Awareness, Perception, and Use of Front-of-Pack Nutrition Labels (FOPNLs) among Parents/ Guardians of School Children: A Mixed-Method Study in South Delhi

Research Article

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Abstract

Introduction: India has been facing a public health crisis of Non-Communicable Diseases (NCDs). Front-of-Pack Nutrition Labels (FoPNLs) are a crucial public health strategy that empowers consumers to make healthier and informed dietary choices. Despite national efforts to standardize labelling in India, little is known about how parents, who are the primary decision-makers for children's diets, perceive and use these labels.

Aims and Objectives: The study aims to assess the awareness, perception, and use of FOPNLs among parents/ Guardians of school children in South Delhi and explore the contextual factors that influence their attitudes and behaviours toward these food labels.

Methodology: 246 parents/ local guardians of school-going children in a public school in South Delhi were interviewed through a structured, pre-validated questionnaire and qualitative insights from semi-structured in-depth interviews, to explore deeper attitudes, motivations, and barriers related to FOPNL use. Quantitative data analysis was done using SPSS Ver 26, and qualitative data analysis using thematic coding.

Results: Quantitative findings revealed that 47.3% of participants were aware of the Front-of-Pack Nutrition Labels (FOPNLs). Education level and health consciousness were significantly associated with higher FOPNL use (p < 0.05). Qualitative findings revealed themes such as "Decoding of labels", "mistrust of packaged food", and "children's food preferences overriding label information". Results highlight gaps in awareness and understanding, with implications for future health literacy interventions and public sensitization.

Conclusions: The awareness of FOPNLs among parents/ local guardians in South Delhi is average and actual usage in daily food purchasing decisions remains low. The study highlights the need for targeted nutrition education campaigns to improve food literacy and promote healthier dietary choices for children.

Keywords: Front-Of-Pack Nutrition Labels (Fopnls); Nutritional Education; School Children; Mixed Method Study, South Delhi

Introduction

India is facing a public health crisis of Non-Communicable Diseases (NCDs) like obesity, diabetes, cancers, hypertension, cardiac diseases, renal disease, and mental health conditions. It is estimated that nearly 5.8 million people die from NCDs every year out of total deaths of about 9 million, contributing to about 60% of annual deaths out of the total 9 million deaths. [1] Ultra-processed unhealthy food/ drink products (UPFs) are significantly associated with high risks of NCDs and all-cause mortality. [2] Unhealthy diets account for 56.4% of the total disease burden in the country, as per the ICMR-NIN Dietary Guidelines for Indians. [3] Childhood obesity strongly predicts adult obesity and carries considerable health and economic consequences for individuals as well as society. [4,5]

The Comprehensive National Nutrition Survey (CNNS) 2016 reveals that more than half of the 5–19-year-olds exhibit biomarkers of NCDs, which are increasingly linked to dietary risk factors. There is a rising trend of NCDs, which is attributed mostly to urbanization, sedentary lifestyles, calorie-dense foods, and marketing of ultra-processed foods have intensified poor nutritional habits, particularly among children [6,7].

In response to these concerns, Front-of-Pack Nutrition Labels (FoPNLs) are an evidence-based intervention endorsed by WHO and the Food Safety and Standards Authority of India (FSSAI) to promote informed food choices. [8] FOPNLs aim to provide simplified, easily visible, and interpretive nutrition information to consumers at the point of purchase. [9,10] They serve as a behavioral "nudge" to guide healthier food choices and promote long-term shifts in dietary patterns. [11,12]

There are three components of Nutritional Labelling: nutrient declarations, nutrition and health claims, and supplementary nutrition information. There are two types of understanding: subjective and objective comprehension. The former refers to the customer's capacity to interpret the FoPNL information as intended by its creators. [13] whereas the latter involves analysing the labelling information as intended by its designers [14]. Many countries, including India, have mandated the declaration of nutrition information on labels (FSSAI, 2011) [15]. The supplementary nutrition information is referred to as Front of Pack Nutrition Labelling (FOPNL). FOPNL could be one of the several strategic communication methods that are being implemented to generate awareness and motivate consumers to make healthy choices. [16,17] In India, FSSAI certification is mandatory for all packaged food products, ensuring safety and labelling compliance. In comparison, the ISI mark (BIS) is primarily used for non-food items, whereas Agmark is a voluntary quality certification for agricultural products.

In addition to enhancing understanding of nutritional information, FOPNL promotes healthier food choices and drives the food industry to reformulate products toward more balanced nutritional profiles. [18,19] Thus, it may help reduce the risk of obesity and non-communicable diseases. FOPNLs are cost-effective means to empower individuals in making healthier food choices at the point of purchase and hence improve dietary intake at the population level. [20]

However, parental understanding, who are key decision-makers and most commonly engage with FOPNLs for children's diets, remains under investigated. This study aims to fill the gap by exploring the parental knowledge of FOPNLs among parents of school-going children in a public school of South Delhi through a mixed-methods approach.

Operational Definitions

Front-of-pack nutrition labelling (FOPNL): "A type of supplementary nutrition information that displays simplified nutrition details on the front of pre-packaged foods. It may use symbols/graphics, text, or a combination to convey the overall nutritional quality of the product and/or key nutrient content included in the FOPNL."

High fat, sugar, salt (HFSS) food: "A processed food item that contains high amounts of saturated fat, total sugar, or sodium. The declared levels of these components are such that the product fails to meet the criteria of energy (kcal) from total sugar being less than 10% of total energy, or saturated fat less than 10% of total energy, and sodium less than 1 mg per kcal." [21]

Objectives:

1. To assess the awareness and use of Front-of-Pack Nutrition Labels (FOPNLs) among parents/guardians of school children in South Delhi.

2. To identify sociodemographic determinants of awareness and use of FOPNLs.

3. To explore qualitative insights into barriers and facilitators influencing FoPNL understanding.

Methodology

Study Design

This study adopted a mixed-methods cross-sectional design, combining quantitative observational study with qualitative interviews. The rationale for this approach was to capture both the breadth (through structured data) and depth (through narrative insights) of awareness, perception, and use of front-of-pack food labels among parents of school-going children.

The study was conducted in two phases.

In **Phase 1**: A structured, pre-validated questionnaire was administered to 246 participants (parents/ local guardians) of children aged 5 to 18 years old in a public school in South Delhi.

In **Phase II**: In-depth interviews (IDIs) were conducted with a purposive sample of 12 participants to explore their attitudes, barriers, and preferences regarding FOPNLs. Participants were selected after completion of the quantitative survey to ensure informed reflection during the interview.

Study Population: Parents/ local guardians of school-going children (aged 5-18 years) from an urban public school in South Delhi.

Inclusion Criteria

- Parents/guardians of children aged 5–18 years currently enrolled in the selected school.

- Those willing to provide informed written consent for participation.

Exclusion Criteria

- Parents not available at the time of the conduct of the study.

- Those unwilling or unable to participate due to language barriers or time constraints

Sample Size

- **Quantitative arm**

  Assuming that 20% of participants buying pre-packaged foods read nutrition information on labels, with a 95% confidence level (Z = 1.96) and an absolute precision of 5%, the formula for sample size calculation was applied using the values p = 0.2 (p is the assumed proportion) and q = 0.8 using the Cochran's formula.

$$n = Z^2(1 -\alpha/2)\ P\ (1- P)\ /d^2$$

This resulted in a final calculated sample size of 246 participants.

- **Qualitative arm**

  12 parents were selected using purposive sampling to participate in in-depth interviews. Participant selection considered diversity in educational status, income level, and awareness of FOPNLs. The sample size for the quantitative component was determined based on practical feasibility, the expected response rate, and the aim of detecting meaningful associations. The principle of thematic saturation guided the selection of the qualitative sample size.

Sampling Technique

- **Quantitative component:** A simple random sampling technique was employed, and participants were randomly selected from the school lists

- **Qualitative component:** Purposive sampling was used.

Data Collection Tools

1. **Quantitative Tool:** Data was collected by administering the questionnaire in an interview mode. Participants completed the instrument in English/ Hindi. A pre-structured, standardized and pre-validated questionnaire was used to assess awareness, understanding, and preference related to various formats of Front-of-Pack Nutrition Labels (FOPNLs) among parents/ local guardians of school-going children. The tool was adapted from the ICMR-National Institute of Nutrition (NIN), Hyderabad, as detailed in the report titled *"Assessing Effectiveness of Front-of-Pack Nutrition Labels in India" (2023)* [22].

This questionnaire includes sections evaluating:

Part 1: The first part of the questionnaire collected sociodemographic details, frequency of consumption of packaged foods, food label usage habits, and their practice of reading the nutrition information on the label.

Part 2: The second part of the questionnaire assessed the perceptions of the participants on likeability, attractiveness and perceived cognitive workload of the five different formats of the FOPNL tested.

Part 3: The third part of the questionnaire assessed the objective understanding, perceived product healthfulness, purchase intention and willingness to change purchase behaviour of the participants.

2. **Qualitative Tool:** A qualitative descriptive study was conducted using semi-structured in-depth interviews (IDIs) with a purposively selected subset of parents. An interview guide was developed to explore perceptions of various food labelling formats, Barriers to understanding and usage, Influence of FoPNL on dietary choices and trust in food label information

Data Collection Procedure

Face to Face-to-face interviews were conducted in a quiet setting, lasting approximately 30–40 minutes and were conducted in either Hindi or English, according to the participant's language preference. Before initiation, informed consent was obtained from each participant, and interviews were audio-recorded and subsequently transcribed verbatim to ensure accuracy. The interview guide comprised open-ended questions designed to explore participants' perceptions, experiences, and preferences regarding nutrition labels on packaged foods.

Ethical Considerations: Ethical approval was obtained from the Institutional Ethics Committee. Written informed consent was obtained from all participants before data collection and audio recording. Confidentiality was maintained by anonymizing school and participant identifiers. Participation was voluntary, and parents could withdraw at any stage.

Quantitative Data Analysis: Descriptive statistics (frequencies, percentages, means ± SD) were computed for demographic variables and responses related to awareness and usage of FoPNL. Bivariate analyses (Chi-square test) were conducted to explore associations between demographic characteristics (e.g., education level, income) and outcomes. For ordinal or non-normally distributed continuous variables, non-parametric tests such as the Kruskal–Walli's test were applied. Data was collated and cleaned using MS Excel and was analysed using SPSS Version 26(IBM Corp., Armonk, NY, USA).

Qualitative Data Analysis: Manual coding of interview transcripts was done and the thematic analysis framework by Braun

and Clarke (2006) was followed. [23] Initial coding was done line-by-line, and codes were grouped into categories and overarching themes.

Results

Participant Characteristics

The mean age of the participants was 37.17 ± 6.51 years, with an average height of 171.55 ± 8.27 cm, and a mean weight of 77.62 ± 13.00 kg. Most respondents were married (81.3%) and responsible for sole (56.9%) or shared (43.1%) household grocery shopping (Table 1).

Awareness and Use of Food Labels: As depicted in (**Table 2**), most participants reported checking basic details such as the manufacturing date (80.5%), expiry date (72%), and veg/non-veg symbol (66.7%), while fewer consistently checked nutrient information. Only around one-fourth examined calories (26%), total fat (26%), salt (25.6%), and protein (35.8%), with very few looking at trans fats (8%), cholesterol (7%), or carbohydrates (11%). Regulatory details like FSSAI license (29%), AGMARK (18.6%), and ISI mark (36.5%) were also infrequently checked. Overall, participants prioritized basic product details over critical nutritional and safety information.

A majority of males, 37.3% reported reading food labels, compared to only 10.6% females (**Table 2**). Interestingly, more females reported

Table 1: Socio-demographic characteristics of the participants.

Characteristic	Frequency	Percentage (%)
Age (in years)		
25 – 35	57	23.1
36 – 45	123	50.0
46 – 55	55	22.3
> 56	11	4.4
Sex		
Males	160	53.8
Females	86	46.1
Education		
Illiterate	5	2.03
Primary School	16	6.5
Middle School	22	8.94
High School	32	13.00
Intermediate/ diploma	40	16.2
Graduate	65	26.4
Professional degree	66	26.8
Annual Household Income (As per Kuppuswamy Scale 2025)		
₹<7988	28	11.4
₹7989- ₹23,869	44	17.9
₹23,870 -₹39,829	52	21.1
₹39,830 - ₹59,974	46	18.7
₹59,975 - ₹79,755	36	14.6
₹79,756- ₹1,59,585	28	11.4
₹1,59,586 and above	12	4.9
Responsibility of Shopping		
Sole	140	56.9
Shared	106	43.0
Habit of Reading Food Labels		
Yes	119	48.4
No	127	51.6
Males	92	37.3
Females	27	10.6

Table 2: Food label information reading practices among the participants

Particulars	Percent (n=246)		
	Always	Sometimes	No
1. Brand Name	60	17	23
2. Manufacturing date	80.5	13.8	5.7
3. Expiry date	72	12	16
4. Ingredients	38.6	57.3	4.1
5. Storage	32.5	63.4	4.1
6. Nutrient Information			
a) Calories	26	47.2	24.8
b) Total fats	26	30.1	43.9
c) Saturated fats	38.6	67.1	32.9
d) Trans fats	8	22	70
e) Carbohydrates	11	23.5	65.5
f) Sugar	10	26	64
g) Protein	35.8	32.5	31.7
h) Salt	25.6	57.3	42.7
i) Cholesterol	7	25.9	67.1
7. Allergen	30.5	35.8	33.7
8. Veg and non-veg symbol	66.7	28.9	4.5
9. Quality symbols			
a) ISI	36.5	32	31.5
b) AGMARK	18.6	19	62.4
10.FSSAI Licence	29	11	60

not reading labels than those who did, whereas among males, the reverse was true, with more engaging in the habit. This suggests that males in this group are more likely than females to read food labels, which may reflect differences in health awareness, purchasing roles, or nutrition education between genders (**Figure 1**).
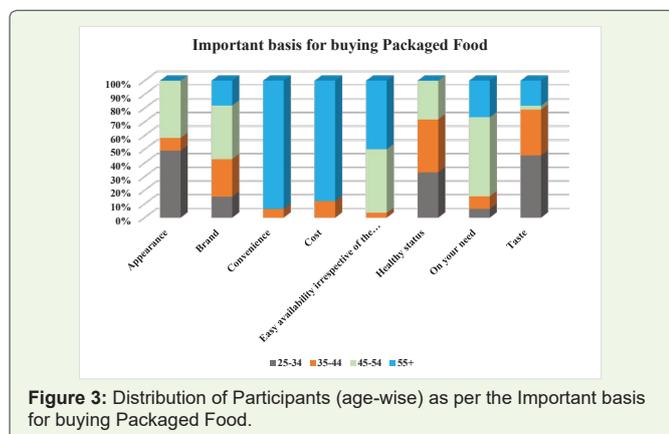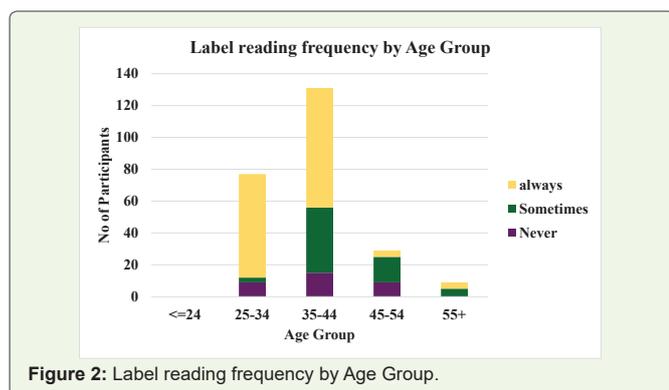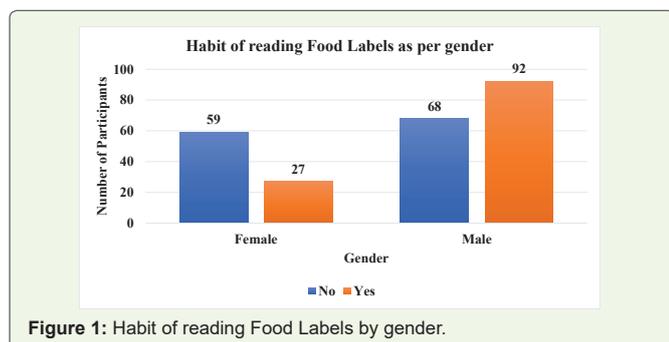
28.9 % of participants don't check the quality symbol on the packaged food items, whereas 36.5% of the participants check the ISI mark on the food labels, 18.6% check the AGMARK label and only 15.8% check the FSSAI license (**Figure 2**).

Participants were mostly unfamiliar with the Nutri-star or traffic light labelling system for food products. Among males, nearly three-fourths (72%) were unaware, compared to 59% of females. Awareness was relatively higher among females (41%) than among males (28%).

Figure 3 illustrates age-related differences in the basis for purchasing packaged foods. Younger adults (25–34 years) prioritized sensory factors such as appearance (55%) and taste (50%), while middle-aged participants (35-44 and 45-54 years) more often considered health status and brand. In contrast, older adults (55+ years) placed the greatest emphasis on convenience, cost, and easy availability. These findings suggest that while younger consumers are guided largely by sensory appeal, middle-aged adults balance brand and health considerations, and older adults rely primarily on practical factors such as accessibility and affordability.

Association between Educational Qualification, Income and Habit of Reading Food Labels

Among participants with a professional degree, 62.1% reported reading food labels (n=82), whereas among those with graduate-level education, only 12.7% (n=9) reported this habit. For participants with

Figure 1: Habit of reading Food Labels by gender.

Figure 2: Label reading frequency by Age Group.

Figure 3: Distribution of Participants (age-wise) as per the Important basis for buying Packaged Food.

intermediate/diploma and high school education, the proportions were 27.6% (n=8) and 21.4% (n=3) respectively. This suggests that the tendency to read food labels increased with higher educational attainment. A significant association was found between educational qualification and the habit of reading food labels ($\chi^2 = 80.17$, df = 9, $p < 0.001$). Participants with higher education, especially those with professional degrees, were more likely to read food labels compared to those with lower educational levels. This highlights the role of education in influencing health-conscious behaviours.

Individuals in the highest income group (₹1,59,586) are more likely to read food labels compared to other groups, suggesting greater health awareness and purchasing power in this category. In contrast, the lowest income group (₹<7,988) shows minimal engagement with label reading

Habit of checking Salt and Sugar content on Food Labels

Only 20.3% of participants reported always checking salt content on food labels, while 30.5% did so occasionally. More than half (49.2%) never checked salt information, indicating limited engagement with this nutrient despite its known association with hypertension and other non-communicable diseases. The Kruskal-Wallis test (p = 0.336) revealed a statistically significant difference between the "never," "sometimes," and "always" groups, indicating that salt label–reading behaviour was associated with meaningful differences in body weight in this sample.

Similarly, for sugars, only 18.7% of participants reported always checking sugar content on food labels, while 32.4% did so occasionally and 48.9% never checked sugar information, highlighting a gap in consumer attention despite the well-established role of high sugar intake in obesity and metabolic disorders. The Kruskal–Wallis test (p = 0.028) revealed a statistically significant difference between the "never," "sometimes," and "always" groups, indicating that sugar label–reading behaviour was associated with meaningful differences in body weight in this sample.

Association between Weight and Checking of Nutrition Information (Sugar)

A cross-tabulation of weight and frequency of checking nutrition information for sugar revealed distinct behavioral patterns. Only 3.7% of participants reported always checking labels, while the majority either never (41.9%), sometimes (26.8%), or rarely (27.6%) engaged in this practice. Participants with lower body weights (<70 kg) were more likely to report "always" checking labels, whereas those with higher body weights (≥80 kg) overwhelmingly fell into the "never," "sometimes," or "rarely" categories, with striking uniformity seen at 83 kg (all never), 85 kg (all sometimes), and 86 kg (all rarely). The mean weight among "always" checkers was 65.3 kg compared to 77–80 kg in the other groups, and the difference was statistically significant (Kruskal–Wallis $\chi^2 = 15.44$, p = 0.0015). These findings suggest that consistent engagement with nutrition labels, particularly for sugar content, may be associated with healthier body weight, whereas lack of such behaviour is more prevalent among heavier individuals.

Association between Body Weight and Habit of Reading Food Labels

A total of 246 participants were assessed for the association between body weight and food label–reading habits. Individuals in the normal weight range were more likely to read food labels, whereas those in higher weight categories (≥85 kg) predominantly did not, indicating a negative association between increasing body weight and label-reading behaviour. This trend may indicate either a lack of awareness or motivation toward nutrition-conscious behaviours among individuals with higher body mass.

The association between food label reading habits and body weight was assessed using the Mann–Whitney U test **(Figure 4)**. Participants who reported reading food labels (n = 119, mean rank =

85.91) had significantly lower weights compared to those who did not read food labels (n = 127, mean rank = 158.72), indicating that label readers were generally lighter in weight. This suggests that the habit of reading nutrition labels is associated with healthier weight outcomes.

A majority of both males and females reported unfamiliarity, with the proportion being higher among males, indicating low overall awareness of front-of-pack labelling systems across genders, with a slightly higher level of awareness among males **(Figure 5).**

Gender-wise comparisons of checking expiry date on packaged food

Most participants reported always checking expiry dates before purchasing food products, with this habit being more prevalent among 65.4% of males and 52.7% of females following this practice. Only a small fraction (4.5% males and 6.9% females) reported never checking expiry dates, indicating generally good consumer awareness across genders **(Figure 6).**

Among male respondents, the most common purchase drivers for packaged food were health status (34.5%), followed by taste (25.0%). In contrast, female respondents most frequently cited taste (23.5%), followed by health status (12.0%) **(Figure 7)**. Other factors, such as appearance, brand, convenience, cost, and easy availability, were reported less frequently by both genders. A statistically significant association was observed between gender and the basis for purchase of packaged food (χ^2 = 24.36, df = 6, p < 0.001).

Association between Marital Status and Habit of Reading Food Labels

Across marital status groups, the most frequently reported basis for purchasing packaged food was taste among married respondents (49.0%), followed by health status (46.5%). For single parents, health status (12.0%) was the predominant reason, while unmarried/local guardian respondents most frequently cited health status (10.5%). Other factors, such as brand preference, appearance, convenience, and cost, were reported much less frequently across all groups. A statistically significant association was found between marital status and basis for purchase (χ^2 = 31.42, df = 6, p < 0.001), indicating that purchase motivations differ by marital status **(Figure 8).**

Association between Comorbidities and Habit of Reading Food Labels

Among the 246 participants, the majority (65.4%) reported no history of cardiovascular disease (CVD), diabetes, hypertension, or obesity. Obesity (21.5%), hypertension (6.5%), diabetes (4.5%), and CVD (2.0%) were the most commonly reported conditions among those with a medical history. Reading of food labels was more common among participants with no history of these conditions (65.2%) compared to those with CVD, obesity (13.2%), hypertension (18.8%), or diabetes (36.4%). Overall, 48.4% of participants reported reading food labels, indicating a moderate level of engagement with nutritional information. Notably, individuals without chronic health conditions had the highest proportion of label-reading behavior, while those with obesity and CVD were the least likely to read labels **(Figure 9)**.
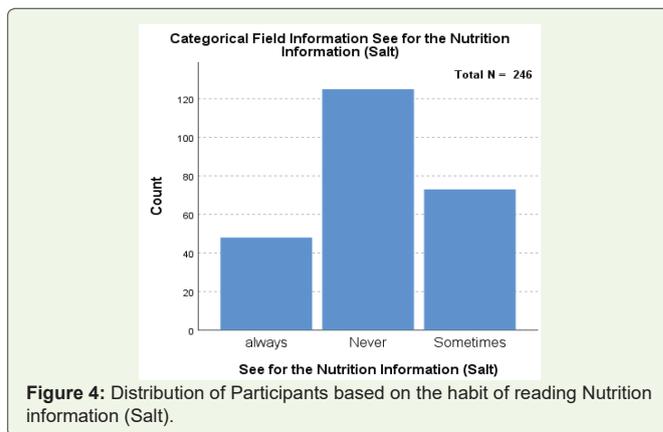

Figure 4: Distribution of Participants based on the habit of reading Nutrition information (Salt).
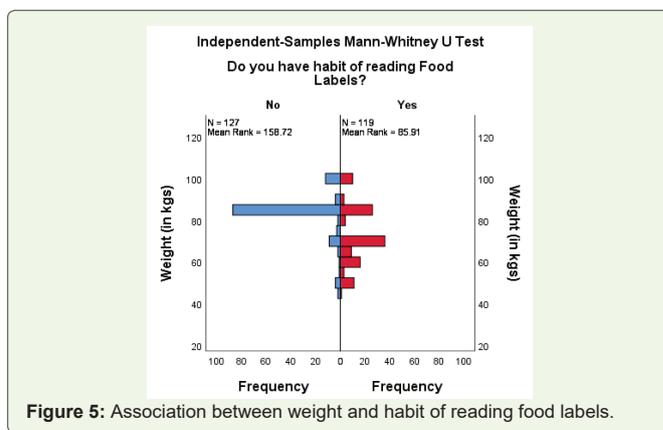

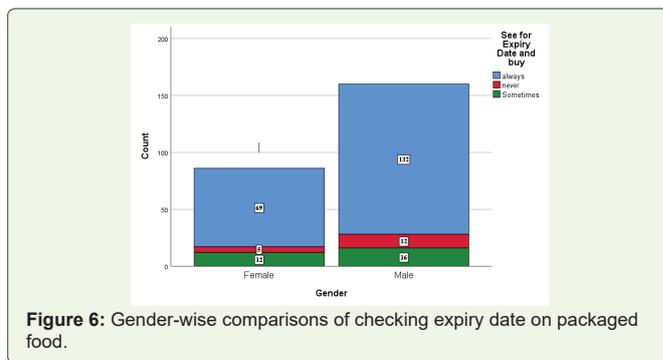**Figure 5:** Association between weight and habit of reading food labels.

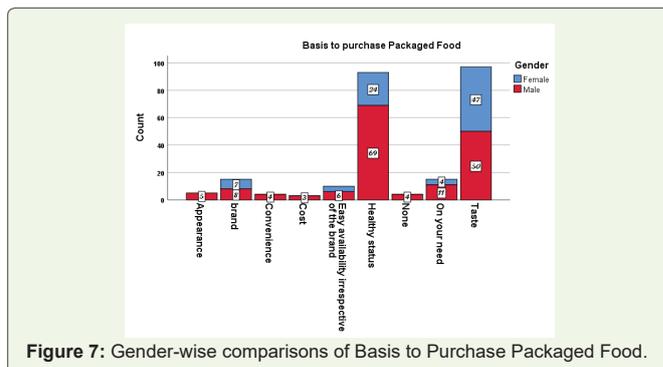**Figure 6:** Gender-wise comparisons of checking expiry date on packaged food.

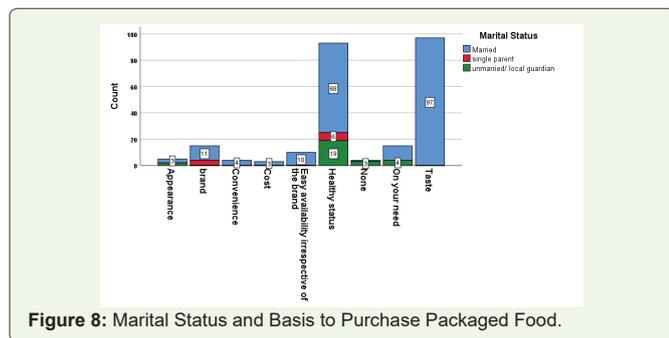**Figure 7:** Gender-wise comparisons of Basis to Purchase Packaged Food.

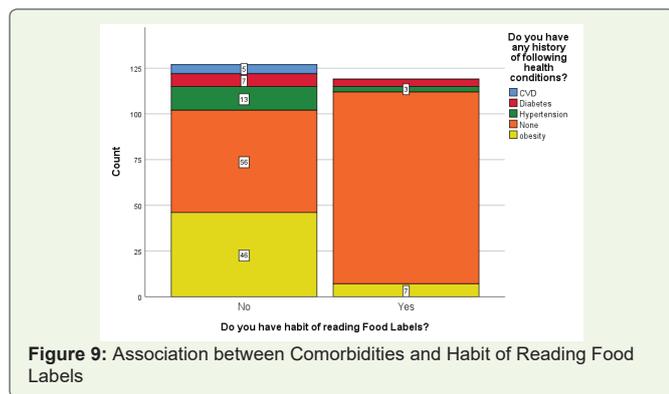**Figure 8:** Marital Status and Basis to Purchase Packaged Food.

Figure 9: Association between Comorbidities and Habit of Reading Food Labels

Binary logistic regression analysis was performed with the habit of reading food labels (Yes/No) as the dependent variable and age (in years) as the independent variable. The model indicated that age was not a statistically significant predictor of the habit (β = 0.032, OR = 1.03, 95% CI: 0.96–1.09, p = 0.375. This suggests that the likelihood of reading food labels does not significantly change with increasing age in the study population.

Qualitative Findings

Thematic analysis of 12 in-depth interviews revealed four overarching themes with associated sub-themes. These insights provide explanatory depth to the quantitative findings, highlighting why awareness and usage of FOPNLs remain suboptimal despite moderate exposure to packaged foods.

1. Visual Clarity vs. Difficulty Decoding:

Sub-themes:

i. Font and Layout Issues – Small print, dense text, and placement at the bottom or side of the pack limited visibility.

ii. Symbol Interpretation Gaps – Colour codes and icons were often misunderstood or overlooked.

"Sometimes I see the label, but I don't know what the figures mean for my child's health." (Parent, Male, 42)

"I thought the red circle was just a design, I didn't know it meant high sugar." (Parent, Female, 39)

2. Trust vs. Skepticism:

Sub-themes:

i. Brand Reliance – Well-known brands were assumed to be healthier.

ii. Perceived Manipulation – Some participants believed labels are intentionally misleading.

"If the brand is good, the food is good – I don't need to read the label. We feel good brands sell good food." (Parent, Female, 34)

"Companies will never show the bad things clearly, so why bother reading?" (Guardian, Male, 56)

3. Time Constraints:

Sub-themes:

i. Shopping in a Rush – Limited time to compare products.

ii. Competing Priorities – Price, availability, and taste often take precedence.

"I'm always in a hurry, so I just pick what we always buy. I miss checking the labels." (Parent, Male, 36)

"I check the expiry date, vegetarian and non-vegetarian symbol and move on; I don't have time for the rest." (Parent, Female, 41)

4. Child-Centric Decision-Making:

Sub-themes:

i. Peer Influence on Children – Children request items seen in advertisements or with peers.

ii. Parental Compromise – Health concerns are sometimes secondary to avoiding conflict.

"If my kid likes it, I don't think too much about sugar or fat. What children see among peers, they ask for it" (Parent, Female, 34)

"Sometimes I know it's not healthy, but saying no is a bigger fight. My child becomes very fussy and I don't have any option but to give him what he desires to eat. It becomes very difficult as a parent" (Parent, Male, 39)

These themes highlight that barriers to FOPNL use are not solely cognitive (lack of awareness/understanding) but also behavioural (time and purchasing habits), and social (child and family influence). Addressing these factors through targeted parental education and integration into school and community nutrition programmes could enhance FOPNL effectiveness and support healthier dietary choices.

Discussion

Findings from both quantitative and qualitative arms of the study demonstrate a considerable gap in parental awareness and interpretation of Front-of-Pack Nutrition Labels (FoPNLs). Despite frequent exposure to packaged foods, most parents lacked sufficient understanding of label formats and their health implications. Educational level and health literacy emerged as significant determinants of label use, while external factors such as time

constraints, brand loyalty, and children's taste preferences frequently overrode nutritional considerations. These results highlight a complex interplay between individual capacity, contextual factors, and marketing influences in shaping parental food choices.

This finding is consistent with prior literature, which suggests that health literacy and educational background are critical in influencing health-related behaviours such as interpreting nutrition labels and making healthier dietary decisions. Studies from India and other low- and middle-income countries (LMICs) have similarly reported that individuals with higher education are more likely to engage with nutrition information, while those with lower literacy tend to rely on brand recognition, pricing, or taste preferences. A study by Sudershan et al has revealed similar findings such as a positive association was found between education level and checking various aspects of food labels. Nutrient information on labels was not often read because most consumers either lacked nutrition knowledge or found the information too technical to understand. The majority looked only for the manufacturing date or expiry/best before date and the findings are consistent with our study. Taste, quality, convenience and ease of use are the main reasons for buying pre-packaged foods. [24] A study by Subbaram et al. revealed low awareness' for food standards among adolescent girls [25]

The qualitative findings of this study, particularly the themes of *trust versus skepticism* and *child-centric decision-making,* echo global evidence that consumer skepticism toward food industry practices and children's strong influence on household food purchases act as barriers to label effectiveness.

Moreover, the persistence of time constraints and competing priorities reflects a broader behavioral challenge, where convenience and cost often outweigh health concerns. This suggests that providing nutritional information alone may be insufficient unless accompanied by strategies to increase consumer motivation and simplify decision-making.

The findings reveal that participants predominantly focused on basic product details such as manufacturing and expiry dates, while nutritional components and regulatory symbols were largely overlooked. [26] The low engagement with critical markers like salt, fat, and trans-fat is concerning, given the rising burden of lifestyle-related diseases such as hypertension, obesity, and cardiovascular illnesses. [27] Another study by the same author among mothers depicts that the *Anganwadi* Centres can be the focal points for imparting food safety education to the mothers [28].

Overall, these findings underscore the urgent need for multi-pronged interventions that address not only individual-level knowledge gaps but also structural and contextual barriers. School-based parental sensitization, mass media campaigns, and stricter regulatory policies mandating standardized, easy-to-interpret FoPNLs could bridge the knowledge–practice gap.[29] Furthermore, culturally tailored awareness strategies, particularly for populations with lower educational attainment, may enhance the reach and effectiveness of interventions.

Conclusion

Parental understanding and utilization of FoPNLs remain low despite moderate exposure to packaged foods. The study highlights that education, health literacy, and competing household priorities strongly influence parental engagement with nutritional labelling. To improve the effectiveness of FoPNLs, multi-level strategies are required.

Recommendations

The findings of the study underscore the need for multi-pronged strategies to improve the use and comprehension of food labels in India.

i. **Label Literacy Programs:** Strengthening label literacy through community-based and digital educational initiatives on reading and interpreting food labels. Integration of modules into school curricula is critical.

ii. **Targeted Awareness for Primary Grocery Buyers** By focusing interventions on household grocery decision-makers, particularly married individuals and women, who demonstrate higher engagement with labels. Implement in-store nudges, shelf talkers, and point-of-sale campaigns in supermarkets and local retail outlets.

iii. **Focus on Low-Income and Less Educated Groups:** Inclusion of label awareness in health camps, community nutrition programs, and *Anganwadi* services. Use of pictorial, video-based, and interactive materials to explain nutritional quality. Training of community health workers to deliver tailored messages.

iv. **Integrate Label Education with Nutrition Counselling:** Combining BMI screening with personalized label interpretation sessions helps individuals understand the link between food choices and health outcomes. Promotion of mobile applications that integrate diet tracking with label education.

v. **Leverage Digital Media for Behaviour Change:** Utilization of social media platforms to disseminate short, engaging content (e.g., reels, infographics, interactive quizzes). Partnering with influencers, healthcare professionals, and educators to debunk myths and promote informed food choices.

vi. **School and Youth-Focused Interventions:** Conduct of school-based workshops on label reading under the Central Board of Secondary Education (CBSE) 's upcoming health initiatives.

vii. **Policy-Level Recommendations:** Encouragement of educational boards (CBSE/ICSE) to integrate label-reading modules into health education curricula.

Limitations

The study has certain limitations, the study was conducted

in an urban setting, which may limit the generalizability of the findings. Responses were self-reported, subject to recall and social desirability bias. Furthermore, the study did not explore the long-term behavioural impact of label reading on actual dietary patterns and health outcomes. Future research employing longitudinal study design is recommended to better understand the causal pathways and to assess the effectiveness of food labelling in influencing dietary behaviour and improving public health outcomes.

Conflict of Interest

The authors have none to declare.

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