages included this information on their labels, whereas it was found on only 51.5% of Indian beverage labels. Dietary fiber was the last nutrient in the analysis, with 54.55% of American beverage products including this information, while only 17% of Indian beverage products displayed dietary fiber content on their labels.

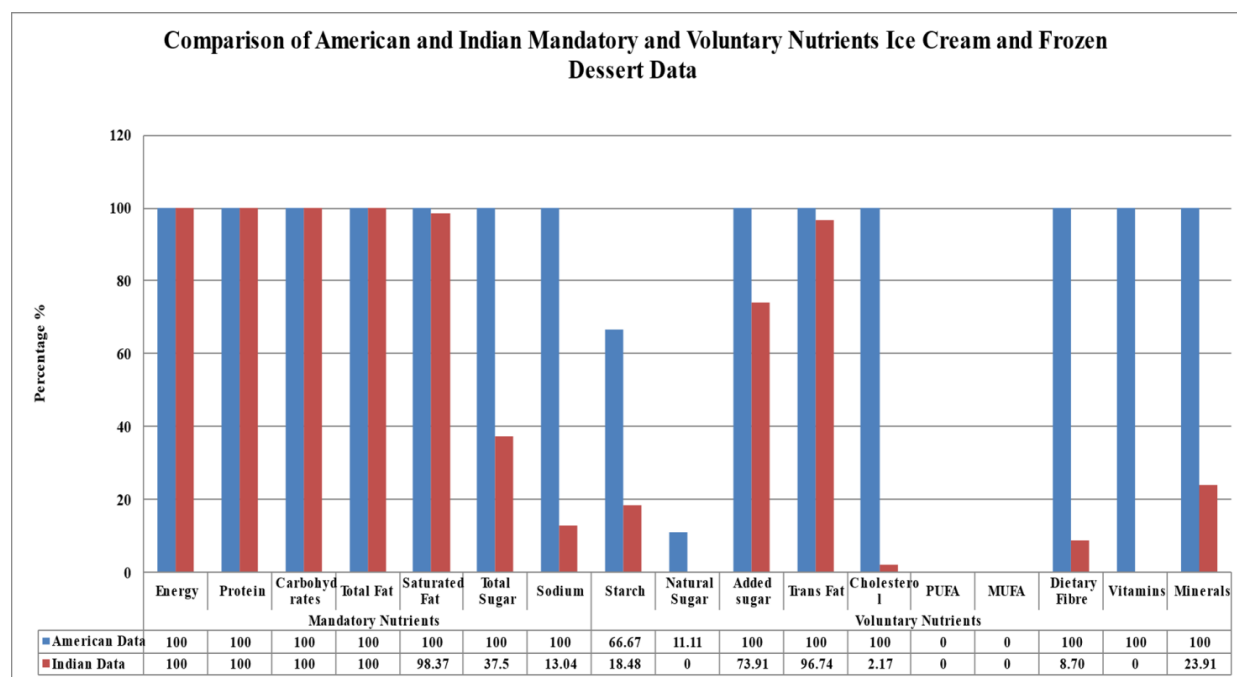


Fig. 2. Nutrient Facts on the label of Ice-Creams and Frozen Desserts

Figure 2 provides a comparative analysis of mandatory and voluntary nutrient labeling compliance in American and Indian ice creams and frozen desserts. In both countries, Energy, Protein, Carbohydrates, and Fat labeling achieved a full compliance rate of 100%. Turning to the nutrient tables for American packaged ice cream and frozen desserts, it is noteworthy that all products displayed the presence of Saturated Fat, Total Sugar, Sodium, Added Sugar, Trans Fat, Cholesterol, Dietary Fiber, Vitamins, and Minerals, all at 100% compliance. In contrast, Indian packaged ice cream and frozen desserts exhibited varying compliance rates: Saturated Fat - 98.37%, Total Sugar - 37.5%, Sodium - 13.04%, Added

Sugar - 73.91%, Trans Fat - 96.74%, Cholesterol - 2.17%, Dietary Fiber - 8.70%, Minerals - 23.91%. However, there was no compliance for the display of vitamins on Indian product labels. American products included starch information on 66.67% of their labels, whereas Indian products displayed starch on only 18.48% of labels. In the case of natural sugar, 11.11% of American frozen desserts and ice creams included this information, while Indian products showed no display of natural sugar. Remarkably, for both American and Indian products, there was no representation of PUFA and MUFA on the labels, indicating a lack of information regarding these nutrients in ice cream and frozen dessert packaging in both countries.

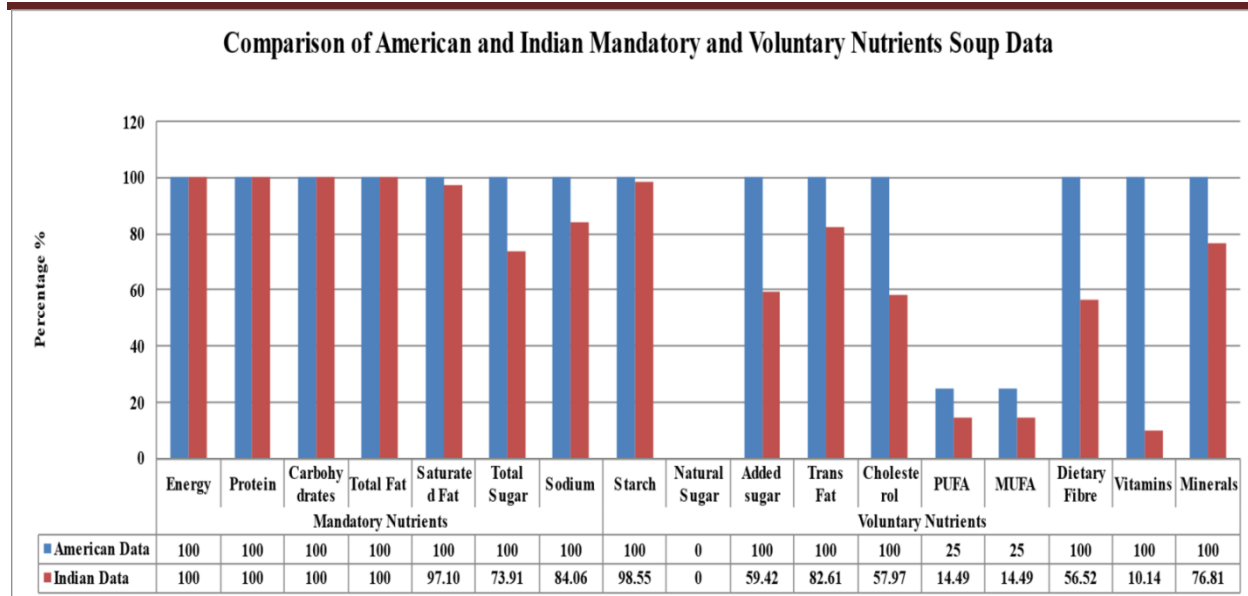


Fig. 3. Nutrient Facts on the label of Soup Premix

Figure 3 sheds light on the compliance with mandatory and voluntary nutrient labelling requirements for soup premixes in both American and Indian products. The data reveal a 100% compliance (n=40) for Energy, Protein, Carbohydrates, and Total Fat in both countries.

In the case of American soup premixes, there was also complete adherence (100%, n=20) to the inclusion of other essential nutrients on the nutrition label, including Saturated Fat, Total Sugar, Sodium, Added Sugar, Trans Fat, Cholesterol, Dietary Fiber, Vitamins, and Minerals. In contrast, Indian soup premixes displayed these nutrients at varying compliance rates: Saturated Fat - 97.10%, Total Sugar - 73.91%, Sodium - 84.06%, Added Sugar - 59.42%, Trans Fat - 82.61%, Cholesterol - 57.97%, Dietary Fiber - 56.52%, Vitamins - 10.14%, and Minerals - 76.81%. This illustrates differences in compliance between American and Indian soup premix products, with Indian products exhibiting slightly lower compliance rates for several nutrients. Notably, both American and Indian products displayed Natural Sugar at 0%, indicating a lack of information about this nutrient on the labels. The representation of PUFA and MUFA on the labels

was found on 25% of American soup premix products and 14.49% of Indian soup premix products, indicating limited inclusion of these specific nutrients in the labelling of soup premixes in both countries.

Figure 4 provides a detailed comparison of compliance with mandatory and voluntary nutrient labelling requirements in American and Indian chocolates, featuring a total of 40 chocolates, with 20 from each country, representing the majorly consumed brands. Energy and total fat displayed a 100% compliance rate (n=40) on packaging labels in both American and Indian chocolates. Furthermore, American chocolates achieved full compliance (100%) for Protein, Carbohydrates, Total Sugar, and Minerals. In contrast, Indian chocolates showed the following compliance rates: Protein - 98.86%, Carbohydrates - 96.59%, Total Sugar - 82.95%, Sodium - 63.64%, Added Sugar - 69.32%, and Minerals - 60.23%. This indicates a slightly lower compliance in Indian chocolates for these nutrients compared to their American counterparts.

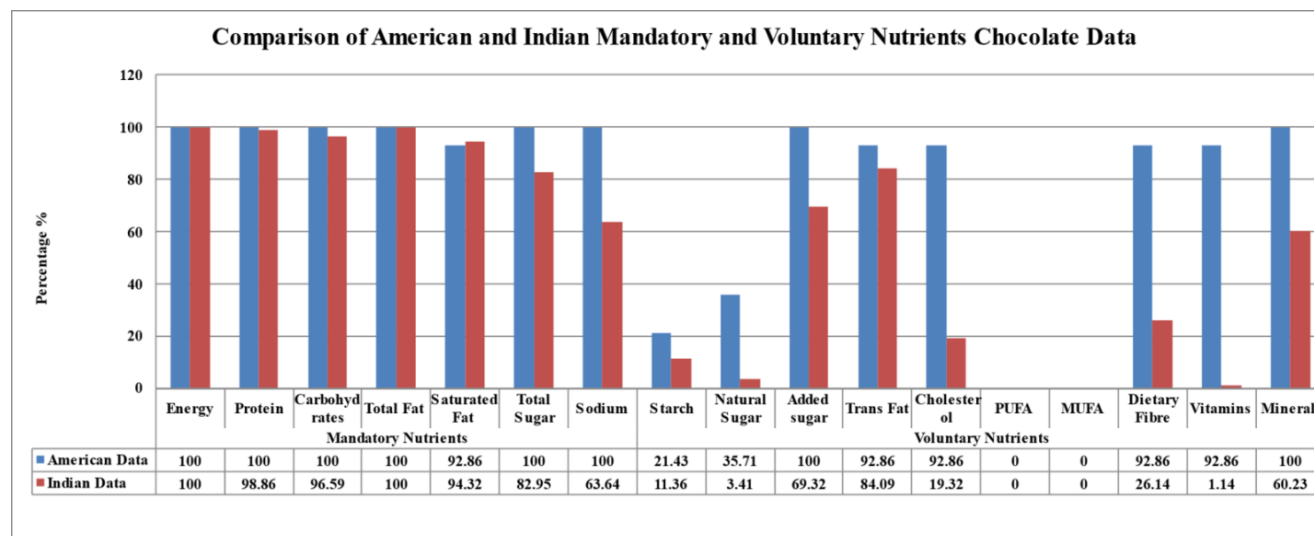


Fig. 4. Nutrient Facts on the label of Chocolates

The labelling of saturated fat, trans fat, cholesterol, dietary fiber, and vitamins achieved 92.86% compliance on American chocolate packaging. In Indian packaged chocolates, the representation rates were as follows: Saturated Fat - 94.32%, Trans Fat - 84.09%, Cholesterol - 19.32%, Dietary Fibre - 26.14%, and Vitamins - 1.14%. These figures highlight some differences in compliance, with Indian chocolates displaying higher levels of saturated fat and trans fat, lower levels of cholesterol and dietary fiber, and very limited representation of vitamins compared to American chocolates. Starch was depicted on 21.43% of American chocolate packets, while Indian chocolates showed a lower percentage of 11.36% compliance in displaying starch content. When considering Natural Sugar, American food labels included this information on 35.71% of products, whereas only 3.41% of Indian chocolate labels displayed Natural Sugar content. In terms of PUFA and MUFA, both American and Indian chocolates had 0% representation on their food labels, indicating a consistent absence of information regarding these nutrients in chocolate

labeling in both countries.

Figure 5 provides a comparative analysis of mandatory and voluntary nutrient labelling compliance in American and Indian sauces and spreads. In American food labels for sauces and spreads, the representation of Energy, Protein, Carbohydrates, Total Fat, Total Sugar, and Sodium achieved a perfect 100% compliance, while in Indian food labels, the percentages were as follows: Energy - 99.42%, Protein - 97.67%, Carbohydrates - 98.83%, Total Fat - 98.54%, Total Sugar - 92.42%, and Sodium - 36.15%. For Saturated Fat, Added Sugar, Trans Fat, Cholesterol, Dietary Fiber, Vitamins, and Minerals, American sauces and spreads exhibited a compliance rate of 88.89%. In contrast, Indian products showed slightly lower compliance rates: Saturated Fat - 76.09%, Added Sugar - 18.08%, Trans Fat - 66.47%, Cholesterol - 40.82%, Dietary Fiber - 28.57%, Vitamins - 18.37%, and Minerals - 39.36%. This indicates some variation in compliance between American and Indian sauces and spreads, with Indian products displaying lower compliance for several nutrients.

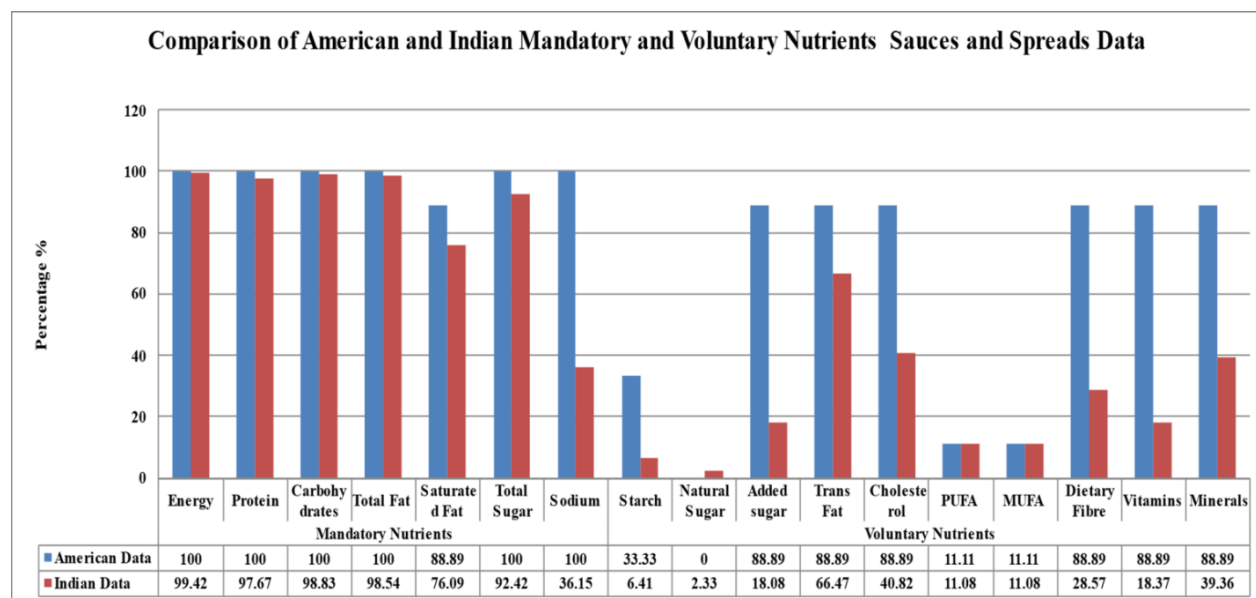


Fig. 5. Nutrient Facts on the label of Sauces and Spreads

Starch was found on the labels of 33.33% of American sauce and spread products, while in Indian products, it was displayed on only 6.41% of products. Natural Sugar compliance was absent in Indian sauces and spreads, whereas American products included it on 2.33% of labels.

In American sauce and spreads, PUFA and MUFA were mentioned on 11.11% of products, and in Indian products, these nutrients were found on 11.08% of labels, showing similar levels of compliance between the two countries.

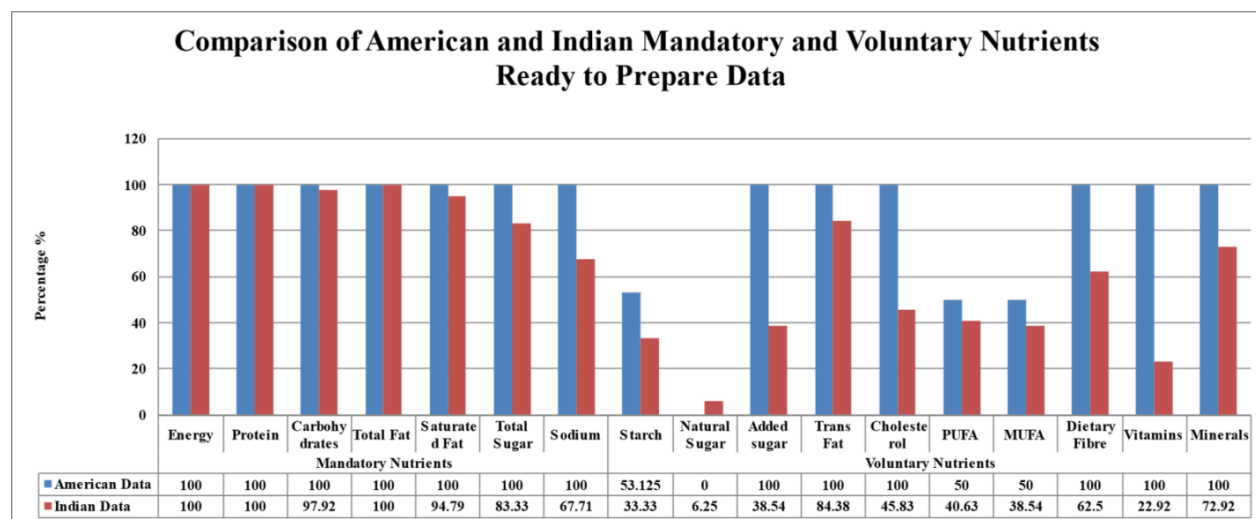


Fig. 6. Nutrient Facts on the label of Ready to Prepare

Figure 6 offers a comparative view of compliance with mandatory and voluntary nutrient labeling requirements in American and Indian ready-to-eat food products. In both countries, ready-to-eat food products achieved a perfect 100% compliance for

Energy, Protein, and Total Fat. The nutrient table for American ready-to-eat foods showed complete compliance (100%) for Carbohydrates, Saturated Fat, Total Sugar, Sodium, Added Sugar, Trans Fat, Cholesterol,

Dietary Fiber, Vitamins, and Minerals. In contrast, Indian products displayed the following compliance percentages: Carbohydrates - 97.92%, Saturated Fat - 94.79%, Total Sugar - 88.33%, Sodium - 67.71%, Added Sugar - 38.54%, Trans Fat - 84.38%, Cholesterol - 45.83%, Dietary Fiber - 62.5%, Vitamins - 22.92%, and Minerals - 72.92%. This indicates some variation in compliance between American and Indian ready-to-eat food products, with Indian products generally displaying slightly lower compliance for several nutrients. Starch was depicted on 53.13% of American ready-to-eat products and 33.33% of Indian products,

indicating the presence of starch information on a significant portion of both country's product labels. Natural Sugar was not displayed on any of the American products, while about 6.25% of Indian products included Natural Sugar information on their packaging. In terms of PUFA and MUFA, Indian ready-to-eat products represented these nutrients at 4.63% and 38.54%, respectively. In comparison, American products displayed these nutrients on 50% of their labels. This demonstrates a notable difference in the inclusion of PUFA and MUFA information on the labels of ready-to-eat products between the two countries.

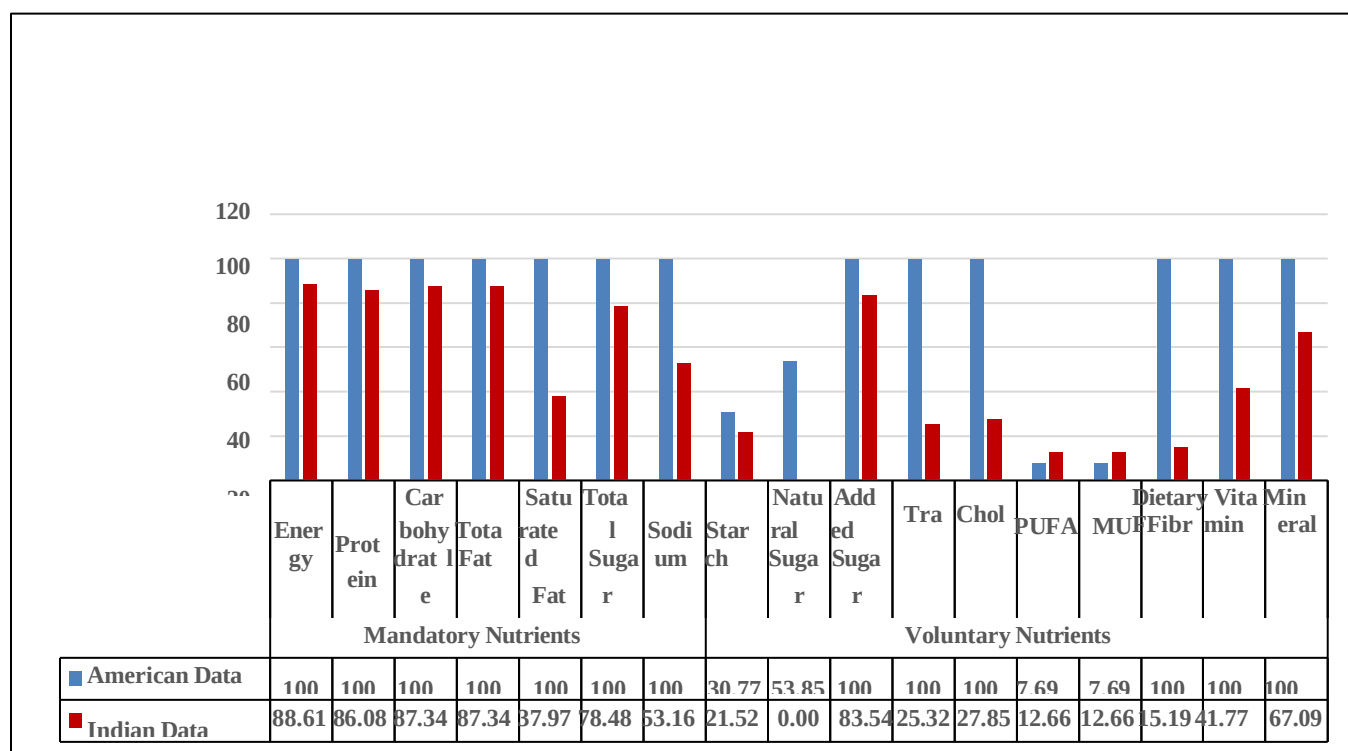


Fig. 7. Nutrient Facts on the label of Protein Supplements

Graph 7 provides a clear overview of the compliance with mandatory and voluntary nutrient labeling requirements in American and Indian Protein Supplements. In our analysis of American protein supplements, all 20 selected products (100%) displayed information for Energy, Protein, Carbohydrates, Total Fat, Saturated Fat, Total Sugar, Trans Fat, Cholesterol, Dietary Fiber, Vitamins, and Minerals. In contrast, the labeling compliance for Indian Protein Supplements varied as follows: Energy 88.61%, Protein 86.08%, Carbohydrates 87.34%, Total Fat 87.34%,

Saturated Fat 37.97%, Total Sugar 78.48%, Trans Fat 25.32%, Cholesterol 27.85%, Dietary Fiber 15.19%, Vitamins 41.77%, and Minerals 67.09%. These figures demonstrate a discrepancy between American and Indian protein supplement labels, with the Indian products showing lower compliance rates for several nutrients, particularly Saturated Fat, Trans Fat, Cholesterol, Dietary Fiber, Vitamins,

and Minerals. Regarding specific nutrients, American Protein Powders had a 30.77%

representation of starch on their labels, while Indian Protein Powders had a slightly lower representation at 21.52%. However, there was a substantial difference in the labeling of natural sugar, with American products displaying it on 53.85% of labels, while Indian products did not include this information at all. Furthermore, it was observed that approximately 12.66% of Indian protein supplement products indicated the presence of PUFA and MUFA on their food labels. In comparison, American products had a lower compliance rate of only 7.69% for these nutrients. These findings highlight notable differences in nutrient labeling practices between American and Indian protein supplement products.

Discussion

The research was conducted to compare the nutritional labeling data of packaged foods in the United States and India across seven different categories: Beverages, Ice-Cream & Frozen Desserts, Soup Premixes, Sauces & Spreads, Chocolates, Ready to Prepare Meals, and Protein Supplements. According to Codex guidelines, certain nutrients, such as Energy, Protein, Carbohydrates, Total Fat, Saturated Fat, Total Sugar, and Sodium, are mandatory for inclusion on packaged food labels. There are also voluntary nutrients that may be included based on the country's food laws and regulations, which can vary in stringency from one nutrient to another.

The present study revealed that American packaged foods consistently included all mandatory nutrients, including Energy, Protein, Carbohydrates, Total Fat, Saturated Fat, Total Sugar, and Sodium, on the labels of all selected products (n=100). In contrast, when we examined Indian packaged food data, compliance with some mandatory and voluntary nutrients was lower compared to American packaged foods. Additionally, our study examined literature related to non-communicable diseases associated with food and their related nutrients. Sodium emerged

as the top nutrient associated with the increasing prevalence of hypertension. When we assessed the presence of sodium on American and Indian product labels, we found that all selected American products included sodium information on their labels, whereas only 52.52% of Indian products displayed sodium content.

Regarding voluntary nutrients, starch was listed on 44.91% of American product labels, while only

27.16% of Indian products included starch information. Natural sugar content was indicated on 14.3% of Indian product labels, whereas American packaged foods showed compliance at only 4.49%. However, added sugar was prominently featured, with 97.1% of American products and 56.33% of Indian products including this information. Other nutrients

such as trans fat, cholesterol, PUFA, and MUFA were also marked on the labels of both American and Indian products, with varying levels of compliance. The most visible differences in compliance were observed in the representation of vitamins and minerals. In American packaged foods, approximately 92.19% of products included information about the presence of vitamins, while 93.21% included details about minerals. In contrast, the Indian packaged foods industry displayed vitamins on only 16.97% of products and minerals on 56.6% of products. As the Study conducted by Dunford et al. (2015) also concluded that Indian products complies neither to international labeling standards nor to Indian labeling standards. So from the study it can be implied that Indian packaged food industry need to work on it is compliance of the nutrients labeling and provide consumers with exact information.

Acknowledgements

The authors would like to thank all individuals and organizations who directly or indirectly contributed to the completion of this research. The authors also acknowledge the cooperation of retail outlets and supermarkets in **Jaipur** for facilitating the data collection process.

Funding Source

This research received financial support under **Project 10 of the RUSA 2.0 scheme implemented at the University of Rajasthan**. The funding support enabled the collection and analysis of data used in the present study.

Ethical Statement

Ethical approval was not required for this research as no human involvement was there.

Conflict of interest

The authors declare no conflict of interest.

References

1. Donga G, Patel N. A review of research studies on factors affecting consumers' use of nutritional labels. *Nutri Food Sci Int J*, 2018; 7(3): 555-713.
2. Dunford EK, Ni Mhurchu C, Huang L, Vandevijvere S, Swinburn B, Pravst I, ... & Neal BC. A comparison of the healthiness of packaged foods and beverages from 12 countries using the Health Star Rating nutrient profiling system, 2013–2018. *Obesity Reviews*, 2019; 20: 107-115.
3. Pandav C, Smith Taillie L, Miles D R, Hollingsworth BA, Popkin BM. The WHO South-East Asia region nutrient profile model is quite appropriate for India: An exploration of 31,516 food products. *Nutrients*, 2021; 13(8): 2799.
4. Kamboj P, Bhatia N, Toteja GS. Awareness and knowledge of nutrition labels on pre-packaged food items among urban adolescents of Delhi, India. *The Indian Journal of Home Science*, 2022; 34(1): 154-166.
5. Stockley L, Rayner M, Kaur A. Nutrient Profiles for Use in Relation to Food Promotion and Children's Diet: Update of 2004 Literature Review. *Oxford: University of Oxford*. 2008.
6. Labonté ME, Poon T, Gladanac B., et al. Nutrient profile models with applications in government-led nutrition policies aimed at health promotion and noncommunicable disease prevention: a systematic review. *Adv Nutr* (In the Press), 2018.
7. Jones A, Dunford E, Crossley R, Thout SR, Rayner M, Neal B. An evaluation of the healthiness of the Indian packaged food and beverage supply. *Nutrients*, 2017; 9(10): 1103.
8. Dunford, EK, Guggilla RK, Ratneswaran A, Webster JL, Maulik PK, Neal BC. The adherence of packaged food products in Hyderabad, India with nutritional labelling guidelines. *Asia Pacific journal of clinical nutrition*, 2015; 24(3): 540-545.