CoFTI
Coalition for Food-Systems Transforma(c)tion in India

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REPORT

THE STATE OF URBAN FOOD ENVIRONMENT IN INDIA:
A Study in 11 States

Eram S.Rao, Meenakshi Garg, Suneeta Chandorkar,
Kamalesh Kumar Patel, Jyoti Vijay, Sana Ahmed, Kriti Rawal

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THE STATE OF URBAN FOOD ENVIRONMENT IN INDIA:
A Study in 11 States

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Cover Photograph: Kriti Rawal

Cover Photo: A street fruit market in Delhi highlighting the accessibility and everyday reliance on fresh produce within India's evolving urban food environment

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About CoFTI

The **Coalition for Food-Systems Transforma(c)tion in India (CoFTI)** was born out of the United Nations (UN) Food Systems Summit 2021 with a commitment to reshaping India's food system so that safe and nutritious food is accessible to all. Its mission addresses hunger and malnutrition while championing biodiversity, climate resilience, and the protection of livelihoods. By bringing together diverse stakeholders, CoFTI works to create sustainable and equitable solutions that balance the needs of people, planet, and economy. Grounded in the Sustainable Development Goals (SDGs), the Coalition drives positive change across seven key areas of work, ensuring that India's food systems remain resilient for both present and future generations.

CoFTI's approach is anchored in **three core objectives**.

1 THOUGHT LEADERSHIP	**USING RESEARCH, INNOVATION, AND EVIDENCE-BASED INSIGHTS TO SHAPE EFFECTIVE POLICIES AND GUIDE THEIR IMPLEMENTATION.**
2 COLLECTIVE ACTION	**OFFERING A COLLABORATIVE SPACE WHERE STAKEHOLDERS CAN UNITE, SHARE RESOURCES, AND WORK TOGETHER ACROSS ITS AREAS OF FOCUS.**
3 BUILDING CONNECTIONS	**FOSTERING STRONG LOCAL AND INTERNATIONAL NETWORKS TO ENABLE THE EXCHANGE OF KNOWLEDGE AND STRENGTHEN PARTNERSHIPS**

Through these objectives, CoFTI serves as both a catalyst and a convener, ensuring that India's journey towards a just, sustainable, and nourishing food future is grounded in shared purpose and actionable solutions.

CoFTI Core Group comprises of Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Welthungerhilfe India (WHH), Food Future Foundation (FFF), and Watershed Support Services and Activities Network (WASSAN), which hosts the Secretariat of CoFTI.

The Core Group has evolved to CoFTI's Transformation Council (2025–26), a strategic advisory body driving high-potential initiatives through a cross-sector cohort. It unites civil society, government, academia, and private sector stakeholders to advance collaborative food systems transformation in India.

The CoFTI Fellowship Programme

The CoFTI Fellowship Programme (2025) was conceptualized to nurture early-career researchers in India by supporting them to explore and generate evidence on critical food systems issues. Designed as a structured three-month fellowship, it combined rigorous selection, thematic focus, and a mentorship model curated, hosted and implemented by CoFTI Secretariat with support from WASSAN and Welthungerhilfe (WHH) India. Through guided research and collaborative knowledge creation, the programme culminated in the Fellows producing six working papers, an Issue Brief, and a detailed survey-based analytical report.

The CoFTI Fellowship Programme was carried out from August to November 2025 followed by a rigorous process of review and finalisation of the outputs. Applications were invited from early career researchers for specific thematic areas identified through consultations with CoFTI members. The programme received nearly 500 applications from which eight fellows were selected by a panel including the CoFTI Core group members and other subject experts who are also members of the Coalition. A team of subject experts was invited to mentor the Fellows. The CoFTI Fellows received an honorarium to support their research during the Fellowship, and the final topics were decided jointly by the Fellows and their assigned mentors.

Of the eight fellows selected, seven successfully completed the CoFTI Fellowship programme. Five Fellows undertook original research projects from conceptualisation to manuscript preparation, while two contributed to the development of a CoFTI Issue Brief and a survey-based analytical report.

Voluntary mentorship by CoFTI members: A defining feature of the fellowship was its mentorship model. Members of CoFTI, Core Group, and the Secretariat have voluntarily mentored the fellows throughout the programme.

The fellowship culminated in the presentation of findings, followed by review, revision, and publication as part of the CoFTI Working Paper Series, with opportunities for further research collaboration and publication.

The CoFTI Secretariat was responsible for the overall design and coordination of the Fellowship programme. This included developing the fellowship framework, managing the selection process, facilitating mentor–fellow engagement, and coordinating the review, editing, design, publication, and communication of the Fellows' outputs. As the institutional anchor of the Secretariat, WASSAN also played a significant role in the operational management and smooth implementation of the fellowship programme by providing administrative, human resource, and design support, which was instrumental in ensuring the effective delivery of the programme.

Acknowledgements

Overall support
This report *"The State of Urban Food Environment in India: A study in 11 States"* is the outcome of a collaborative, multi-institutional initiative conducted across several Indian states.

We are deeply grateful to Mr. Pawan Agarwal (CEO, Food Future Foundation and Co-Lead - Coalition for Food Systems Transforma(c)tion in India) for envisioning and initiating the concept that inspired this study. His insight and guidance were instrumental in bringing this study to fruition.

We gratefully acknowledge the Agri-Food Café, jointly organised by the Food and Agriculture Organization of the United Nations (FAO) and CoFTI, for providing a platform to present the preliminary findings of this study.

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Sana Sana Ahmed was supported through the CoFTI Fellowship Program during August November 2025 for the writing of this report.

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Sana also extends her thanks to Payal Thakur for her editorial assistance in finalising the Report.

We would like to extend our sincere gratitude to WASSAN (Watershed Support Services and Activities Network) for hosting the CoFTI Fellowship Program and providing the necessary organisational support.

Sana also extends her appreciation to her fellow CoFTI Fellows for the peer-learning opportunities that contributed to a broader understanding of food systems-related issues.
The authors also extend our sincere gratitude to Nemani Chandrasekhar for his thoughtful and creative design contributions, which have enhanced the presentation and overall quality of this Working Paper.

Survey implementation

The survey was conducted during March and April 2025. The study was led by Prof. Eram S. Rao (Project Team Lead and Principal Investigator), with Prof Meenakshi Garg, Dr. Suneeta Chandorkar, Dr Kamalesh Kumar Patel and Dr Jyoti Vijay serving as Principal Investigators. They have been involved in planning the study design, ensuring scientific, ethical, and regulatory compliance, as well as execution of the study across 11 states in India.

We gratefully acknowledge the supporting organisations, nodal officers, and student field investigators, whose dedication and collaborative efforts ensured the successful implementation of the survey while upholding methodological rigor, fostering community engagement, and maintaining the highest ethical standards throughout the data collection process.

- **Delhi NCR:** The survey was implemented through Bhaskaracharya College of Applied Sciences, University of Delhi, with Prof. (Dr.) Eram S. Rao serving as Nodal Officer. The student field investigators were Abdul Razzaq, Aman Vasishth, Ayush Kumar, Ayush Pal, Drashti, Harsh, Himanshi, Jai, Kriti Rawal, Komanvi, Lavanya, Nidhi Bhatia, Purav, Sania, and Shambhavi. Eram S. Rao and Kriti Rawal are co-authors of this report.

- **Haryana:** The survey was implemented through Lakshmibai College, University of Delhi, with Dr. Roshan Lal serving as Nodal Officer. The student field investigators were Bharti, Deeksha Ahuja, Hiteshi, Ritu Mishra, Ritika, Riya Mishra, Sara Malik, Sneha Chanda and Sumit.
- **Himachal Pradesh:** The survey was implemented through Bhaskaracharya College of Applied Sciences, University of Delhi, with Prof. (Dr.) Meenakshi Garg serving as Nodal Officer. The student field investigators were Megha and Vinay. Meenakshi Garg is a co-author of this report.
- **Uttar Pradesh:** The survey was implemented through the University of Allahabad, Prayagraj, with Dr. Pinki Saini serving as Nodal Officer. The student field investigators were Ankit Kumar, Arin Kesharwani, Aryan Gupta, Ayushi Bharti, Janhavi Singh, Kumari Saumya, Nitika Keshari, Purva Pritam, Riya Kumari, Saundarya Jaiswal, Shubham Vishwakarma, Saurabh Sharma, Swayn Mishra, Vaishnavi Mishra, and Veena Singh.
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- **Bihar:** The survey was implemented through Bhaskaracharya College of Applied Sciences, University of Delhi, with Prof. (Dr.) Meenakshi Garg serving as Nodal Officer. The student investigator was Akanksha. Meenakshi Garg is a co-author of this report.
- **Odisha:** The survey was implemented through Watershed Support Services and Activities Network (WASSAN), with Dinesh Balam, Sumeet Kumar Behra, Jitendra Kar, Anita Pinheiro and Abhishek Pradhan serving as Nodal Officers. The student field investigators were Madhavi Swain, Aayusha Maharana and Krutartha Biswal.
- **Maharashtra:** The survey was implemented through SVT College of Home Science, Mumbai, with Dr. Panchali Moitra serving as Nodal Officer. The student field investigators were Aditi Mogaveera, Arpita Tibrewala, Bushra Qureshi, Hazra Sunasara, Manushi Shah, Pradnya Mandavkar, and Sneha Singh.
- **Karnataka:** The survey was implemented through Smt. V.H.D. Central Institute of Home Science, Maharani Cluster University, Bangalore, with Dr. Vaijayanthi Kanabur serving as Nodal Officer. The student field investigators were Akula Sirisha, Azba Fathima Noorien, Azra Mariyam, Bhoomika B, Bhuvana H S, Chaithrashre E K V, Deepashree C N, Deepika S, Dhanalakshmi Bai B N, Divya Jahnavi E, Kavya, Kavya C, Meena N, Musfirah Saba, Nisha V, Pooja N, Rakshitha S, Ranjita Dhami, Sangeetha M, Sinchana K, Sneha V, Srinidhi, Supriya Viswakarma, and Tejashree M C.

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List of Abbreviations

ABBREVIATION	FULL FORM
LMICs	Low- and Middle-Income Countries
SDGs	Sustainable Development Goals
DQQ	Global Diet Quality Questionnaire
ToT	Training-of-Trainers
IRB	Institutional Review Board
IIHMR	Institute of Health Management Research
ICMR	Indian Council of Medical Research
LIG	Low-Income Group
MIG	Middle-Income Group
HIG	High-Income Group
RTE	Ready-to-Eat
FOPL	Front-of-Pack Labelling

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Foreword

This report, *The State of Urban Food Environment in India: A Study in 11 States*, presents evidence from a large, multi-state household survey designed to better understand how urban residents navigate their everyday food environments.

To the best of our knowledge, this is the first survey-based study of its kind in India to systematically examine multiple dimensions of the urban food environment, making it a timely and significant contribution to understanding what is unfolding in urban India today.

By examining patterns of access, affordability, convenience, quality, safety, information, and sustainability, the survey offers grounded and empirically rich insights into the factors shaping food choices across diverse urban settings. It moves beyond assumptions to document lived realities, capturing how households engage with food systems amid rapid urbanization, changing markets, and evolving consumption practices.

Covering 11 cities across states, the survey highlights both shared trends and important variations in urban food access. Traditional neighbourhood markets continue to play a central role in food procurement, while the use of digital and e-commerce platforms reflects clear socioeconomic and generational divides. Income, convenience, and perceived affordability emerge as strong determinants of food choice, influencing the balance between staple foods, fresh produce, and ultra-processed items across households.

At the same time, the findings point to persistent structural challenges related to food safety, rising prices of nutrient-dense foods, and the growing influence of convenience-driven and promoted food products, alongside clear opportunities for policy action.

The findings also underscore persistent structural challenges within urban food systems. Concerns related to food safety, rising prices of nutrient-dense foods, and the growing influence of convenience-driven and promoted food products cut across income groups. At the same time, the survey reveals opportunities for policy action, particularly in strengthening local fresh food markets, improving nutrition literacy, and enabling more informed consumer decision-making through better food information and labelling.

This work would not have been possible without the collective efforts of many individuals and institutions. We would like to express my sincere appreciation to **Eram Rao** and her colleagues, **Meenakshi Garg, Suneeta Chandorkar, Kamalesh Kumar Patel, Jyoti Vijay, Sana Ahmed**, and **Kriti Rawal** for their leadership, collaboration, and scholarly commitment. We are deeply grateful to the team of researchers and student investigators across the country, whose valuable contributions are acknowledged in detail in this report.

This study was undertaken under the aegis of **CoFTI (Coalition for Food Systems Transforma(c)tion in India)**, whose support and vision made this collaborative endeavour possible.

Pawan Agarwal
CEO, Food Future Foundation
Co-Lead - Coalition for Food Systems Transforma(c)tion in India

Executive Summary

The report on *'The State of Urban Food Environment in India'* provides a comprehensive assessment of the factors influencing dietary choices across 11 states in India. The survey involving 1,117 households examines the complex interplay of accessibility, affordability, convenience, quality, safety, promotion, and labeling within the Indian urban food environment. The main objective is to provide information for customized interventions that enhance nutritional outcomes and address the double burden of malnutrition in India.
Our findings reveal notable differences in the urban food environment. Although traditional kirana stores remain the primary source of food, there is a noticeable digital divide, with younger, wealthier, and educated groups using e-commerce more frequently. Food purchasing patterns varied substantially across income groups. While lower-income groups tend to buy staples and traditional ultra-processed snacks due to budget and storage constraints, higher-income groups choose convenient fast foods and perishables, reflecting a lifestyle prioritizing convenience. The report highlights that affordability is a major barrier because many nutrient-dense products are perceived to be expensive for people of all income groups. This is further underscored by the fact that most respondents would prioritize dietary quality and variety over simply increasing food quantity with a hypothetical rise in income.

Food choices are heavily influenced by convenience, especially ease of access, with common staples like rice and pulses being the most convenient. The study also reveals a clear gender-based division of labor in household duties related to food, with women handling the majority of food purchase and preparation and frequently allocating a substantial amount of time each day to cooking. Customers also place a high value on food safety and quality, with hygiene and cleanliness being important considerations when making purchases. Concerns regarding pesticide residues in fruits and vegetables and adulteration in dairy products were reported across income groups.

Although few respondents can recall being exposed to food promotions in terms of information, promotion, and labeling, these promotions have a big impact on consumers' decisions to buy, especially when it comes to highly processed foods like fast food and savory snacks. Among many respondents who reported reading food labels , they tend to pay more attention to the expiration dates and the veg/non-veg symbol than to the comprehensive nutritional information. Drawing on global models such as Chile's, the report highlights the potential role of a standardized Front-of-Pack Labelling (FOPL) system in supporting informed dietary choices and strengthening approaches to the promotion and distribution of foods high in nutrients of concern, particularly among vulnerable groups. . Finally, the study examines how respondents perceive sustainability, pointing out that many of them noticed changes in food prices and availability over the previous five years. These changes in the food environment are intricately linked to major structural shifts, such as the effects of climate change on food systems and the globalization of food markets.

In conclusion, the findings indicate socioeconomic differences in access to and perceived affordability of nutritious foods within the urban food environments studied. In order to promote a more resilient, equitable, and health-conscious urban food system, it suggests a two-pronged approach that includes strong policy measures such as mandatory FOPL and targeted incentives to support local fresh food vendors as well as the incorporation of educational programs to improve food and nutrition literacy.

1

INTRODUCTION

The food environment serves as the interface between individuals and the food system, influencing their decisions about what to eat and where to obtain it (Neve *et al.*, 2021). The external food environment comprises a spectrum of factors, ranging from affordability, accessibility, convenience, food safety and quality, promotion, and sustainability across wild ecosystems, cultivated landscapes, and built infrastructures. These dynamics are embedded within and shaped by broader social, cultural, political, and environmental contexts (Downs *et al.*, 2020). Personal attributes, including financial resources, awareness, physical and mental health status, practical competencies, ability to travel, and time availability shape how individuals engage with the surrounding food landscape and ultimately determine their dietary decisions (Downs, Fox, *et al.*, 2022). Turner et al. proposed a conceptual framework that categorizes the food environment into two interrelated domains: the personal and the external (Turner *et al.*, 2018). The personal domain encompasses factors under an individual's direct control and includes four key dimensions- accessibility, affordability, convenience, and desirability of food. In contrast, the external domain comprises broader contextual influences, such as food availability, pricing, vendor and product characteristics, marketing, and regulatory mechanisms. The dynamic interaction between these domains influences dietary behaviors, shaping food choices and, ultimately, health outcomes (Sachdeva *et al.*, 2024).

Food environment is particularly complex (Bogard et al., 2021; Downs, *et al.*, 2022) and rapidly changing in low- and middle-income countries (LMICs) (Downs, *et al.*, 2022). LMICs, including India, are experiencing a significant nutrition transition, marked by a departure from traditional diets, once rich in staple grains, legumes, fruits, and vegetables, toward increased consumption of highly processed foods laden with added salt, fats and sugar (Popkin, 2015; Popkin *et al.*, 2012, 2020). Transformations in food systems, food environments, and dietary and lifestyle patterns have contributed to an emerging double burden of malnutrition, defined by chronic undernutrition and increasing prevalence of overweight, obesity, and nutrition-related non-communicable diseases (Global Panel, 2017; HLPE, 2017; Wells *et al.*, 2020; WHO, 2017). This trend is clearly visible in India, which is now seeing a dramatic increase in these non-communicable diseases, a rise that is directly linked to the country's changing food consumption patterns, especially in the urban setting (Indian Council of Medical Research *et al.*, 2017).

The common understanding of the urbanization-diet relationship is rooted in the assumption that a growing urban population and a stark rural-urban divide are the primary drivers of dietary change. In the context of the nutrition transition, existing research makes a clear distinction between urban and rural consumers and consistently demonstrates that people living in cities in lower-income countries face a higher risk of developing nutrition-related disorders and dietary excesses (Hawkes *et al.*, 2017; Mendez & Popkin, 2004; Popkin, 1999). Urban food choices are shaped by accessibility, affordability, convenience, food quality and safety, and promotion. The urban food environment evolves under the influence of global and local actors, shifting norms, household dynamics, individual preferences, technological advances, infrastructure of food system, and climate change. Grasping how these factors interact across communities is key to designing effective nutrition interventions (Polack & Platenkamp, 2019).

Research into food environments is becoming increasingly important in LMICs, especially as the UN Decade of Action on Nutrition (2016-2025) gets underway (United Nations General Assembly, 2016). To address global food and nutrition security and the double burden of malnutrition, policymakers are focusing more on how food environments influence diets, nutrition, and health (Development Initiatives, 2017; Global Panel, 2017; HLPE, 2017).

Given the pivotal role of food environments in influencing dietary choices, their assessment in LMICs is vital. Such evaluations not only support ongoing monitoring and surveillance but also inform tailored interventions designed to improve nutritional outcomes and address the dual burden of malnutrition (Downs et al., 2025). India's urban food landscape remains under-researched, despite its relevance to dietary behaviors and metabolic health. Guided by this essential need for assessment, our study utilized a cross-sectional design to map out and measure the urban food environment in different urban cities, across eleven states in India. The findings are expected to contribute to the operationalization of sustainable development goals (SDGs) targets 2.1, 2.2, 3.4, and 11.3.

2
METHODOLOGY

2.1. Study participants

The study participants were identified as the primary decision-maker in the household, typically those responsible for food purchasing and meal planning. Eligibility was restricted to individuals aged 18 years and above.

2.2. Sample size

The calculated sample size for this study was 102 households per city, based on the following formula:

$$n = \frac{Z^2 * p(1-p)}{d^2}$$

where, Z= 1.96 for 95% level of confidence
p= estimated proportion or prevalence
d= desired margin of error (precision)

2.3. Sampling technique

The study employed multi-stage stratified systematic random sampling for selection of the participants to examine the state of urban food environments across diverse urban settings in India. The sampling procedure included the following stages:

2.3.1. Stage I: Selection of cities with random sampling

Eleven cities from eleven Indian states were selected through random sampling to ensure national geographic, linguistic, and economic diversity. These states include Delhi NCR, Haryana, Himachal Pradesh, Rajasthan, Gujarat, Uttar Pradesh, Bihar, Odisha, Karnataka, Maharashtra, and West Bengal.

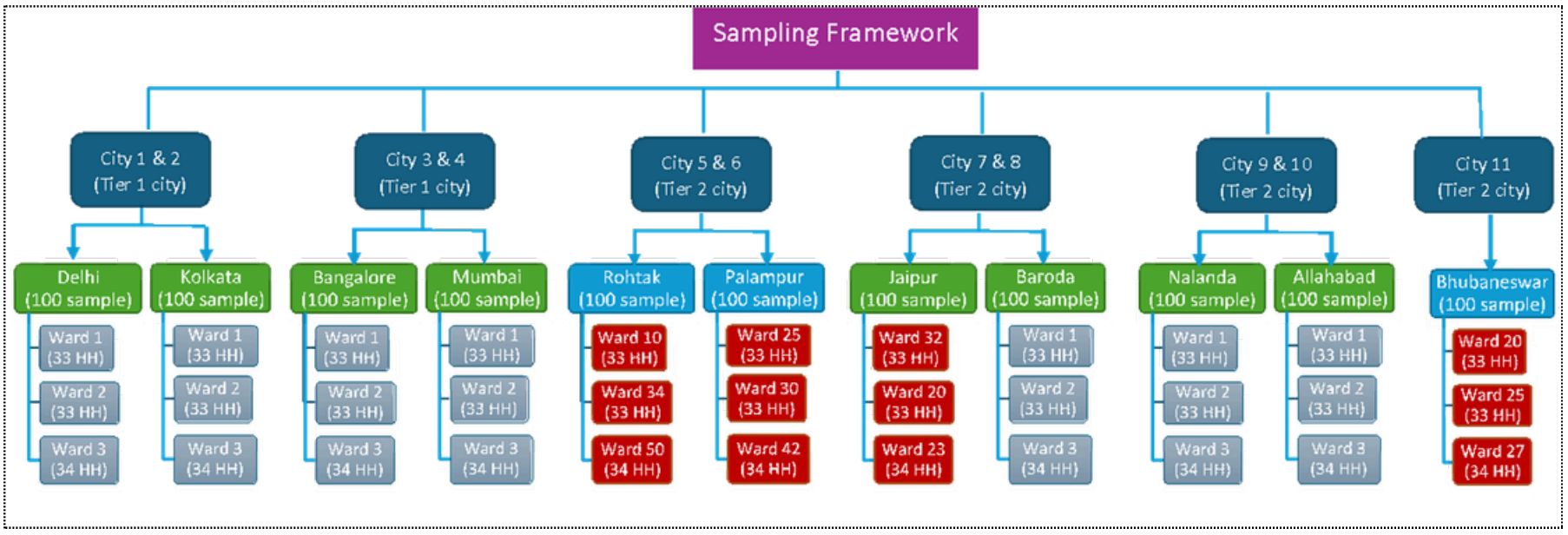
2.3.2. Stage II: Selection of wards with probability proportional to size sampling

In each urban site, three blocks/wards were selected based on socio-economic strata: low, middle, and high, using income-based and infrastructural criteria in consultation with local municipal data.

2.3.3. Stage III: Selection of households with systematic random sampling

Within each ward, 34 households were randomly sampled, targeting a total of 102 households per site.

2.4. Sampling Framework



2.5. Survey instrument development

The research tool was adapted from the 'Global Diet Quality Questionnaire (DQQ)' developed by GAIN, IFPRI, and FAO and the 'Urban Food Environment Tool' developed by The George Institute for Global Health, contextualized for India through an expert panel. The final questionnaire comprised seven modules, reflecting major food environment domains: socio-demographic profile; food accessibility; affordability; convenience; food quality and safety; information, labelling, and promotions; and sustainability. The tool was subjected to pilot testing in Delhi NCR and subsequently refined through expert feedback. It was then translated into respective vernacular languages (Hindi, Kannada, Marathi, Gujarati, Oriya, and Haryanvi) and certified for cultural and semantic accuracy.

2.6. Data collection and analysis

All nodal officers and investigators were trained using the training-of-trainers (ToT) model. Pilot testing of the tool in the regional language was conducted by surveyors prior to field deployment. Field data collection was executed by trained student investigators from partner academic institutions, under the supervision of state-level nodal officers. All surveyors were briefed through a centralized training program on ethical procedures, respondent interaction, and digital data entry.

Key protocols included: Use of CSPro software on tablets for real-time, encrypted data capture, unique interviewer ID login system for data attribution, geo-verification of ward locations and block-level identifiers, minimum of 4 to 5 geotagged photographs per block capturing food environments (wet markets, street vendors, grocery outlets, supermarkets, etc.), collection of written or thumbprint informed consent with daily upload and verification by nodal officers.

Data was synchronized daily (5:00 PM to 8:00 PM) and automatically uploaded to a centralized cloud server with backup protocols.

The survey data were exported from CSPro directly into STATA 17 (StataCorp, College Station, USA), where data cleaning, processing, and statistical analyses were conducted. Microsoft Excel was additionally employed, alongside STATA, for the generation of graphical outputs. The study spanned across seven weeks, beginning March 2025, and ending in April 2025.

2.7. Ethical clearance

This study received formal ethical clearance from the Institutional Review Board (IRB) of Indian Institute of Health Management Research (IIHMR), Bangalore, under reference number IRB_IHMRB_25Q1_01. All respondents were briefed about their rights to voluntary participation, confidentiality, and data security. The study adhered to the Declaration of Helsinki and Indian Council of Medical Research (ICMR) guidelines for social science research involving human participants.

3
RESULTS AND DISCUSSION

The study was conducted across 11 Indian states representing north, south, east, and west zones to ensure variability in socio-economic, cultural, and food environment conditions. The 11 states included Delhi NCR, Haryana, Himachal Pradesh, Karnataka, Maharashtra, Rajasthan, Gujarat, Uttar Pradesh, Bihar, Odisha, and West Bengal. ***Figure 1*** provides geographic context for the study, illustrating the diversity of regions included in this study, across India.

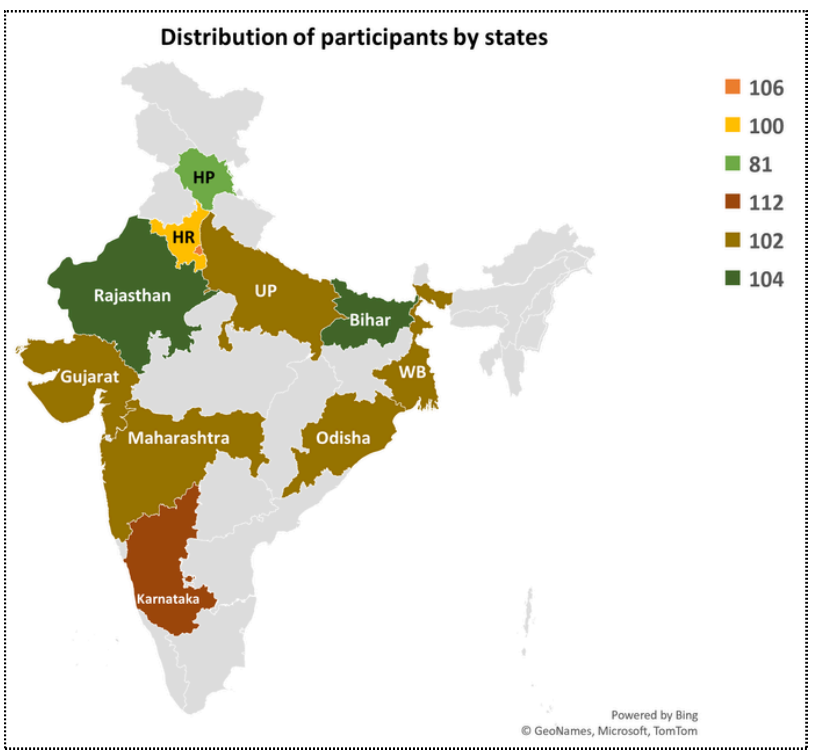


Figure 1. Geographic breakdown of participants

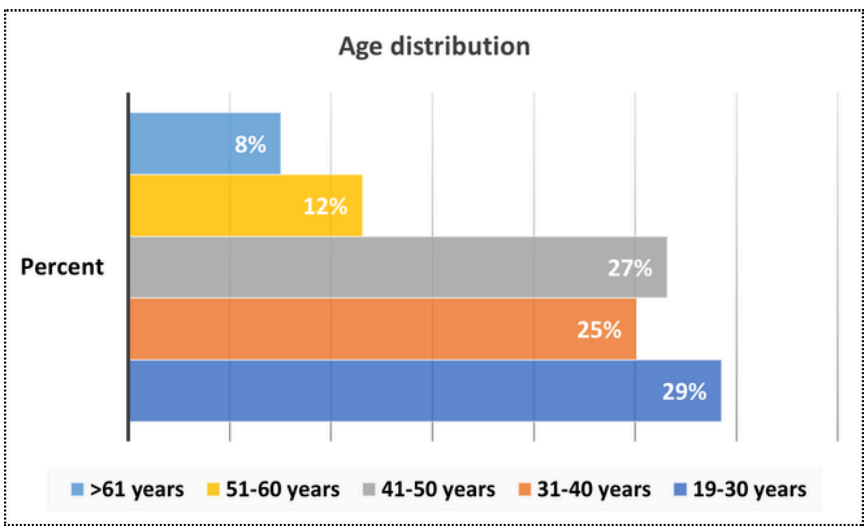
Out of the 11 states, 1117 households were selected using stratified multistage sampling, representing diverse geographic regions and urban infrastructure. Each urban site included low, middle, and high socio-economic strata.

3.1. Sociodemographic characteristics

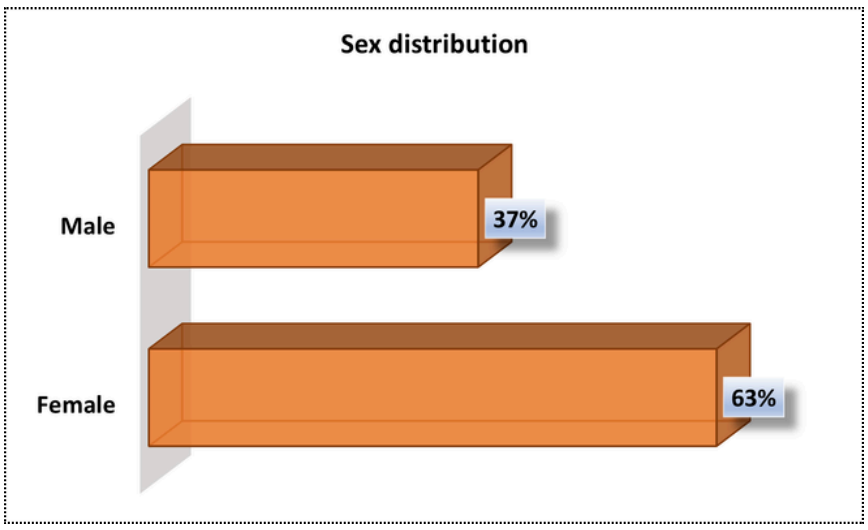
The sociodemographic attributes of the study participants are summarized in ***Figure 2 (A-G)***. The participant pool was primarily composed of younger individuals, with those aged 19 to 40 years constituting over half of the total sample followed by participants aged 41 to 50 years, accounting for approximately 27%. The study aimed to collect data from the member of the household responsible for the decision-making pertaining to food procurement and preparation. Females formed the largest proportion (63%) of the respondents.

Figure 2. Sociodemographic profile of the participants

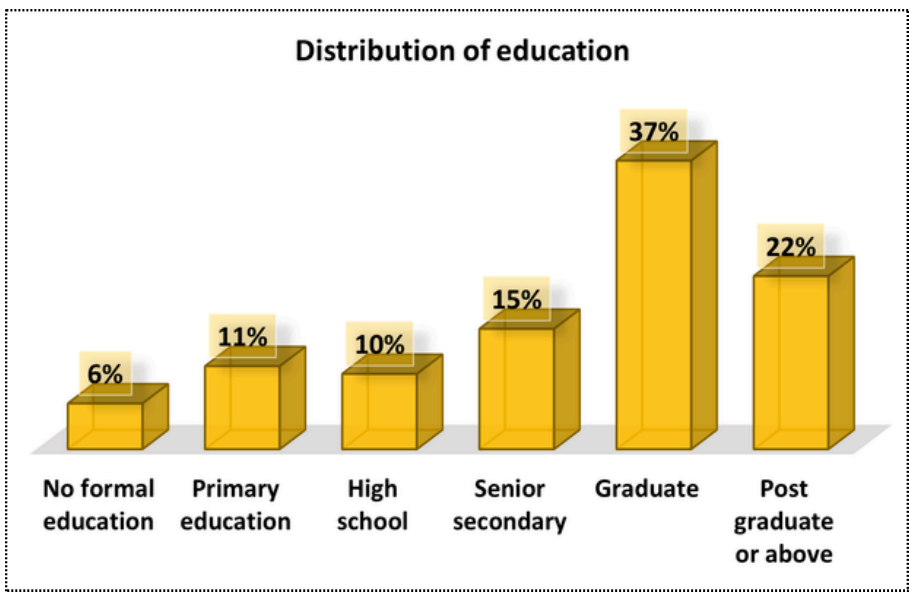
(A)



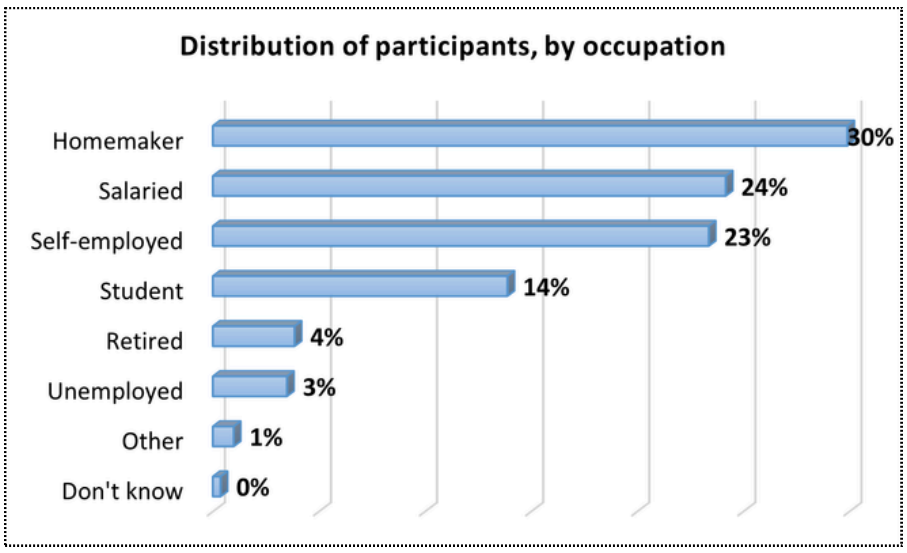
(B)



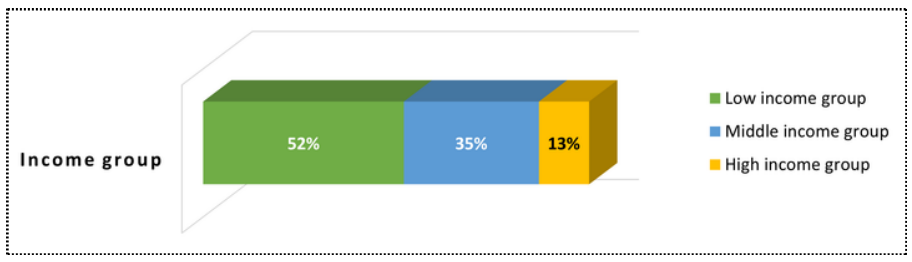
(C)



(D)



(E)



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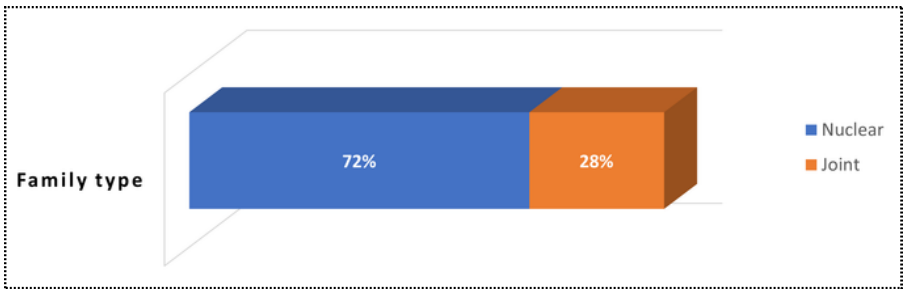
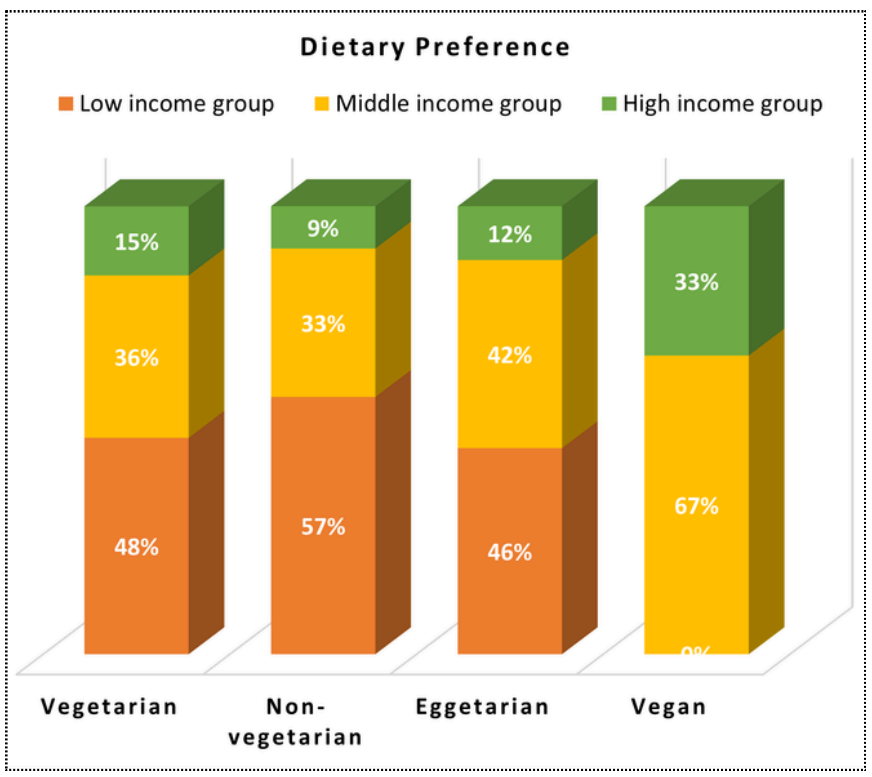


(G)



Participants demonstrated a high level of literacy (97%). Specifically, 37% held graduate degrees, and an additional 22% possessed postgraduate or higher qualifications. In terms of occupational status, homemakers comprised the largest segment (30%), followed by salaried individuals (24%) and the self-employed (23%); students comprised of 14% of the participants. A large proportion of participants belonged to the low-income group (LIG) (53%) and resided in nuclear family structures (72%). Analysis of dietary preferences revealed distinct patterns across income strata. The highest proportions of vegetarians, non-vegetarians, and eggetarians were observed among participants from the LIG. Conversely, the percentage of vegans was highest within the middle-income group (MIG), followed by the high-income group (HIG).

3.2. Accessibility

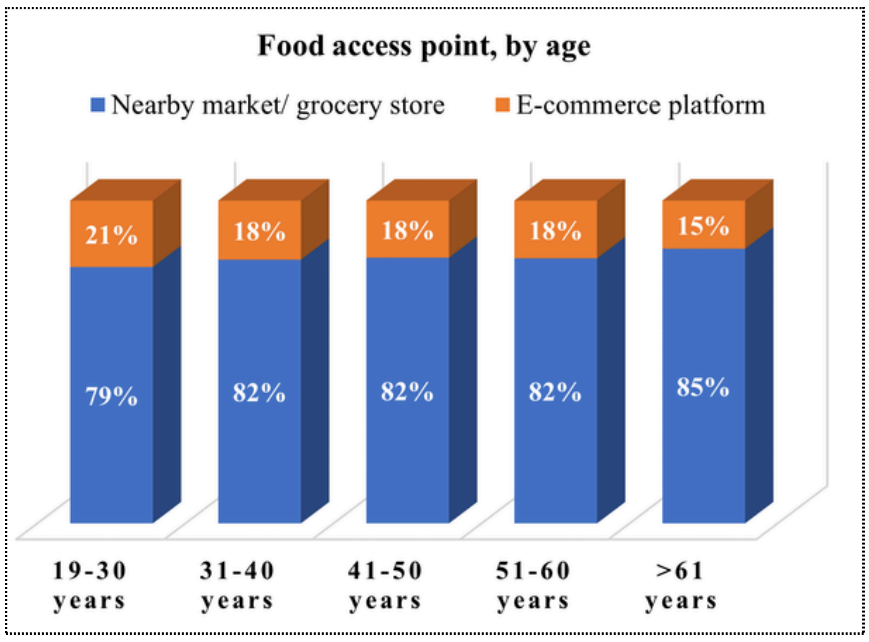
Urban access to healthy diets varies widely, shaped by mobility, transport, and retail options. While cities offer diverse food sources and types, affordability and physical access remain uneven, underscoring the need to prioritize food in urban planning (Raza *et al.*, 2022).

The usage of the two most common food access points among the study participants: nearby markets/grocery stores/kirana stores and e-commerce platforms was examined across demographic variables- age, gender, income group, and education.

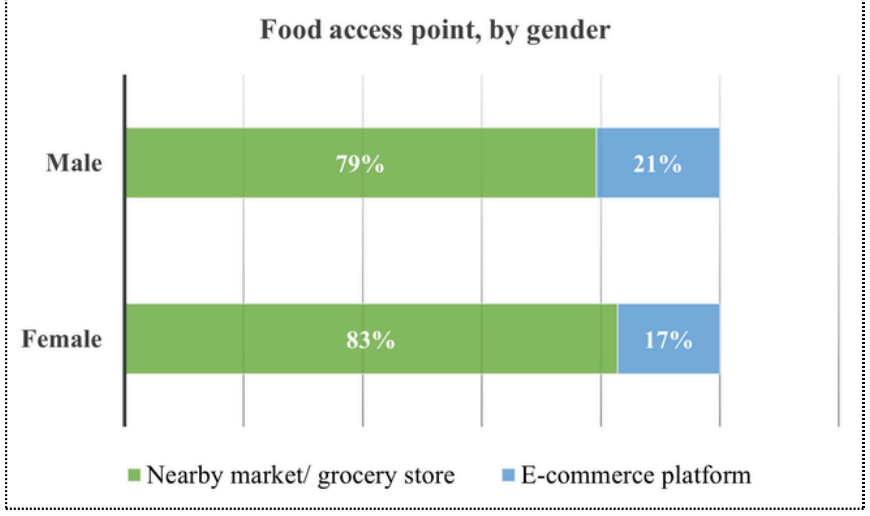
Figure 3 (A-D) collectively illustrate a strong relationship between demographic characteristics and the choice of food access points. Nearby markets and grocery/kirana stores are the preferred option across all groups. This finding aligns with a pan-India survey of 10,207 participants across 32 states and union territories, which reported that 86% favored local kirana stores for routine grocery purchases whereas only 2% were using the e-commerce platforms (Axis My India, 2022). A clear digital divide was observed in the use of e-commerce platforms. The data shows a higher usage of e-commerce platforms among those with higher education levels, higher income, and younger age. Conversely, those with lower levels of education, lower income, and older individuals (aged 61+) rely more heavily on traditional market access. Additionally, a minor gender difference was observed, with males slightly more likely to use e-commerce for food than females. A study reported that rising income led shoppers to prioritize convenience, such as online platforms, over price, while women show a stronger preference for affordable, nearby markets, unlike men (Siddiqui & Tripathi, 2016). Nearby markets allow informal credit and familiar social interactions (Hoffman *et al.*, 1999), in addition to letting people personally inspect the product's quality (by touching and smelling) and confirm its authenticity (Siddiqui & Tripathi, 2016; World Economic Forum, 2020). E-commerce platform, on the other hand, limits sensory and social aspects of shopping, such as touching products and engaging with vendors, and often requires digital and financial literacy, trust in online system (Hoffman *et al.*, 1999; Sekhar *et al.*, 2019), access to smartphones, and a good internet connectivity, thereby restricting its adoption especially among the elderly and those with lower income and lesser education.

Figure 3. Food purchases from nearby markets/grocery stores and e-commerce platforms

(A)



(B)



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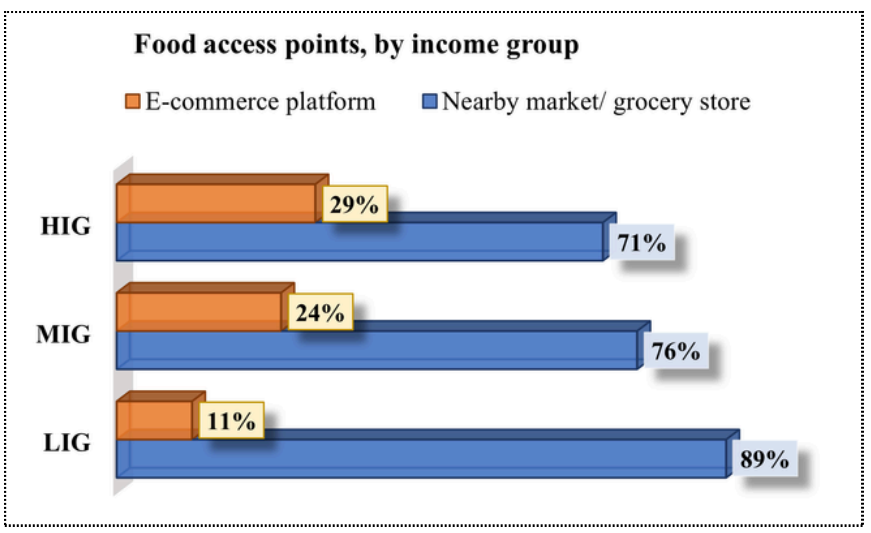

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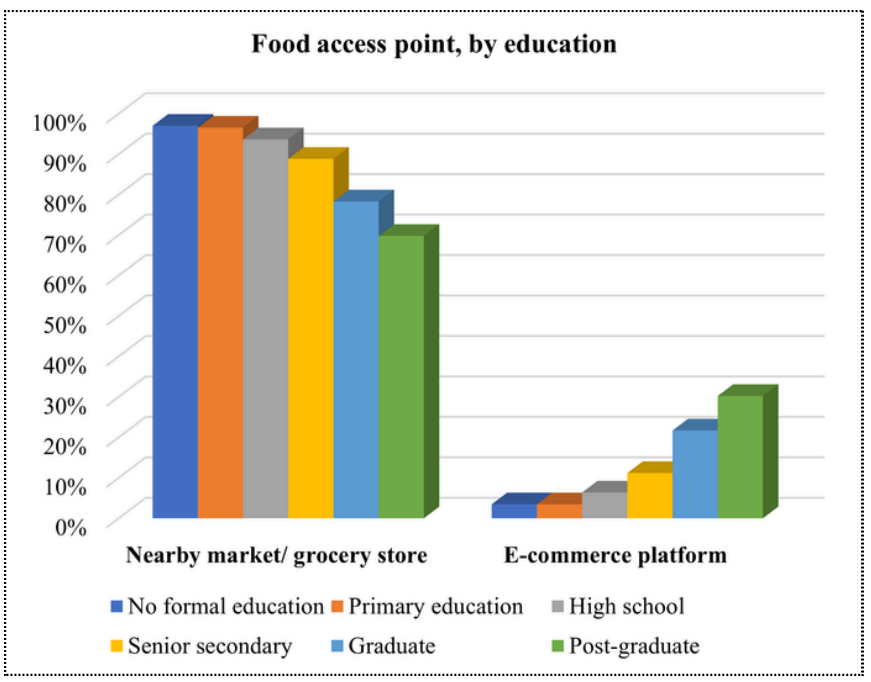


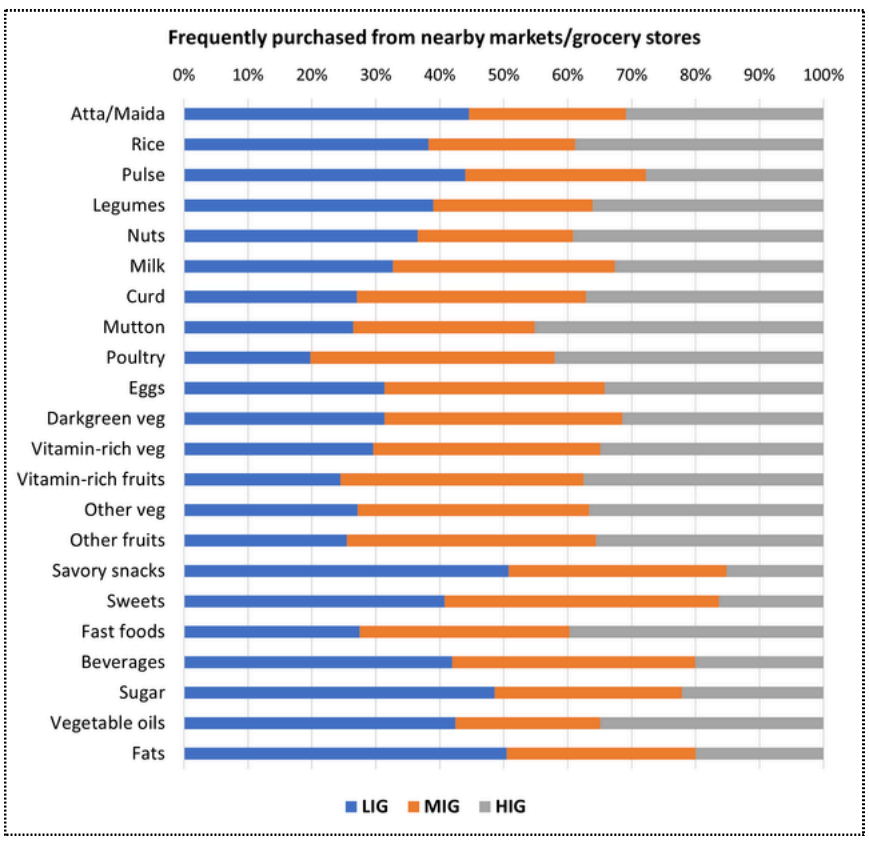
An inverse relationship between income level and the frequency of purchasing staple items and certain ultra-processed foods, coupled with a direct relationship between income level and the frequency of purchasing perishable goods and fast food from these specific outlets has been observed. Participants from the LIG predominantly sourced staple items including rice, atta/maida, pulses, as well as ultra-processed foods such as savory snacks, sweets, beverages, along with sugar and fat from these outlets, most frequently.

In contrast, individuals from MIG and HIG majorly frequently purchased perishable commodities, including milk, curd, meat, poultry, eggs, fruits, and vegetables through this platform. Notably, MIG participants also exhibited considerable reliance on nearby markets for acquiring ultra-processed food items, whereas HIG participants demonstrated a substantial preference for fast food procurement via the same source (***Figure 4A***).

LIG participants are likely purchasing these items very often, possibly in smaller quantities due to budget constraints, limited storage space, or a daily wage-daily purchase cycle (Leibtag & Kaufman, 2003). MIG are relying on frequent purchases of fresh perishables. Their considerable reliance on nearby markets for ultra-processed food suggests convenience and possibly a blend of traditional and modern food habits. They might be able to afford more variety than LIG, but still find local ultra-processed foods accessible and appealing. In MIG and HIG groups, the ability to buy in larger quantities reduces the frequency of purchases from nearby markets for staples. For HIG, substantial preference for fast food procurement implies a lifestyle driven by convenience, time constraints, and the ability to afford ready-to-eat options.

Figure 4. Food items procured frequently from different food access points

(A)



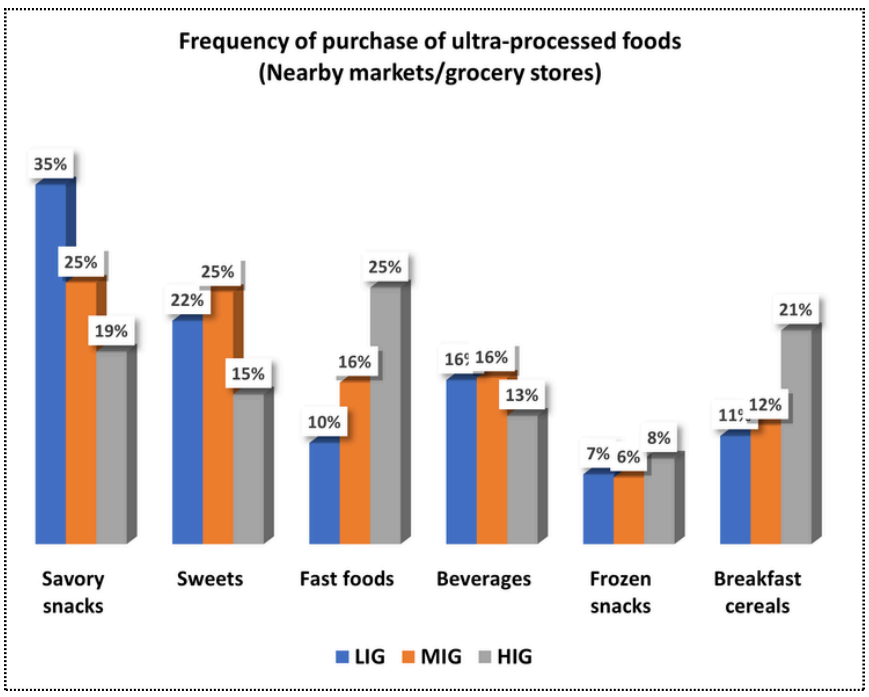
Although, the proportion of participants using e-commerce platforms was very less compared to the nearby markets, among those who did opt for this channel, usage patterns varied notably across income groups. The LIG primarily utilized it frequently for purchasing staples (atta/maida, rice, pulses, and legumes), perishable food items (eggs, vegetables, and fruits), sweets, oils, and fats, a pattern similar to that of MIG. On the other hand, HIG predominantly used this platform for purchasing dairy (milk, curd), meat, poultry, fast-foods, and beverages (***Figure 4B***).

(B)

LIG respondents reported the highest frequency of purchasing savory snacks (35%) and sweets (22%) from nearby markets/grocery stores/kirana stores. MIG showed a similar trend as LIG. Individuals belonging to HIG frequently purchased fast foods (25%) and breakfast cereals (21%) from the same platform (***Figure 5A***). While nearby markets/kirana shops were accessed by majority of our study participants to meet dietary needs, their frequent use has been associated with elevated intake of ultra-processed foods. Dependence on these outlets tends to correlate with lower engagement in home cooking and reduced confidence, attitudes, and motivation toward healthier eating practices (Gundersen et al., 2008).

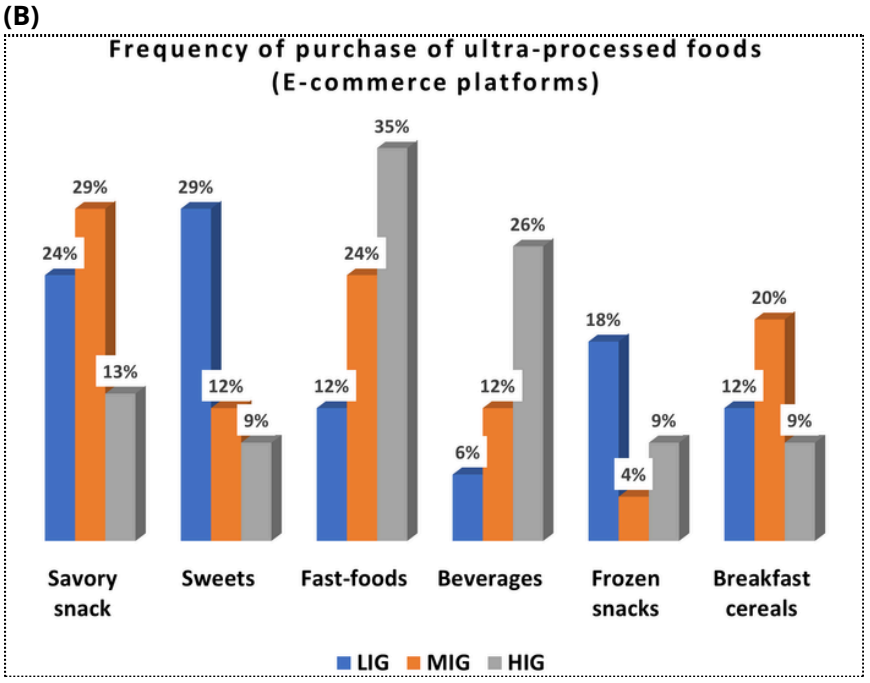
Figure 5. Frequency of purchase of ultra-processed foods

(A)



Sweets (29%) and savory snacks (24%) were also purchased more frequently by e-commerce platform among the LIG group and so were fast foods (35%) and beverages (26%) among the HIG group. Individuals from MIG purchased savory snacks (29%), fast foods (24%), and breakfast cereals (20%) more frequently from the online platform (***Figure 5B***). Lower-income groups tend to favor cheaper, traditional ultra-processed foods such as savory snacks and sweets. Higher-income groups opt for convenience-driven ultra-processed foods such as fast foods and breakfast cereals. Interestingly, some ultra-processed foods like savory snacks, sweets, and fast foods, are consistently popular across all income levels and purchasing platforms, highlighting a broad demand met by both local markets and e-commerce.

(B)



The purchasing trends across income groups show how cost and accessibility are associated with urban food choices. These patterns may reflect broader structural issues in urban food systems, where income and market dynamics shape access to healthier options. Prior research suggests that urban populations likely have more diverse diets than those in rural areas (Levin *et al.*, 1999). However, this advantage may be constrained by socioeconomic disparities, highlighting social and health inequities within urban environments. In urban settings, food is predominantly purchased rather than cultivated. This suggests that access to nutritious food in urban areas is closely tied to household income and the underlying architecture of the food system, including supply chains, distribution networks, and market dynamics along the entire 'farm-to-table' continuum. These factors may inform policy approaches aimed at improving equitable access to healthy diets among urban populations. (Cunha et al., 2011; Levin et al., 1999). In low-income urban areas, healthy foods are often costlier and less available, with few nearby stores. This forces families to travel for nutritious options, adding transport costs, stress, and exposing them to weak transport infrastructure and crime (Barosh *et al.*, 2014; Jones & Charlton, 2015). On the other hand, food items that are unhealthy with poor nutritional composition are often easily accessible and at a lower cost.

3.3. Affordability

Affordability involves more than the cost of food alone; it reflects the household's total income, the relative importance assigned to food spending compared to other financial obligations, and the choices made regarding which food categories are favored or deprioritized (Polack & Platenkamp, 2019). **Table 1** demonstrates the perception of the participants regarding affordability of the food items from different food groups. Cells highlighted in red indicate the highest distribution for a given food group in each of the four consumer perceptions of affordability.

Table 1. Consumer-perceived affordability of different food items

Food groups	LIG (n=581)				MIG (n=394)				HIG (n=142)			
	Expensive foods	Foods wished were cheaper	Foods with Seasonal price fluctuations	Foods bought because cheap	Expensive foods	Foods wished were cheaper	Foods with Seasonal price fluctuations	Foods bought because cheap	Expensive foods	Foods wished were cheaper	Foods with Seasonal price fluctuations	Foods bought because cheap
Roots, tubers, and plantains												
Atta/Maida												
Rice												
Grain-based dishes												
Millets												
Roots/tubers												
Pulses and legumes												
Pulse												
Legumes												
Lentil-based dish												
Nuts and seeds												
Nuts												
Seeds												
Dairy and dairy products												
Milk												
Paneer												
Curd												
Lassi etc.												
Ice-cream etc.												
Probiotic												
Mutton, poultry, fish, and eggs												
Mutton												
Poultry												
Fish												
Eggs												
Vegetables and fruits												
Darkgreen veg												
Vitamin rich veg												

Food groups	LIG (n=581)				MIG (n=394)				HIG (n=142)			
	Expensive foods	Foods wished were cheaper	Foods with Seasonal price fluctuations	Foods bought because cheap	Expensive foods	Foods wished were cheaper	Foods with Seasonal price fluctuations	Foods bought because cheap	Expensive foods	Foods wished were cheaper	Foods with Seasonal price fluctuations	Foods bought because cheap
Other veg												
Other fruits	■	■			■	■			■	■	■	
Ultra-processed foods												
Savory snacks				■		■		■		■	■	■
Sweets	■	■	■		■		■					
Fast foods	■				■				■			
Beverages												
Frozen snacks												
Breakfast cereals												
Sweeteners, fats, and oils												
Nutritive sweeteners												
Non-nutritive sweeteners												
Vegetable oils	■	■	■	■	■	■	■	■	■	■	■	■
Fats									■	■	■	
Spices and condiments												
Masalas	■	■	■	■	■	■	■	■	■	■	■	■
Chutneys												
Pickes												
Sauces												
Jams												
Beverages												
Tea/coffee	■	■	■	■	■	■	■	■		■	■	■
Energy drinks	■											
Dairy alternatives									■			

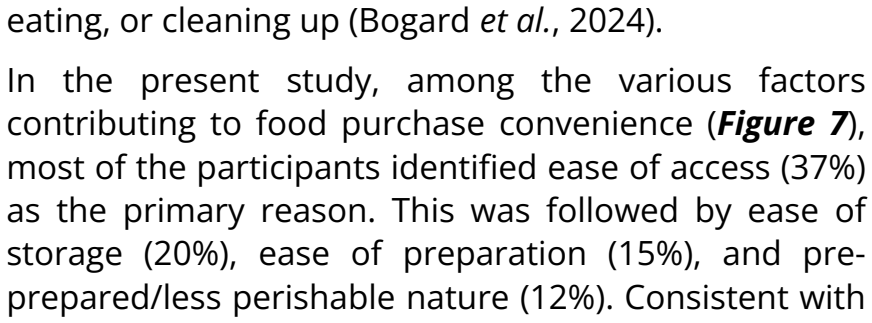
Cells highlighted in red indicate the highest distribution for a given food group in each of the four consumer perceptions of affordability

The three income groups found pulses, nuts, vegetable oils, masalas (food adjuncts), tea, coffee, meat, and fruits to be expensive, suggesting these items may inherently be costly for the general population in an urban setting. Their perceptions on other foods varied. LIG and HIG considered rice expensive, whereas the MIG felt the same way about atta/maida. This could be due to differing primary carbohydrate sources or regional dietary habits influencing perceived cost. Fast foods were seen as expensive across all groups positioning them as a discretionary or occasional indulgence rather than a staple. The LIG and MIG individuals also found sweets to be pricey. All the income groups were buying savory snacks when cheap or on sale. Regarding paneer (cottage cheese), LIG and MIG found it expensive, while the HIG would only buy it when prices were low. HIG participants considered milk to be expensive, but the other two groups simply wished it was cheaper.

The food pricing perceptions reported across income groups reflect broader patterns observed in LMICs, where cost remains a major determinant of dietary choices. Items such as pulses, nuts, meat, fruits, and dairy, frequently considered expensive by participants, are also among the most costly globally, particularly when compared to less nutritious alternatives. These findings align with an analysis conducted across 20 LMICs which revealed that urban households in the lowest income brackets allocated a substantial share of their spending to food, exceeding 50% in 18 of the 20 countries reviewed (Ahmed *et al.*, 2007). Healthier diets, characterized by adequate intake of protein, vegetables, and fruits often come at a higher cost than less nutritious options (Darmon & Drewnowski, 2015). This resonates with another study which reported that fruits, vegetables, and animal-based foods rank as the most costly among major global food groups (Hirvonen *et al.*, 2020). For individuals with limited incomes, allocating a substantial portion of household resources to food can constrain their ability to select diverse or higher-quality food, leading to a reliance on inexpensive and nutritionally poor choices (Darmon et al., 2003). Among low-income populations, fluctuations in food prices often trigger coping strategies, including reduced consumption and substitution with lower-cost, less nutritious foods, which can further increase the risk of malnutrition (Cohen & Garrett, 2010).

Following a hypothetical increase in income, 28% of respondents indicated a preference for enhancing dietary quality, while 24% favored increased food variety. A smaller proportion (14%) reported they would increase the overall quantity of food consumed. Additionally, 22% collectively expressed interest in convenience- and experience-driven food choices: preferring to dine out (7%), exploring diverse cuisines (7%), opting for online food orders (4%), and selecting ready-to-eat products (4%) (***Figure 6***). This indicates that for many, basic caloric needs are likely already met, and increased income would allow for more refined or convenient food choices.

Figure 6. Perceived shifts in food purchase behaviour with an increase in income

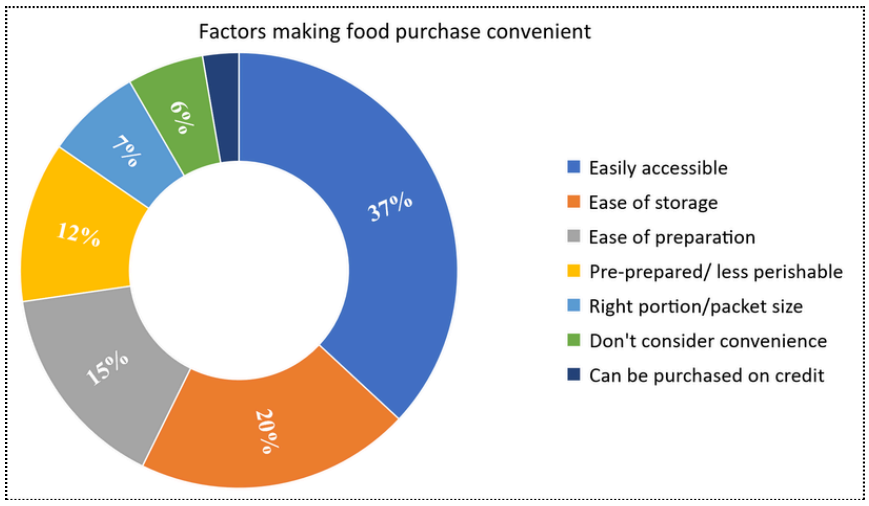


3.4. Convenience

Convenience in the context of food encompasses features that lessen the consumer's reliance on time, effort, and expertise during various stages, such as planning, obtaining, preparing, storing, transporting, eating, or cleaning up (Bogard *et al.*, 2024).

In the present study, among the various factors contributing to food purchase convenience (***Figure 7***), most of the participants identified ease of access (37%) as the primary reason. This was followed by ease of storage (20%), ease of preparation (15%), and pre-prepared/less perishable nature (12%). Consistent with these findings, a study conducted in Nairobi, Kenya emphasized the role of ease of access in shaping food purchasing behavior. Respondents in that study noted the convenience of buying pre-prepared foods from street vendors, describing them as both time- and cost-efficient options (Downs, *et al.*, 2022). Additional research has also identified ease of access as an important factor associated with food purchasing behavior, particularly in relation to store proximity (Krukowski *et al.*, 2012), with consumers frequently opting to shop at a single location due to its convenient distance (Bridle-Fitzpatrick, 2015; Webber *et al.*, 2010).

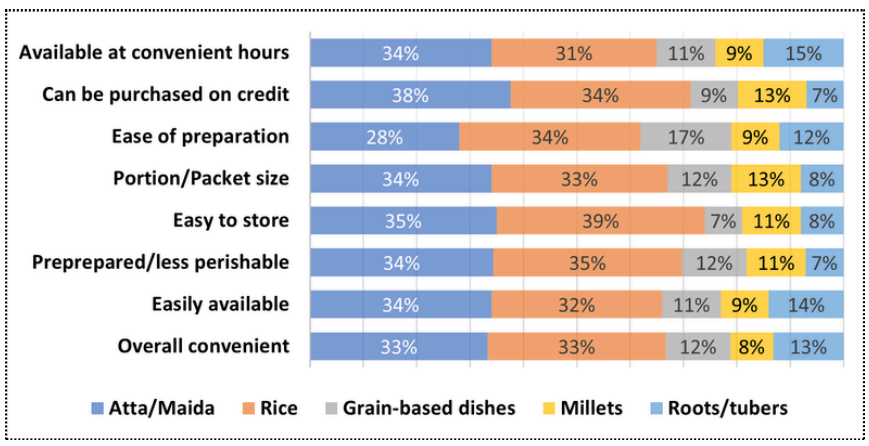
Figure 7. Distribution of factors contributing to the convenience of food purchases



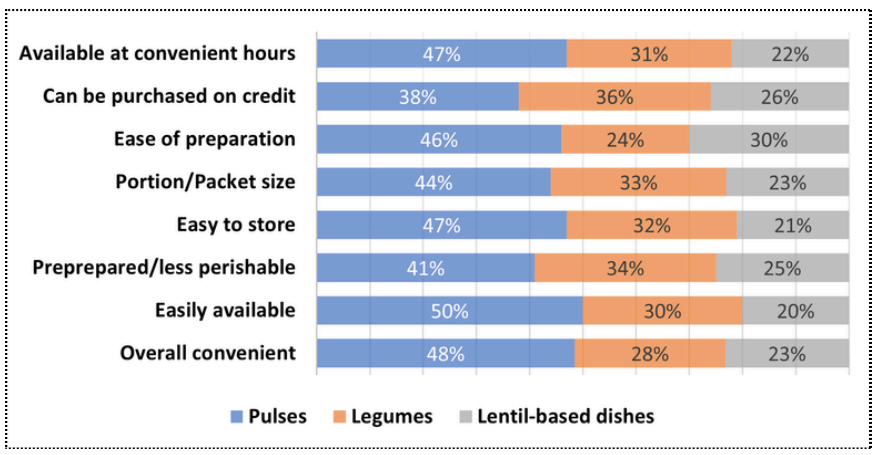
Participants were assessed on various dimensions of convenience associated with food items across multiple food groups (***Figure 8A-J***).

Figure 8. Participant perceptions of convenience for various food groups

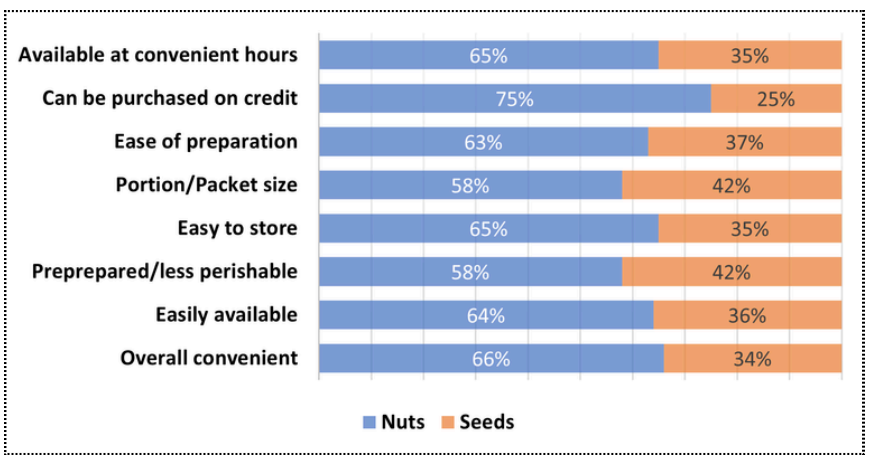
(A). Grains and tubers



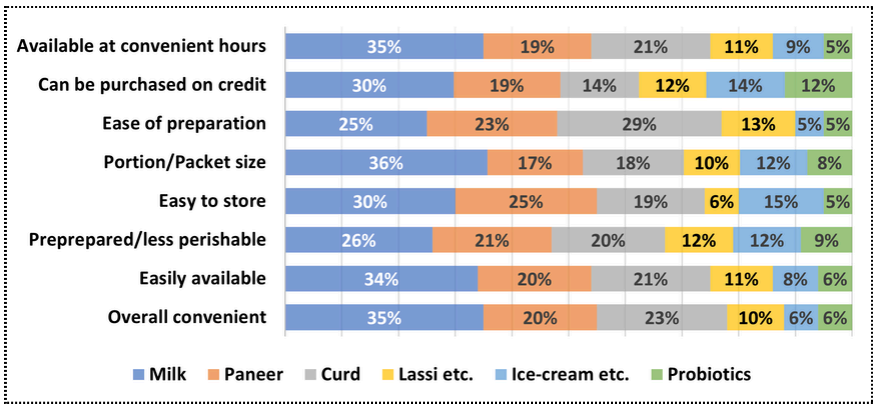
(B). Pulses and legumes



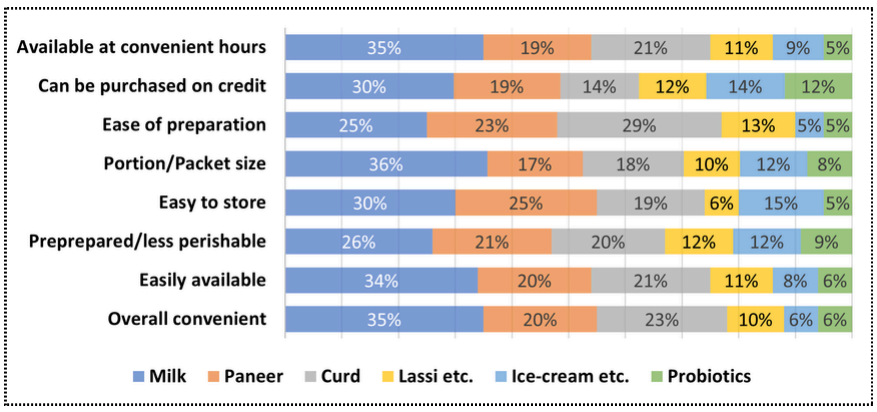
(C). Nuts and seeds



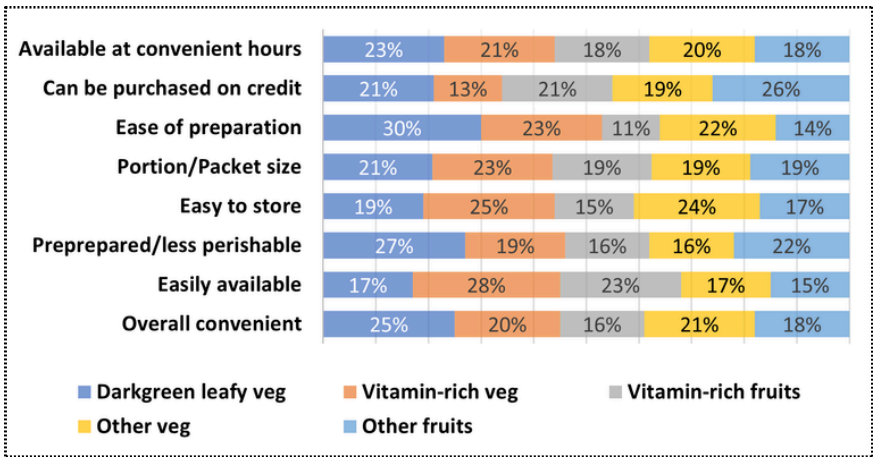
(D). Dairy and dairy products



(E). Meat, poultry, fish, and eggs



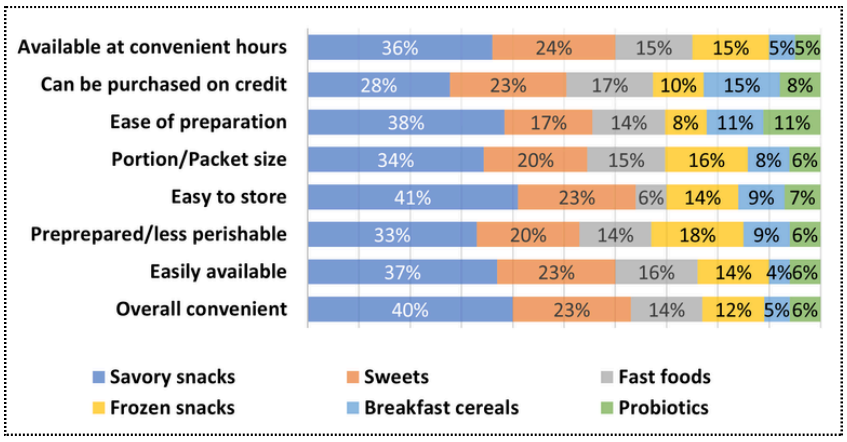
(F). Vegetables and fruits



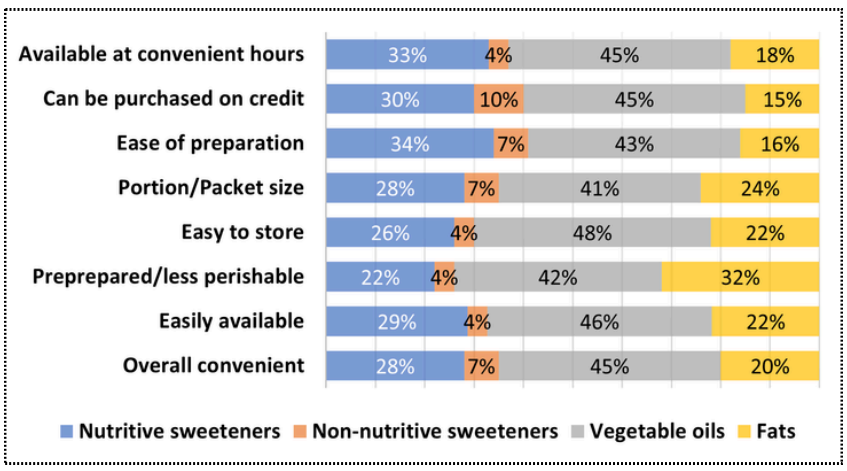
Atta/Maida, rice, pulses, nuts, milk, and eggs were perceived as the most convenient options within their respective food categories across various factors of convenience such as availability, purchase, preparation, and storage. Legumes and poultry generally ranked second in convenience. In contrast, grain-based dishes offered moderate convenience, while millets, roots/tubers, seeds, meat, and fish were consistently seen as less convenient. Among vegetables and fruits, darkgreen leafy and vitamin-rich vegetables showed slight advantages in preparation and availability, while other fruits led in credit purchase convenience, with varying convenience levels for vitamin-rich fruits and other vegetables (***Figure 8A-F***).

Among ultra-processed foods, savory snacks exhibited the highest perceived convenience, followed by sweets. Fast foods, frozen snacks, breakfast cereals, and probiotics showed comparatively lower convenience. Vegetable oils emerged as the most convenient among 'sweeteners, fats, and oils' category, with nutritive sweeteners ranking second. Masalas were deemed most convenient among food adjuncts, while chutneys, pickles, sauces, and jams had more uniform convenience distribution. In beverages, tea/coffee was rated highest (***Figure 8G-J***).

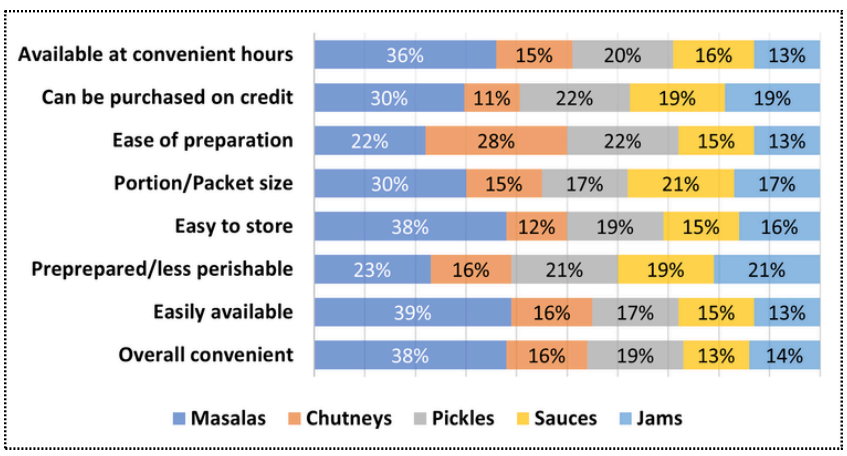
(G). Ultra-processed foods



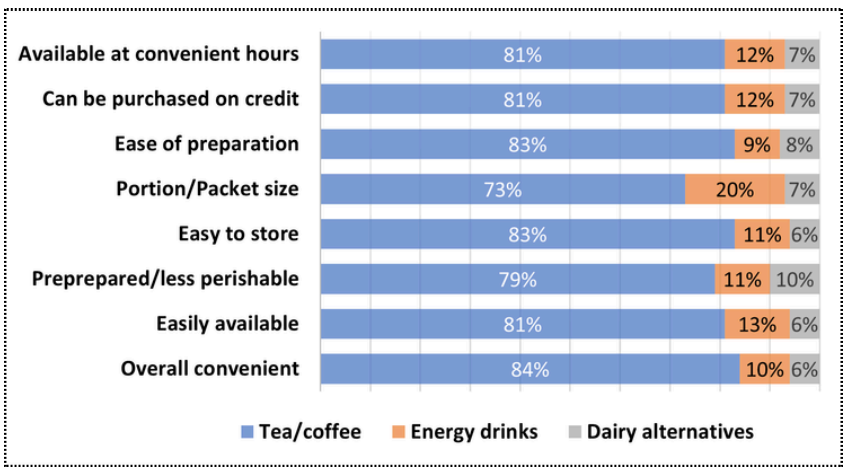
(H). Sweeteners, fats, and oils



(I). Food adjuncts



(J). Beverages



These findings align with a broader trend seen in other studies, which also highlight the role of convenience in food purchasing decisions. For example, a study from Brisbane, Australia, revealed that urban consumers frequently purchased non-essential food items, with just 58.2% favoring expenditure on fresh and healthy essentials. Over 30% shopped for discretionary foods more than twice weekly. Key reasons cited included convenience (28%), accessibility and availability (19% each), taste (16%), and affordability through promotions (11%), despite majority of the respondents (81.4%) being fully aware of the health risks linked to excess consumption of such foods (Summerhayes et al., 2024). In other studies, ready-to-eat (RTE) products including items like bread, packaged cookies, candies, salted snacks, canned and fresh fruits, baby carrots, and ready-to-drink beverages, were widely viewed as highly convenient due to their immediate consumability without requiring any preparation (Costa *et al.*, 2001; Pearson et al., 1985; Viskaal-van Dongen *et al.*, 2011).

A substantial proportion of participants (76%) reported daily cooking times ranging from 1 hour to over 2 hours during the last 30 days. The '1 to 1.5-hour' category represented the highest frequency within this distribution (28%), with a comparatively smaller group of participants engaging in less than one hour of daily cooking (***Figure 9***).

Figure 9. Time spent on cooking per day

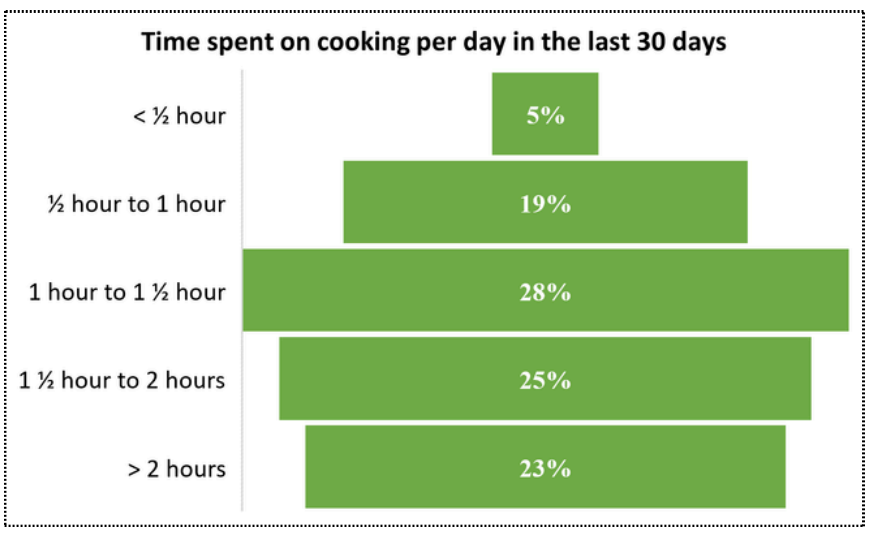
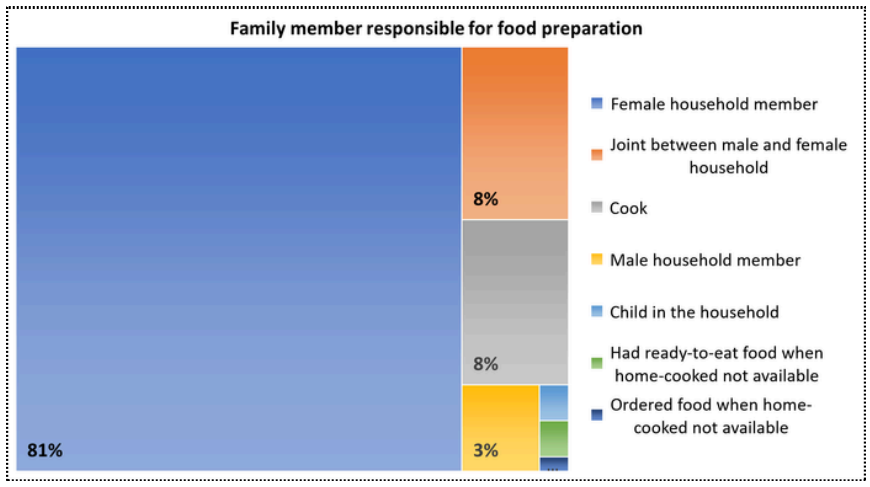


Figure 10 (A-C) consistently reveals a pronounced gender-based division of labor in household food-related responsibilities. Women were predominantly the primary agents in decisions regarding food procurement and meal preparation, occupying over half of these roles, substantially surpassing the involvement of men or jointly shared decision-making. Additionally, women undertook the primary responsibility for executing food preparation tasks, with 81% of households assigning this role exclusively to a female member. The role of women as key decision-makers within the food environment has also been reported previously (Twyman *et al.*, 2020).

Figure 10. Family members responsible for decision making of food procurement and preparation

(A)



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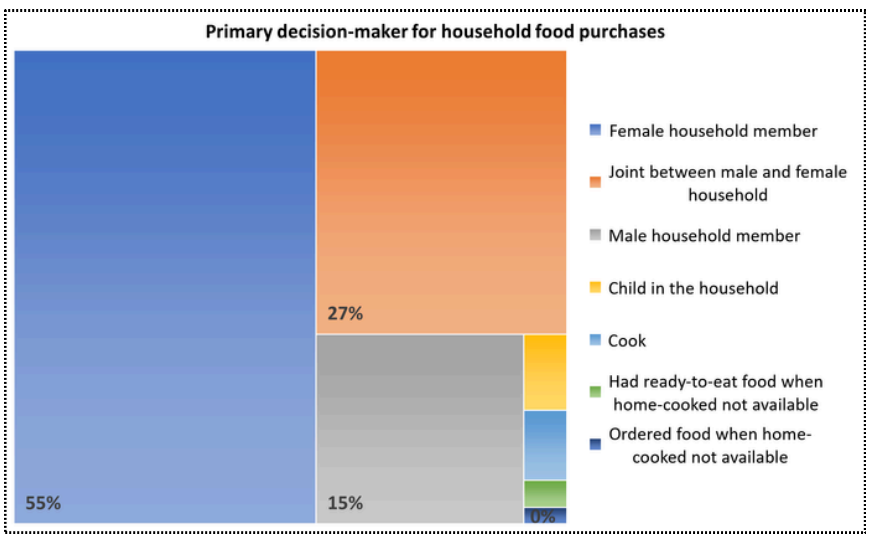

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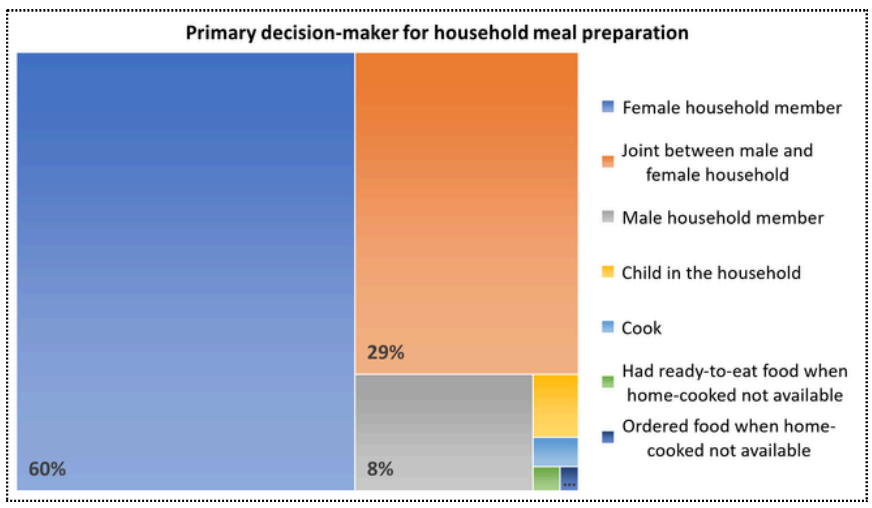


3.5. Quality and Safety

Food quality and safety play a crucial role in shaping dietary choices. In low-income and low-resource settings, the widespread availability of poor-quality or unsafe food is often associated with undernutrition and poorerhealth outcomes. Thus, to effectively inform nutrition policy and practice, food systems assessments aimed at promoting healthy diets may incorporate targeted inquiries into food quality and safety (Raza *et al.*, 2022). The present study aimed to explore participants' perceptions of food safety and quality within their immediate food environment.

Most of the participants considered cleanliness and hygiene (26%) an important factor while purchasing food, followed by food cost (21%) and personal preference (14%) (***Figure 11***). This finding aligns with research across various LMICs that highlights how concerns over hygiene, and sanitation significantly influence consumer food choices (Omari & Frempong, 2016; Rathi *et al.*, 2016; Turner, 2020; Wertheim-Heck *et al.*, 2014, 2019).

Figure 11. Criteria influencing food purchase based on quality and safety attributes

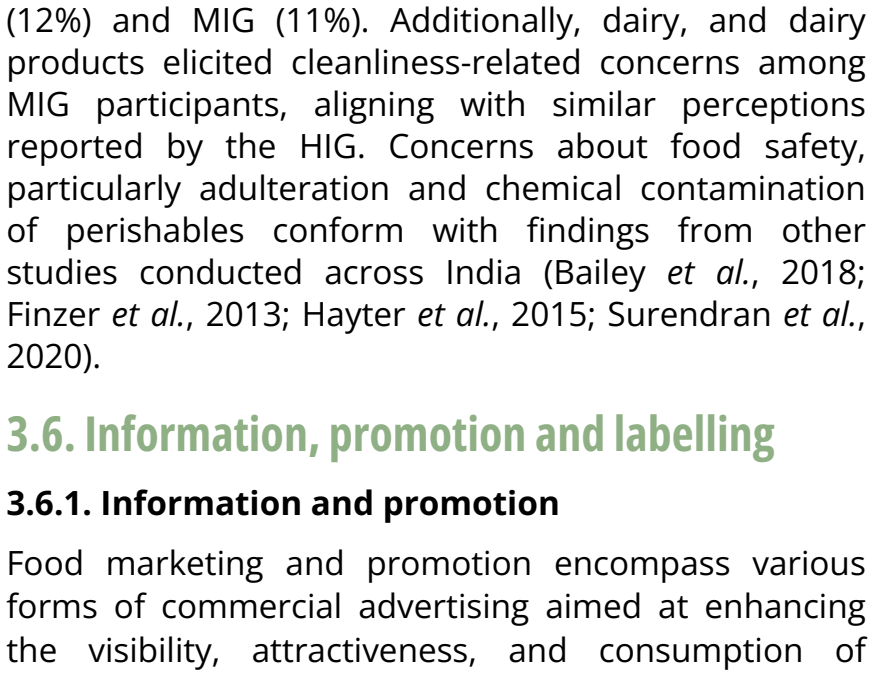


Table 2 presents a structured overview of consumer concerns related to cleanliness, pesticide and chemical residues, and adulteration across various food groups, stratified by income levels: LIG, MIG, and HIG. Adulteration in dairy and dairy products emerged as the most prominent concern across all income groups (16% LIG; 17% MIG; 16% HIG). In contrast, fruits and vegetables were predominantly associated with concerns regarding pesticide and chemical residues. Cleanliness concerns were notably high for 'grains, roots, and tubers' among participants from the LIG (12%) and MIG (11%). Additionally, dairy, and dairy products elicited cleanliness-related concerns among MIG participants, aligning with similar perceptions reported by the HIG. Concerns about food safety, particularly adulteration and chemical contamination of perishables conform with findings from other studies conducted across India (Bailey *et al.*, 2018; Finzer *et al.*, 2013; Hayter *et al.*, 2015; Surendran *et al.*, 2020).

3.6. Information, promotion and labelling

3.6.1. Information and promotion

Food marketing and promotion encompass various forms of commercial advertising aimed at enhancing the visibility, attractiveness, and consumption of specific food products, brands, or services (Cairns *et al.*, 2013). In this framework, advertising serves as a critical link between production and consumer demand (Kraak *et al.*, 2019).

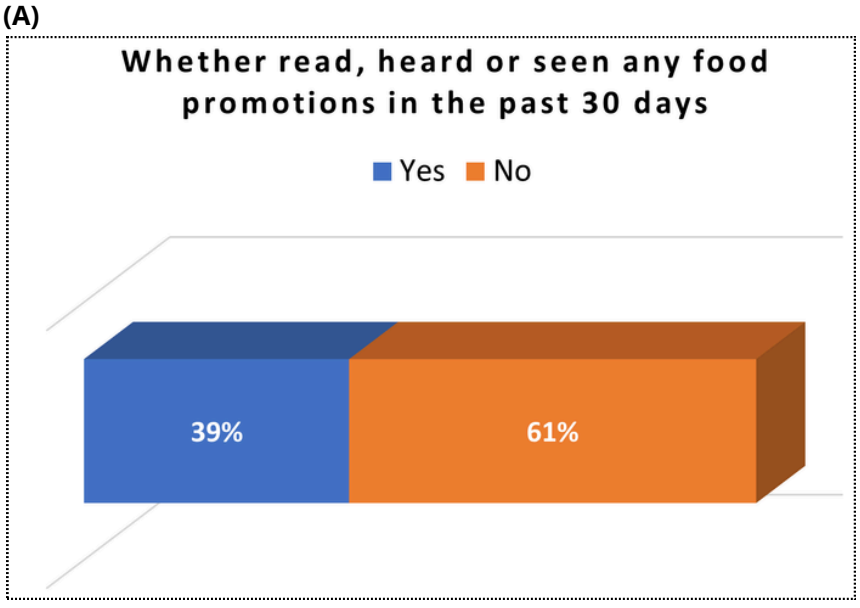
Table 2. Comparative overview of perceived safety and quality in food items

Food groups	LIG (n=581)			MIG (n=394)			HIG (n=142)		
	Worried for cleanliness (%)	Worried for pesticides and chemicals (%)	Worried for adulteration (%)	Worried for cleanliness (%)	Worried for pesticides and chemicals (%)	Worried for adulteration (%)	Worried for cleanliness (%)	Worried for pesticides and chemicals (%)	Worried for adulteration (%)
Grains, roots, and tubers	12	9	12	11	7	10	6	7	5
Pulses and legumes	10	8	9	10	8	10	8	8	11
Nuts and seeds	4	2	2	4	3	3	3	2	3
Dairy and dairy products	10	8	16	11	5	17	13	9	16
Meat, poultry, fish, and eggs	9	4	3	8	3	4	8	4	5
Green leafy vegetables	10	15	6	10	16	6	12	14	6
Vitamin-rich fruits and vegetables	10	14	6	11	16	6	12	14	7
Other vegetables	10	14	5	10	15	5	11	16	7
Other fruits	8	12	5	10	13	4	12	14	8
Ultra-processed foods	2	3	7	2	3	8	5	2	9
Sweeteners	4	3	7	4	2	6	2	1	5
Fats and oils	5	5	10	4	3	7	3	3	7
Food adjuncts	4	4	9	2	4	8	3	4	7
Beverages	3	1	4	2	1	4	2	1	3

In this study, of the total respondents, only 39% reported an exposure (read, heard, or seen) to food and beverage promotions in the past month (***Figure 12A***).

Figure 12. Recent consumer exposure to food promotions

(A)



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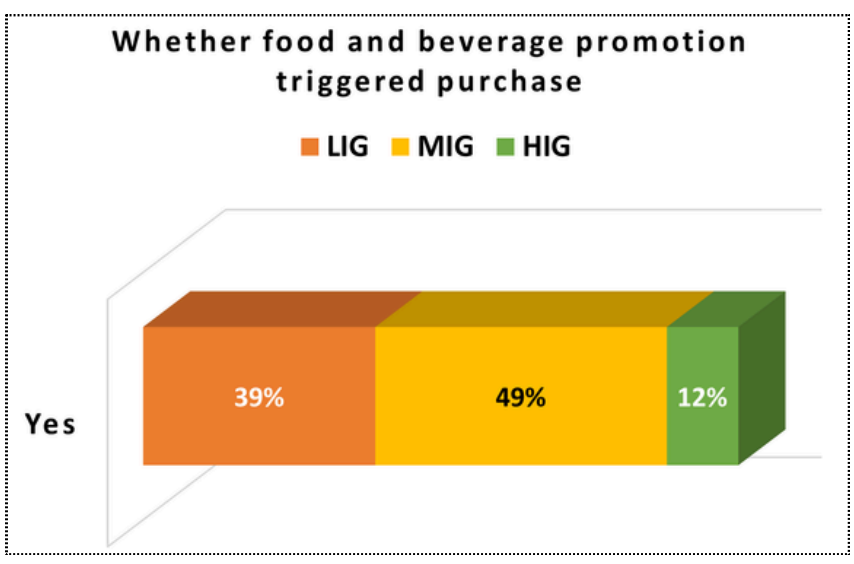

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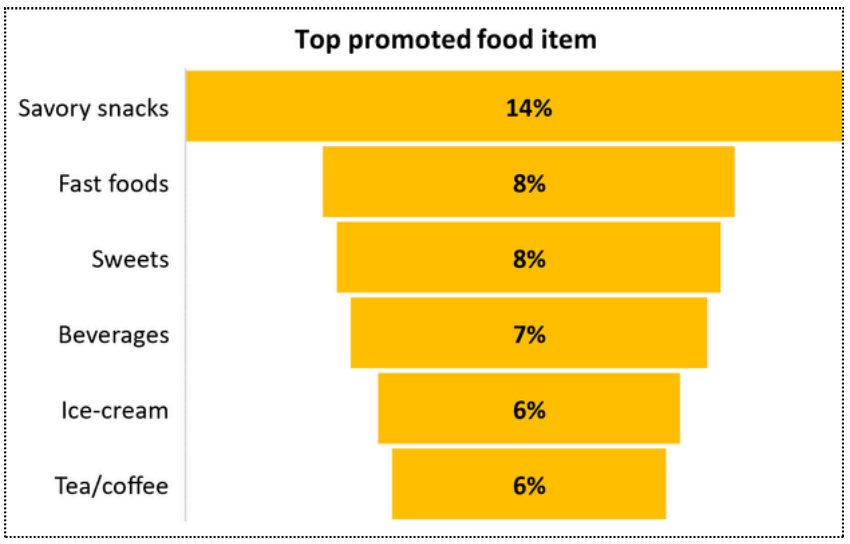

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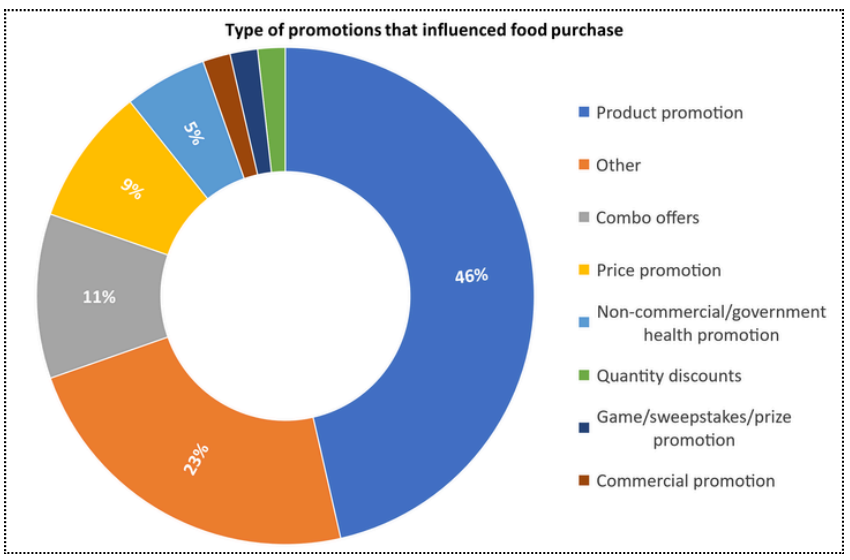
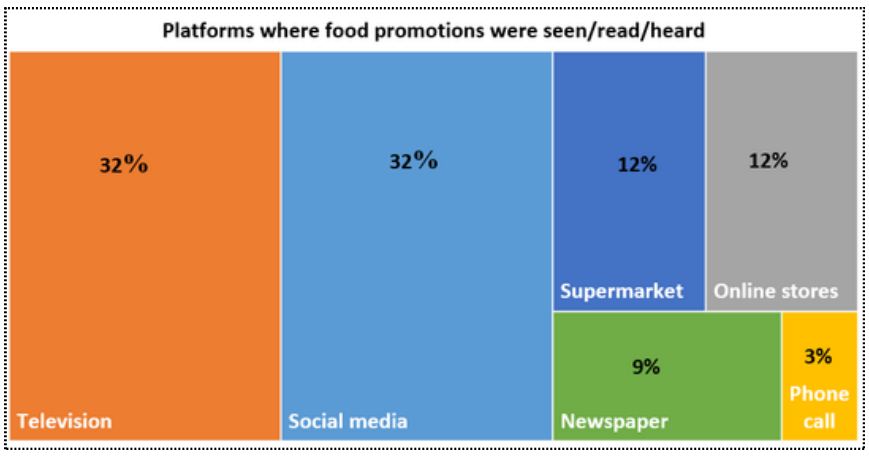


These respondents who were exposed to promotions notably included a high proportion (88% combined from LIG and MIG) for whom these promotions triggered a purchase (***Figure 12B***). Among the promoted food items, 'savory snacks' were the most frequently promoted category, accounting for 14% of promotions, followed by 'fast foods' and 'sweets' at 8% each (***Figure 12C***).

The type of promotion that most significantly influenced these purchases was product promotion (46%), followed by other unspecified types (23%) and combo offers (11%) (***Figure 12D***).

The effectiveness of these promotions, particularly for ultra-processed foods like savory snacks and fast food, is not an isolated trend. Our results are consistent with a systematic review which found that the food industry shapes children's eating habits through six key environments: school, home, retail, media (TV and internet), and promotion campaigns. Unhealthy foods are heavily marketed using eye-catching packaging, toys, and emotional hooks, while healthier options remain underpromoted, fueling brand loyalty and poor dietary choices (Sonntag *et al.*, 2015). Evidence from a systematic review of randomized controlled trials shows that marketing of unhealthy foods and beverages leads to greater consumption and preference for energy-dense, nutrient-poor products among children, particularly during or immediately following exposure to the promotion (Sadeghirad *et al.*, 2016).

(E)



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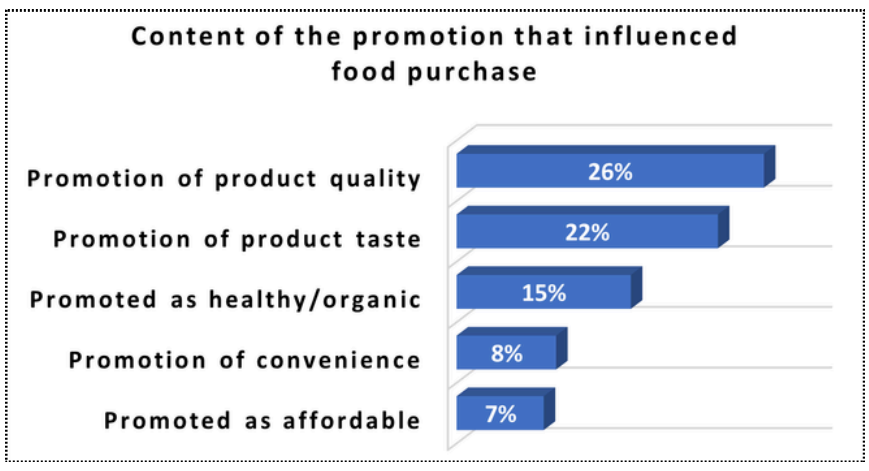

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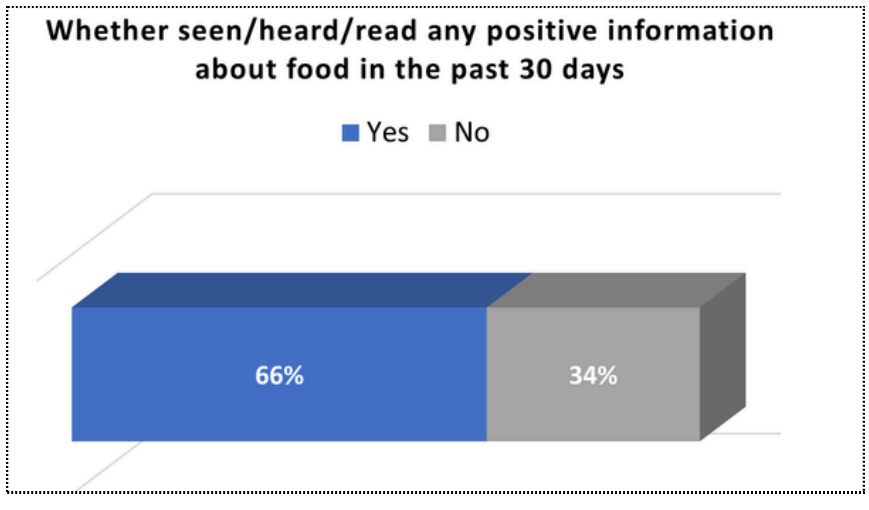

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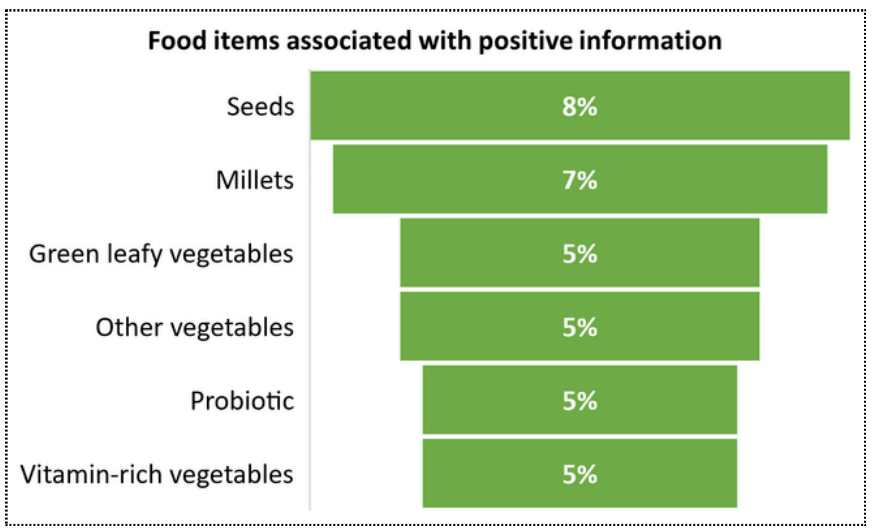
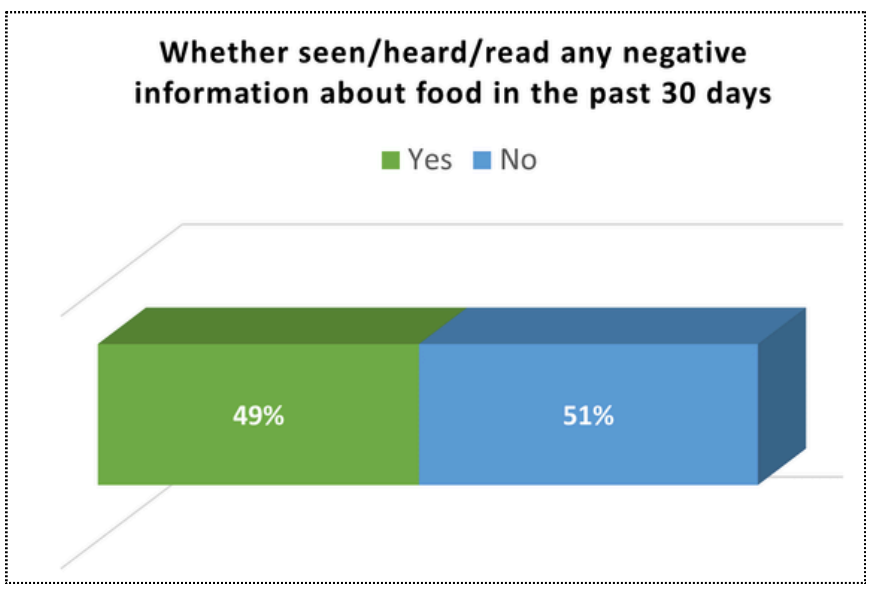
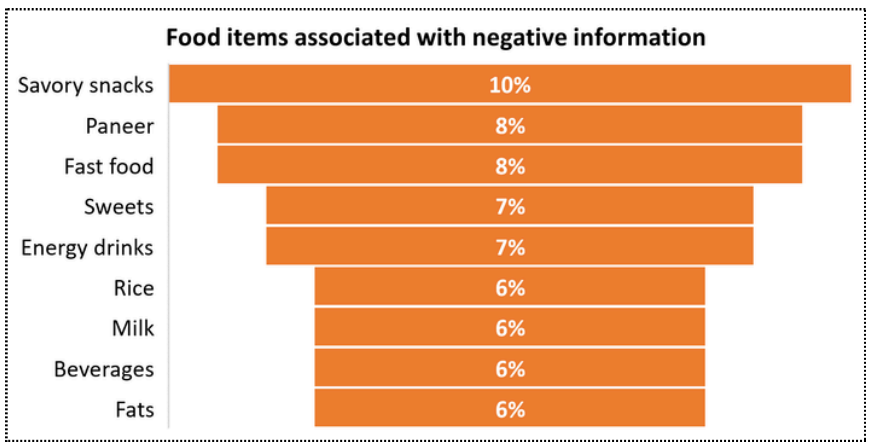


(I)



(J)



The platforms where food promotions were seen were predominantly television and social media, both accounting for 32% of responses (***Figure 12E***). When it came to the content of promotions that influenced food purchases, product quality was the most influential factor at 26%, followed by product taste at 22% (***Figure 12F***). A considerable portion of people have been exposed to both positive and negative food-related information in the past 30 days. The data shows that 66% of individuals saw, heard, or read positive information about food, with seeds and millets being the most frequently mentioned food items (8% and 7%, respectively). Conversely, 49% of people encountered negative information, with savory snacks (10%), paneer (8%), and fast food (8%) being the most associated food items (***Figures G to J***).

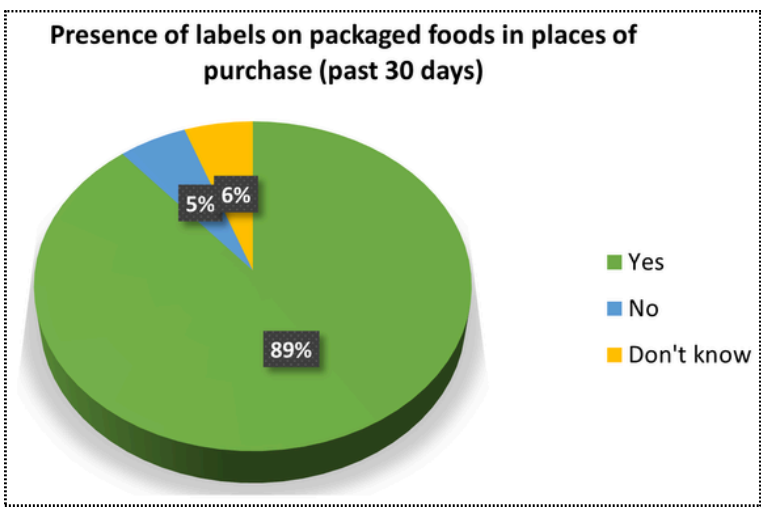
Despite broad exposure to both positive and negative food-related messaging, the degree to which these communications influence actual dietary choices appears to diverge significantly along socioeconomic lines. An Australian study found that individuals from lower socioeconomic backgrounds such as blue-collar workers and those without post-school education were less likely to buy foods aligned with positive food promotions and guidelines. They purchased fewer high-fiber, low-salt, low-sugar items and consumed fruits and vegetables less frequently than their higher-income counterparts (Turrell *et al.*, 2002). These patterns are consistent with findings from other similar studies (Rankin *et al.*, 1998; Turrell, 1996, 1998). Notably, evidence from these and related investigations suggests that health promotion campaigns advocating diverse and nutritious food choices are generally more effective among socioeconomically advantaged populations (Patterson & Block, 1988; Turrell, 1997; Worsley & Crawford, 1986). This uneven distribution of benefit has led researchers to argue that such interventions, though well-intentioned, may inadvertently increase nutritional inequalities, as disadvantaged groups often face greater social and economic constraints that hinder their ability to adopt healthier dietary behaviours (Kawachi & Marmot, 1998). Moreover, recommended foods in positive food promotions and health guidelines may be financially out of reach for economically constrained communities, further limiting adoption of such dietary practices (Barratt, 1997; Sooman *et al.*, 1993).

3.6.2. Labeling

Nutrition labeling represents a key public health strategy designed to support healthier consumer choices by conveying essential information directly on food packaging (Mahan, 2004). As a primary channel of product communication between sellers and buyers (Satia et al., 2005; Wardlow & Insel, 1996), food labels serve as practical instruments for informed decision-making. When effectively utilized, they can act as influential tools in promoting dietary awareness (Goldberg, 1992).

Figure 13. Consumer behaviour regarding food labels

(A)



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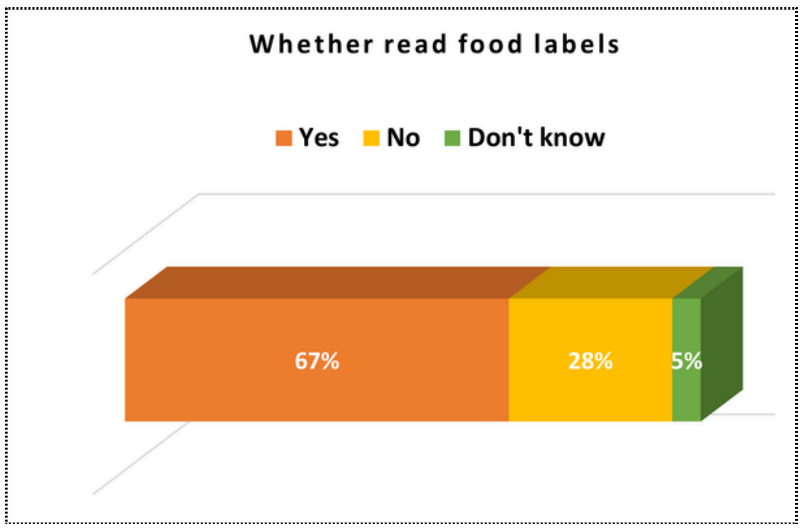

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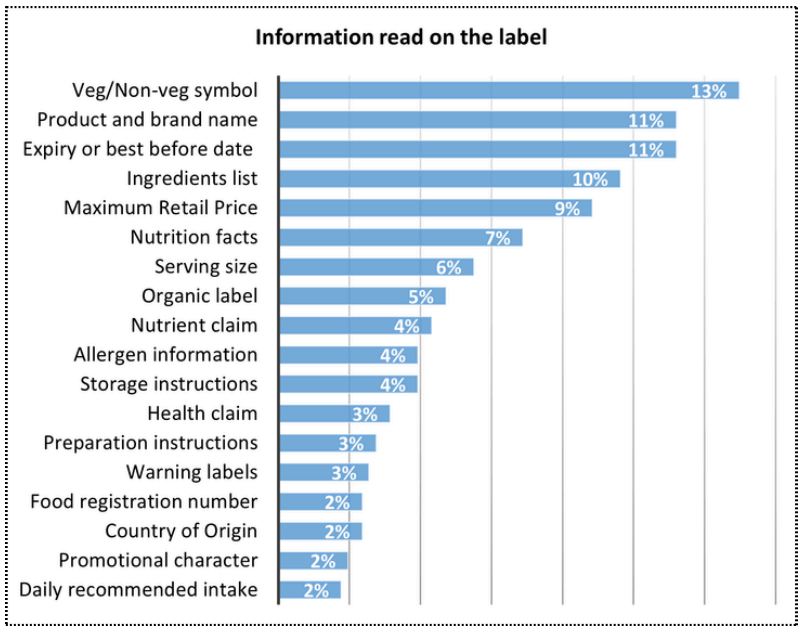


A vast majority of the participants found that packaged foods (89%) have labels present at the point of purchase (***Figure 13A***). Consistent with this, a notable proportion of consumers (67%) reported that they read food labels (***Figure 13B***). When they did read labels, the most frequently checked information was the veg/non-veg symbol (13%), followed by the product/brand name and the expiry/best-before date, both at 11%. Other important details consumers looked for included the ingredients list (10%), maximum retail price (9%), and nutrition facts (7%). Information such as daily recommended values, promotional characters, and country of origin were among the least read items, each with a low percentage of 2% (***Figure 13C***).

These preferences appear consistent with findings from a European study involving 248 participants where nutritional composition in the product label was not the primary factor influencing food choices. Instead, respondents prioritized overall checking the product quality on the label, focusing on aspects such as origin, ingredient integrity, and additive content (Viviana Viola *et al.*, 2016). Similar results were found in a study conducted in India which reported that nearly 90% of participants routinely examined food labels. Their primary concern, however, centered on food safety, particularly regarding shelf-life, and thus tended to focus mainly on the manufacturing and expiry dates (Bera *et al.*, 2021). Several studies have shown that

engaging with label content has been associated with healthier consumption patterns, including reduced intake of salt and fat (De Magistris *et al.*, 2010; Teisl & Levy, 1997). Reinforcing this, a systematic review and meta-analysis of randomized trials demonstrated that nutrition labeling serves as a practical tool to support and guide consumers toward making more informed, health-conscious food choices (Cecchini & Warin, 2016).

In their 2021 analysis, Bera et al. recommended stronger food labeling and advertising regulations in India, modeled on Chile's approach (Bera *et al.*, 2021). Such a framework, they argue, would empower consumers to make informed dietary choices, favoring healthier options over those high in critical nutrients. According to Chilean law introduced nationwide in Chile in 2016, packaged food products that contain elevated levels of energy, sugars, saturated fats, or sodium, nutrients associated with non-communicable diseases, are required to feature warning labels on the front of the packaging to alert consumers. Additionally, these items are barred from being advertised to children under the age of 14 and are not allowed to be sold or distributed through schools, nurseries, or related food programs (Corvalan *et al.*, 2013, 2019; Food and Agriculture Organization of the United Nations (FAO) & Pan American Health Organization (PAHO), 2017). Leveraging longitudinal data from 2,381 households in Chile, a study published in the Lancet identified marked declines in the purchase of items containing calories, sugar, saturated fat, and sodium following the enactment of Chile's front-of-package nutrient warning label law. These changes, measured against projections assuming the law had not been implemented, were largely due to reduced consumption of products classified as "high-in" critical nutrients, though this shift was partially offset by increased purchases of alternatives not bearing such labels (Taillie *et al.*, 2021).

FSSAI's 2019 draft for Front-of-Pack Labelling (FOPL), which proposed color-coded warnings for foods high in harmful nutrients, was shelved due to industry resistance. Inspired by global benchmarks like Chile's black stop-sign warnings, the issue subsequently received renewed policy attention, prompting the formation of a consultative committee to revisit FOPL regulations (Bera *et al.*, 2023). Time constraints and limited comprehension of on-pack nutrient details often prevent consumers from making informed dietary choices. The implementation of FOPL would offer interpretative nutritional information directly on products, enabling more informed and health-conscious decisions at the time of purchase (Bera *et al.*, 2023).

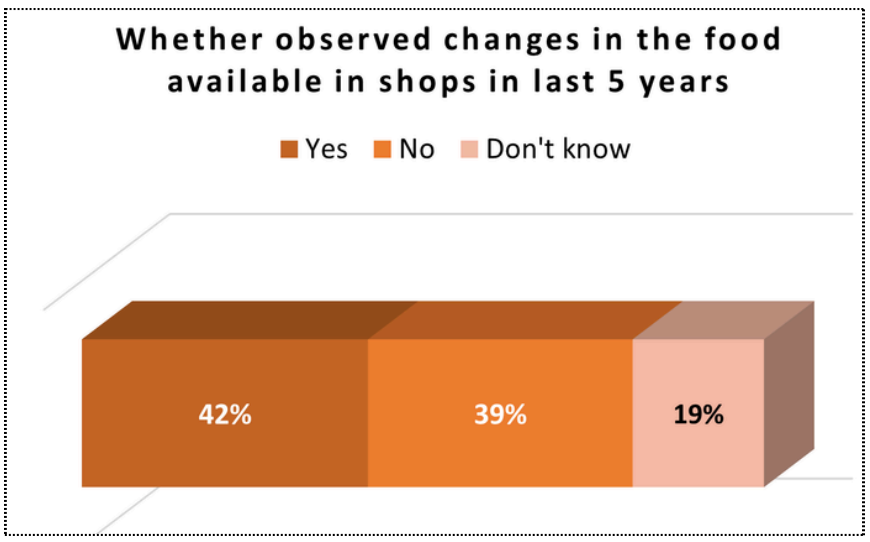
3.7. Sustainablity

Sustainability covers three interconnected dimensions-individual well-being, social equity, and protecting ecosystems (Friel *et al.*, 2008). Within this framework, a sustainable food system is one that provides adequate and nutritious diets today while maintaining the ecological conditions necessary for future production. It strengthens local food systems, makes healthy food affordable and accessible, and protects the rights of farmers, consumers, and communities (Story *et al.*, 2009).

In this study, a considerable proportion of respondents (42%) observed changes in food availability in shops during the past five years. Conversely, 39% reported no change, while 19% were unsure (***Figure 14A***).

Figure 14. Perceived changes in the available food in shops over the past half decade

(A)



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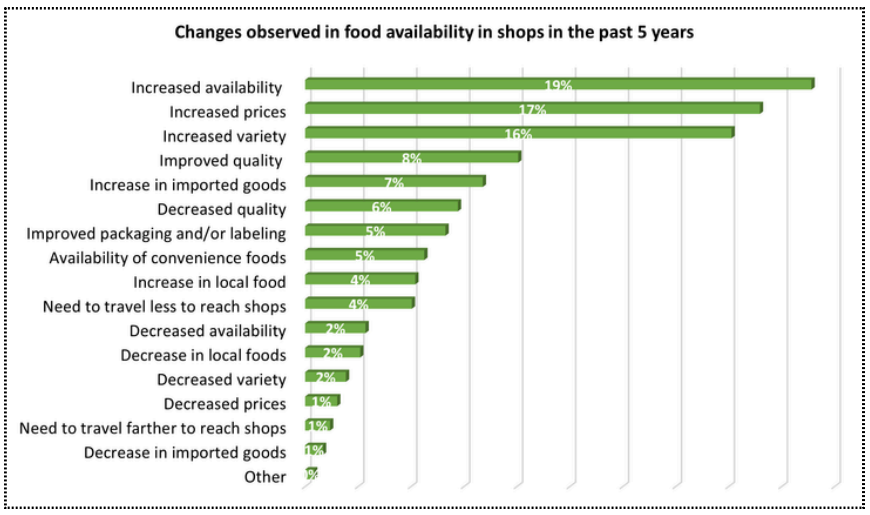

The most commonly seen change among those who observed a difference was an increase in the availability of food, reported by 19% of respondents. This was followed by increased prices (17%) and variety of food (16%). Other considerable changes included improved quality (8%), an increase in imported goods (7%), and decreased quality (6%) (***Figure 14B***).

Table 3. Consumer-observed changes in the food items available in shops in the last five years

Food groups	LIG (n=581)					MIG (n=394)					HIG (n=142)				
	Change in availability (%)	Change in variety (%)	Change in quality (%)	Change in price (%)	Change in import (%)	Change in availability (%)	Change in variety (%)	Change in quality (%)	Change in price (%)	Change in import (%)	Change in availability (%)	Change in variety (%)	Change in quality (%)	Change in price (%)	Change in import (%)
Grains, roots, and tubers	13	13	13	11	14	11	10	10	10	8	10	7	7	9	5
Pulses and legumes	12	11	10	10	12	10	10	10	11	9	8	7	9	11	5
Nuts and seeds	6	5	6	8	8	7	6	6	9	13	8	6	5	6	12
Dairy and dairy products	10	10	12	10	9	9	10	13	9	9	10	9	17	11	9
Meat, poultry, fish, and eggs	4	3	4	5	4	4	2	4	5	2	4	4	4	4	3
Green leafy vegetables	6	7	6	7	5	6	5	4	6	5	6	9	8	7	5
Vitamin-rich fruits and vegetables	6	7	7	7	7	8	7	7	7	7	8	9	9	11	9
Other vegetables	6	6	6	6	6	6	5	5	7	4	6	8	8	11	6
Other fruits	6	6	6	7	6	7	6	6	7	9	8	8	9	10	10
Ultra-processed foods	8	10	5	5	7	11	14	9	5	12	13	14	8	5	13
Sweeteners	6	5	7	6	5	5	5	6	5	6	7	4	4	3	5
Fats and oils	7	7	7	7	9	7	7	9	9	6	4	5	3	5	7
Food adjuncts	5	5	6	6	4	4	5	5	5	3	3	3	5	4	4
Beverages	5	5	5	5	5	5	5	5	6	6	8	8	4	3	6

Changes in the food available in shops and markets were observed across all dimensions: availability, variety, quality, price, and import (***Table 3***). For LIG, staple foods like grains, roots & tubers, and pulses & legumes were most affected. For MIG and HIG, the main changes were in the availability and variety of ultra-processed foods. Across all groups, the biggest quality changes were noted in dairy and dairy products. Price increases were reported differently- LIG and MIG cited higher costs for staples such as grains and pulses, while HIG reported rising prices for dairy, fruits, and vegetables. Response to import also varied- LIG mainly experienced shifts in staple foods, whereas MIG and HIG reported changes in imported nuts, seeds, and ultra-processed products.

These shifts in food access and consumer perceptions reflect wider changes in food systems, especially in LMICs. Globalization has reshaped the diversity and distribution of food outlets and expanded the range of available products (Baker et al., 2016; Baker & Friel, 2016; Reardon et al., 2003; Thow & Hawkes, 2009). These regions have also seen changes in supply chains (Gómez & Ricketts, 2013; Kraemer *et al.*, 2016), altering consumer access to food within their food environment (Hawkes, 2009). In addition, climate fluctuations affect what foods are grown, their quantity, nutritional quality, and their overall availability, affordability, and accessibility (Downs, 2019; Fanzo *et al.*, 2018).

Unlike factors such as availability, affordability, convenience, promotion, and quality, features consumers easily notice, sustainability aspects are often hidden. Most food environments lack clear labels or indicators of sustainability, leaving consumers with little awareness of these attributes (Downs *et al.*, 2020). Making sustainability information more transparent is essential to help consumers make environmentally conscious choices and to support researchers in assessing this dimension of the food system (Downs *et al.*, 2020).

4

CONCLUSION

The findings from this multi-state survey reveal that India's urban food environment is increasingly shaped by inequalities in food accessibility, affordability, convenience, and safety, with traditional markets continuing to dominate while digital and nutritional divides widen across income groups. Lower-income households face persistent barriers to nutritious foods, alongside concerns about adulteration, pesticide residues, and aggressive promotion of ultra-processed products that influence purchasing choices across all strata. Taken together, these insights highlight the need for a coherent, farm-to-fork policy approach that moves beyond isolated interventions and instead integrates nutrition, equity, production and distribution, food waste management, and safety and hygiene into a unified strategy. Strengthening urban and peri-urban production, shortening supply chains, improving cold storage and transport infrastructure, regulating marketing and front-of-pack labelling, and supporting informal vendors through training and hygiene safeguards will be critical. Equally important are efforts to promote dietary diversity, reduce dependency on ultra-processed foods, enhance nutrition and food label literacy, and ensure that healthy options are both affordable and accessible within urban markets. Embedding environmental sustainability and climate resilience across these actions can help cities transition toward food systems that are not only efficient, but equitable, health-promoting, and capable of meeting the nutritional needs of rapidly urbanizing populations.

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REPORT

THE STATE OF URBAN FOOD ENVIRONMENT IN INDIA:

A Study in 11 States

Photo Credit: Kriti Rawal
A packaged-food outlet in Delhi reflecting the growing demand for convenience-driven and processed food choices shaping India's urban food environment

COALITION FOR FOOD SYSTEMS TRANSFORMA(C)TION IN INDIA

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