Examining Nutrition Label Knowledge, Self-Efficacy, and Nutrition Facts Panel Usage

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Abstract

With the rise in health concerns, including obesity, cancer, and cardiovascular diseases, it has become increasingly important to explore the factors influencing the use of nutrition labeling. This study examines the intricate relationship between nutrition label knowledge, nutrition self-efficacy, and the utilization of nutrition facts panel (NFP) labels, based on data from 384 participants. Employing a mixed-methods approach, we evaluated participants' comprehension of nutrition label information, their confidence in making dietary choices, and their actual use of NFP labels. The utilization of the Partial Least Squares Structural Equation Modeling (Smart PLS version 3.0) tool in our study offers robust evidence of both reliability and validity in the analysis of our data. PLS SEM, as a sophisticated statistical method, is well-suited for our research as it accommodates mediating roles involving latent variables, making it particularly advantageous for examining relationships in our dataset. Our findings underscore a significant and positive correlation between nutrition label knowledge and self-efficacy. Through the application of the Information Motivation Behavioural Skills (IMB) model, we aim to provide a comprehensive understanding of the multifaceted determinants impacting the use of nutrition facts panel labels. This research contributes to a more holistic understanding of the complexities involved in consumers' utilization of nutrition labels, offering insights for targeted interventions and strategies to promote healthier dietary practices.

Keywords: Nutrition facts panel label, Nutrition label knowledge, Nutrition self-efficacy, Regulations, IMB model, Structural Equation Modelling.

Introduction

In the past few years, India has witnessed a remarkable surge in packaged and processed food consumption, particularly in urban regions (1). This notable shift in dietary preferences and a growing wariness among consumers regarding these food products' authenticity, quality, and longevity presents significant encounters with public health and governing bodies (2). Consequently, the call for comprehensive regulations governing food labelling has intensified. Notably, in 2023, the Indian government introduced additional guidelines mandating that NFP labels (3) must include essential information such as nutritional content (4), serving sizes, manufacturer and brand identification, ingredient lists, and production and expiration dates.

With the persistent rise of online food shopping (5) and a heightened focus on health and nutrition (6), food labelling has become a vital source of information for consumers when selecting food products. In the Indian context, approximately 90 percent of consumers in metropolitan areas who frequent supermarkets prioritize examining NFP labels before purchasing (7). Additionally, separate research underscores that Indian buyer, particularly the younger demographic, attach significant importance to NFP labels, relying on them extensively to guide their buying decisions (8). This suggests a growing trend where Indian consumers are increasingly conscious of their products' nutritional aspects and ingredients, highlighting the crucial role of clear and informative food labelling in influencing consumer choices (9).

In contrast to developed nations, limited research has delved into the various factors shaping Indian consumers' utilization of NFP labels. These papers have mainly focused on demographic and socio-economic factors, including gender, age, education, pay stages, and residential locations. For instance, Abbafati *et al.*, (10) discovered that,

highly educated, and affluent males residing in major cities tended to rely on NFP labels. Conversely, another study highlighted that woman exhibited a higher propensity for using NFP labels compared to males (11). Additionally, research revealed that specific labelling aspects, such as data concerning eminence, nutrition, manufacture and storing methods, and general product details, significantly influenced the uptake of NFP labels (12).

Notably inattentive from these. inquiries were assessments of influence of the Indian customers' nutrition label information (13), nutrition self-efficacy (14), and NFP label utilization and succeeding purchasing choices . Given the substantial disparities in nutrition awareness and subsequent food label engagement within the Indian population (15). It is imperative to investigate whether nutrition label knowledge and attitudes to nutrition labels can forecast the extent of NFP label usage between Indian consumers. This comprehensive exploration would shed light on the intricate dynamics underlying the relationship between consumer behaviour and NFP label comprehension, ultimately fostering a more nuanced understanding of how Indian consumers interact with nutrition labelling in the context of their dietary choices.

This research attempts to resolve the inconsistent outcomes of prior inquiries concerning the correlation between an individual's understanding of nutrition and their utilization of NFP labels. Several studies conducted in Westernized societies propose that education and nutritional knowledge are significant indicators of food labelling utilization (16). Conversely, there are contrasting reports in the literature (17). Some researchers have notably suggested that there is no clear link between an individual's knowledge of nutrition and their utilization of nutrition labels (18). The conflicting results can be partially attributed to variations in samples, research methodologies, study durations (16), and contexts. The inconsistency among previous studies underscores the need for further research. Our theoretical framework relies on the information-motivation-behavioural (IMB) (19) skills model, which has demonstrated efficacy in predicting a range of health behaviors, including reducing erotic hazards, accepting preventives

(20), using condoms , and establishing diet and exercise habits. Additionally, the IMB model has been applied to investigate the intake of fruits and vegetables, as well as the consumption of sweetened beverages in children (21), among other health behaviors. However, despite the extensive application of the IMB model, there has been a lack of research examining the association between nutritional knowledge, attitudes towards nutrition label utilization, and actual utilization of nutritional facts panel (NFP) labels. Considering the inconclusive findings concerning the direct impact of nutritional knowledge on the use of NFP labels, additional investigation is warranted. This further exploration should focus on identifying potential mediating factors that could shed light on this intricate relationship.

Our specific aim is to assess whether self-efficacy serves as a mediating factor. We aim to explore its role in the relationship between nutrition knowledge and the utilization of NFP labels. This investigation will shed light on the potential role of self-efficacy in this association. This study's findings could provide valuable insights for the Food Safety and Standards Authority of India (FSSAI) as they develop regulations for prepackaged foods, as the final directives have yet to be provided. Consequently, the findings of this study can provide valuable insights for the FSSAI, guiding their approach to the initial regulations outlined in their preliminary notice on the Food Safety and Standards Regulations, 2020. This information can contribute to the development of more effective and evidence-based strategies for ensuring food safety and standards.

Theoretical Framework and Hypotheses Development

The Influence of the IMB Model on Nutrition Label Use: The Role of Nutrition Self-Efficacy as a Mediator

The Information-Motivation-Behavioral Skills (IMB) model is a comprehensive theoretical framework to elucidate and predict health-related behaviours. Information refers to individuals' understanding of a particular behaviour and its associated risks or benefits. At the same time, motivation encompasses both intrinsic and extrinsic factors that drive behavioural change, including personal attitudes, beliefs, values, social influences, and support. Behavioural skills pertain

to the practical abilities and resources required to enact a desired behaviour, incorporating the cognitive and physical skills necessary for effective implementation. This model underscores the dynamic interplay between these three factors, serving as a valuable tool in various health contexts, including sexual health, substance use, dietary practices, exercise, and other health-related behaviours.

In the context of nutrition labeling, the Information-Motivation-Behavioral Skills (IMB) model (19) serves as a valuable framework. It helps to comprehensively grasp how these three elements collectively impact individuals' dietary decisions and behaviors concerning the comprehension and utilization of NFP labels on food items. Nutrition labels provide essential information about the nutritional content of food products. This information includes details such as serving size, calories, macronutrients (e.g., fat, carbohydrates, protein), vitamins, minerals, and other key nutritional components. The availability and clarity of this information on food labels are crucial for individuals to make informed dietary choices. Motivation refers to individuals' internal drive and interest in using nutrition labels to make healthier food choices. Motivational factors may include personal health goals, weight management concerns, dietary preferences, and the desire to consume more nutritious foods. Motivation influenced by marketing, educational campaigns, or personal health beliefs (22). Behavioral skills related to nutrition labeling encompass the ability to read, interpret, and apply the information provided on food labels to make dietary choices that align with one's health goals. These skills involve understanding serving sizes (23), interpreting percentages of daily values, comparing products, and incorporating label information into meal planning and food selection. Numerous studies have shown that clear, easy-to-understand nutrition labels enhance consumers' knowledge about the nutritional content of food products. Research suggests that detailed information on labels can positively influence consumers' ability to assess the nutritional quality of food items, particularly about factors like sugar content, saturated fats, and sodium levels (24).

Downs et al., (25) conducted a study to evaluate the influence of menu labeling on individuals' food selection within the context of fast-food establishments. It found that providing calorie information on menus increased consumer awareness and motivated them to make lower-calorie food choices. Grunert and Wills, (26) extracted the results of nutrition labeling on the dietary selections of consumers. The investigation revealed that the provision of lucid and comprehensible nutrition details on food labels had a positive impact on consumers' awareness regarding the nutritional composition of food items, thus stimulating them to opt for more salubrious food alternatives. Grunert and Wills (26) studied the role of consumer motivation and behavioural skills in the context of food label use.

The findings highlighted the importance of both motivational factors, such as health consciousness and concern for nutrition, and practical skills, such as the ability to understand and use nutrition labels effectively, in shaping consumers' food choices and dietary behaviors. These studies exemplify the significance of the IMB model when it comes to comprehending the influence of food and nutrition labeling on consumers' dietary behaviors. Furthermore, they underscore the value of offering informative and encouraging nutrition labels to foster healthier food selection. Kanyemba et al., (27) investigated on the subject matter of HIV risk reduction behaviors among males who engage in sexual activities with other males. The study revealed that interventions focusing on information, motivation, and behavioural skills were successful in encouraging safer sexual practices and lowering the risk of HIV transmission within this demographic. These findings underscore the importance of targeted approaches in promoting public health initiatives.

Turner et al.. (28) applied the IMB model to understand and promote physical activity among sedentary individuals. The findings highlighted the importance of addressing both motivational factors, such as enhancing self-efficacy and intrinsic motivation, and providing practical strategies to develop and maintain physical activity behaviors. The connection between nutrition self-efficacy and changes in dietary behavior among individuals with chronic illnesses was investigated (29). The study found that higher levels of nutrition self-efficacy were associated with greater adherence to dietary recommendations and improved health outcomes.

Another study the role of self-efficacy in predicting dietary behaviors among adults (30). The findings demonstrated that nutrition self-efficacy significantly influenced individuals' dietary choices and their ability to maintain a healthy diet over time.

These studies emphasize the importance of considering nutrition self-efficacy within the framework of the IMB model to understand its role in influencing individuals' dietary behaviors and promoting positive changes in dietary habits. By integrating the concept of nutrition self-efficacy, researchers and practitioners can develop targeted interventions that focus on enhancing individuals' confidence in their ability to adopt and maintain healthy eating behaviors. Consumers who possess a profound understanding of nutrition and exhibit favourable attitudes towards nutrition labels could enhance their self-assurance and ability to effectively employ nutrition facts panel (NFP) labels, thereby resulting in an escalation of NFP label utilization. This impact may hold particular significance within a demographic confronted with persistent health afflictions. Drawing from these considerations, we assert that self-efficacy acts as a mediator between nutrition literacy and the practical usage of NFP labels.

H1. The mediating role of nutrition self-efficacy in the association between nutritional literacy and the use of NFP labels. Specifically, it suggests that greater nutritional knowledge and attitude increase self-efficacy, leading to a higher likelihood of utilizing NFP labels.

Data collection procedure and sample

Data were gathered from individuals diagnosed with at least two chronic situations, illnesses persisting for three months or more. The selection of contributors with numerous chronic illnesses was deliberate, considering the relevance of the sample to the study's context, given the significance of NFP labels for individuals managing chronic health conditions. A snowball sampling method was employed to recruit the sample from Vellore, India. This technique was employed primarily to engage participants who were difficult to influence due to their unique features. In the technique of snowball sampling, individuals who were initially chosen for the sample acted as informants to ascertain additional individuals possessing the requisite attributes for incorporation (31). Initially, individuals expected to partake in the study were those who self-reported having two or more chronic health conditions within a particular region. These participants were referred by healthcare professionals, including physicians and other medical workers.

Subsequently, the participants in the same region received referrals from the previous participants, resulting in a final count of 153 participants. Only one adult participant represented each household. Finally, the participants' height and weight were assessed using an anthropometer rod and a numerical weighing scale. Subsequently, their body mass index was calculated based on these measurements. Table I specifies that the sample's average age was 52.48 years. Roughly 42 percent of the participants were categorized as being overweight. Hypertension and arthritis emerged as the most frequently co- occurring health conditions impacting 46.8 percent of the sample.
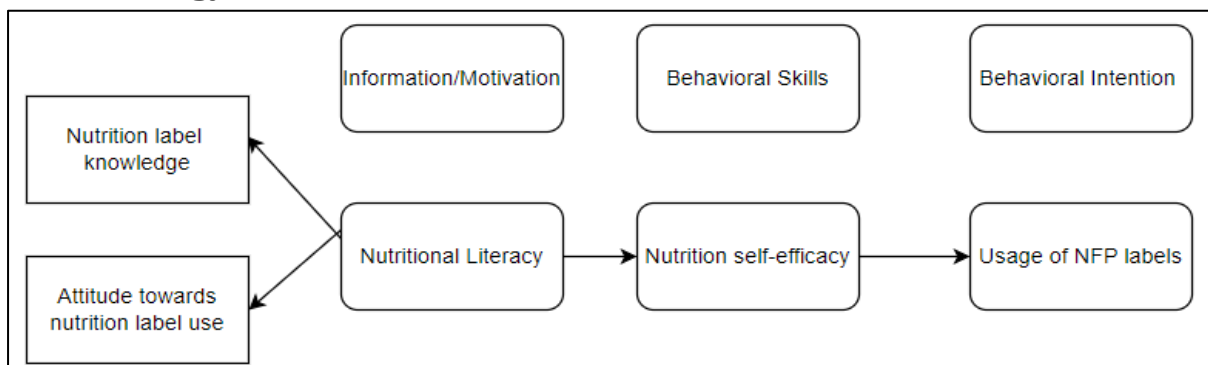
Methodology

Figure 1: Conceptual model (Authors own source)

Approximately 65 percent of the participants, primarily women, were recruited from their homes during the daytime, as the men were engaged in outdoor activities or employment. Additionally, 86 percent of the participants had attained at least a primary level of education.

Measures

The NFP labels were rated on a five point 'Likert' scale, with '1' means "strongly disagree" with the label and '5' means "strongly agree". This measurement approach has remained consistent with earlier studies,

as indicated by research conducted (32). Examples of statements include: "I try to know the function of each nutrient on nutrition labels" and "I will adjust (calorie and fat intake) my diet based on nutrition labelling." The scale exhibited excellent reliability ($\alpha = 0.89$). We utilized the

nine-item scale developed to assess respondents' nutrition label knowledge. Comparable scales have been employed in prior studies to assess participants' general understanding of nutrition, as demonstrated in research carried out by (33, 34). Prior research indicates that this scale is appropriate for gauging knowledge in situations where participants possess limited understanding and confidence in nutritional subjects. This is especially relevant when they face challenges in interpreting food and nutrition-related information, as evidenced by studies conducted by (35).

Moreover, research indicates that having nutritional label knowledge may not correspond to using NFP labels. This suggests that individuals with higher nutritional knowledge may not consistently use food labels, as evidenced by studies conducted (16, 35).

Table 2: Sample Characteristics

		Frequency	%
Gender	Female	196	51.0
	Male	188	49.0
Educational	School level	19	4.90
Qualification	UG	121	31.5
	PG	244	63.5
Average age 52.48 years			
Occupation	Private	250	65.1
	Public	28	7.30
	Business	73	19.0
	Housewife	33	8.60
Monthly	<20000	118	30.7
Income (in rupees)	21000 to 40000	113	29.4
	40001 to 60000	69	18.0
	>60001	84	21.9
Body mass index (BMI)	Obese	053	13.90
	Underweight	029	07.41
	Overweight	137	35.60
	Normal	165	43.09
Multiple comorbidities	Heart disease	033	08.50
	Hyper tension and Obesity/Blood pressure	064	16.67
	hypertension and diabetes /Blood Pressure	114	29.68
	Diabetes and CVD	113	29.42
	Obesity and CVD	026	06.77
		034	09.11
Note n=384			

The nine-item scale for nutritional knowledge included the following statements: "I have knowledge about nutrient reference values," "I am familiar with Omega 3 and Omega 6," and "I comprehend that 'nutrition claims' on food labels, such as 'low fat' and 'added vitamins,' can help regulate my nutritional intake." The scale. established acceptable reliability (α =0.81) .

We assessed nutrition self-efficacy using a 7 point scale comprising ten items (extending from "Very unimportant" to "Very Important"). Sample items included: "For me, understanding and believing the nutrition label information is" and "Paying attention to the nutrition label information is." The measure exhibited high reliability, with a Cronbach's alpha of 0.91.We adapted seven items from (36) to assess participants' attitudes toward nutrition labels. Illustrations of the employed items included: "I consciously search for nutritional information" and "I seek to understand the content on nutritional labels." Participants provided responses on a five-point Likert scale (ranging from 1, indicating "Strongly disagree," to 5, indicating "Strongly agree"). The reliability of the scale was high with a Cronbach's alpha value of 0.93.

Results

Initial Analysis

Before our hypotheses testing, we conducted a relationship investigation between the variables. Table II displays the descriptive data and connection background. All the constructs utilized in the study exhibited significant and positive correlations with each other ($p < 0.01$).

Mediation Effect

For testing the hypotheses related to mediation mechanisms, we utilized the SMART PLS 3.0 software (37). H1 postulated that nutrition label information positively influences NFP label use through self-efficacy. The results indicated a substantial and positive correlation between nutrition literacy and self-efficacy (t = 14.023, p > 0.000), as well as between nutrition literacy and NFP label use (t = 17.608, p > 0.000), as illustrated in Table IV." Moreover, self-efficacy was found to be a significant and positive predictor of NFP label use (t = 4.032, p > 0.000). According to the data in Table IV, the indirect impact of nutrition knowledge on NFP label use through self-efficacy

was determined to be 0.48, with a 95% bias-corrected confidence interval spanning from 0.24 to 0.54.Consequently, the statistical significance of the indirect effect was confirmed, considering that the bias-corrected confidence interval did not include zero, in line with the findings of (38). This provided support for Hypothesis 1. However, given that nutritional literacy remained a significant predictor of NFP label use, the outcomes suggest partial rather than complete mediation.

The constructs include Nutritional literacy, Nutrition self-efficacy, and NFP (Nutrition Facts Panel) Label Use. For the construct of Nutritional literacy, the indicators ATN1 through ATN5 are loaded at 0.663, 0.791, 0.758, 0.778, and 0.762 respectively (table 3). The Average Variance Extracted (AVE) for Nutritional literacy is 0.577, with a Composite Reliability (C.R.) of 0.877 and Cronbach's Alpha of 0.818. "Likewise, the construct of Nutrition self-efficacy is represented by NSE1 to NSE5, demonstrating factor loadings of 0.783, 0.817, 0.871, 0.635, and 0.805, respectively. This signifies that these specific components collectively contribute to the measurement of Nutrition self-efficacy within the study. The AVE for Nutrition self-efficacy is 0.714, C.R. is 0.914, and Cronbach's Alpha is 0.899. The NFP Label Use construct, composed of NLU1 through NLU6, has factor loadings of 0.726, 0.678, 0.787, 0.76, 0.815, and 0.698, respectively, an AVE of 0.616, C.R. of 0.879, and Cronbach's Alpha of 0.848.

The analysis reveals compelling findings in nutrition literacy, attitude, knowledge, NFP label use, and self-efficacy (see Table 4). The sample means for each variable align closely with the original sample values, signifying consistent data across the board. Impressively, the calculated T statistics demonstrate significant effects, particularly in the cases of nutrition literacy to knowledge (T=226.487) and nutrition literacy to attitude (T=171.39). Additionally, the relationship between nutrition literacy and NFPL use is notable (T=17.608), indicating a strong association. Surprisingly, self-efficacy does not correlate strongly with NFPL use (T=4.032). Importantly, the p-values for all the tests indicate strong evidence against the null hypothesis, reinforcing the statistical significance of the observed relationships.

Table 2: Mean(M), standard deviation (SD), and correlations between study constructs

s.no	N=384	M	SD	1	2	3
1	Nutritional literacy	3.940	1.613	1		
2	Nutrition self-efficacy	1.886	1.289	0.594**	1	
3	NFP label use	1.598	1.241	0.699**	0.387*	1
	Note:**p<0.01 (two-tailed)					

Table 3: Reliability and validity measures.

Constructs	Indicators	Factor loadings	AVE	CR	Cronbach's Alpha
Nutritional literacy	ATN1	0.663	0.577	0.877	0.818
	ATN2	0.791			
	ATN3	0.758			
	ATN4	0.778			
	ATN5	0.762			
	NLK1	0.859	0.621	0.902	0.897
	NLK2	0.847			
	NLK3	0.815			
	NLK4	0.771			
	NLK5	0.784			
	NLK6	0.733			
	NLK7	0.730			
Nutrition self-efficacy	NSE1	0.783	0.714	0.914	0.899
	NSE2	0.817			
	NSE3	0.871			
	NSE4	0.635			
	NSE5	0.805			
NFP Label Use	NLU1	0.726			
	NLU2	0.678			
	NLU3	0.787	0.616	0.879	0.848
	NLU4	0.760			
	NLU5	0.815			
	NLU6	0.698			

ATN: Attitude towards NFP label, NSE- Nutrition Self-efficacy, NLK- Nutrition label knowledge, NLU- NFP label use.

Table 4: Structural model (direct effect)

Constructs	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)
Nutrition literary -> Attitude	0.953	0.953	0.006	171.39
Nutrition literary -> Knowledge	0.964	0.964	0.004	226.487
Nutrition literary -> NFPL Use	0.72	0.72	0.041	17.608
Nutrition literary -> Self-efficacy	0.592	0.592	0.042	14.023
Self-efficacy -> NFPL Use	0.172	0.172	0.043	4.032

Table 5: Mediation analysis result

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)
Nutrition literary -> Self-efficacy -> NFPL Use	0.102	0.102	0.027	3.762

These results underscore the critical role of nutrition literacy in shaping attitudes and knowledge and ultimately influencing the utilization of non-front-of-package labelling, highlighting potential pathways for effective health interventions and policy strategies.

Table 5 shows that the relationship between nutrition literacy, self-efficacy, and NFPL use reveals a noteworthy pattern. With an original sample value of 0.102, closely matching the sample mean, and a standard deviation of 0.027, the T statistic 3.762 indicates a significant link. "This finding implies a scenario of complementary partial mediation, indicating that the association between nutrition literacy and NFPL use is partially influenced by self-efficacy. It implies that while self-efficacy plays a role in the association between nutrition literacy and NFPL use, other influential factors are at play, highlighting the intricate nature of this relationship".This suggests a nuanced approach to intervention strategies, focusing on enhancing nutrition literacy and bolstering self-efficacy to promote informed decision-making and use of non-front-of-package labelling, fostering better health outcomes and informed consumer choices.

Discussions

Our study sought to explore the intricate dynamics among nutritional literacy, nutrition self-efficacy, and the utilization of Nutrition Facts Panel (NFP) labels. The positive results affirm our hypothesis, indicating a significant mediating role of nutrition self-efficacy in the association between nutritional literacy and the use of NFP labels. The findings underscore the critical interplay between cognitive aspects, represented by nutritional knowledge, and psychological factors, encapsulated in attitudes toward nutrition, in influencing individuals' confidence to apply this knowledge in practical contexts. The observed positive relationship between nutritional knowledge and nutrition self-efficacy aligns with the tenets of Bandura's Social Cognitive Theory, emphasizing that an individual's perceived capability to execute a behavior is influenced by their knowledge and beliefs. As individuals acquire greater nutritional knowledge and develop positive attitudes toward nutrition, they are more likely to feel efficacious in utilizing NFP labels. This insight is valuable for interventions aiming to enhance nutrition-related behaviors, suggesting that efforts to boost nutritional literacy should concurrently address the psychological aspects of self-efficacy.

Furthermore, our study highlights the practical significance of nutrition self-efficacy as a key determinant of NFP label utilization. The positive association between self-efficacy and label usage suggests that interventions focusing on improving individuals' confidence in interpreting and applying nutritional information could effectively promote the practical use of NFP labels. This has implications for health education programs and public health campaigns, emphasizing the need to incorporate strategies that not only impart nutritional knowledge but also build individuals' self-efficacy in making informed food choices. It is noteworthy that our results reveal a pathway through which attitudes toward nutrition influence label usage—via their impact on nutrition self-efficacy. This nuanced understanding contributes to a more comprehensive theoretical framework for guiding future research and intervention development. The positive outcomes further underscore the need for tailored approaches that consider individual differences and the diverse sociodemographic characteristics of the population. In conclusion, our study provides empirical support for the mediating role of nutrition self-efficacy in the relationship between nutritional literacy and the use of NFP labels. These findings offer valuable insights for practitioners, educators, and policymakers working toward fostering healthier dietary practices by emphasizing the intertwined nature of knowledge, attitudes, and self-efficacy in shaping individuals' behaviors in the realm of nutrition.

Practical and Social Implications

Our findings suggest that individuals' confidence in their ability to make healthy nutritional choices influenced the connection between understanding nutrition information and using Nutrition Facts Panel (NFP) labels. This suggests that programs to improve individuals' understanding of nutrition should also prioritize building their confidence in NFP labels and their self-assurance in effectively using the information provided. Given the potential of food education initiatives to promote healthier dietary choices (39), food marketers, public health experts, and government bodies must educate the public about utilizing nutrition labels effectively. Identifying and implementing strategies that can bolster individuals' self-assurance in interpreting NFP label information is vital. This emphasis is particularly critical for individuals managing chronic health conditions, as NFP labels can serve as a valuable resource in aiding them to make well-informed decisions regarding their diet and lifestyle .

Studies indicate consumers approach health claims featured in nutritional information sceptically (40).Individuals with specific dietary requirements rely more on food labels to manage and potentially improve their health conditions (41), their interpretations of the details on food packaging can significantly influence their dietary choices. Consequently, social marketing and public health campaigns must prioritize efforts that cultivate positive attitudes toward NFP labels. This effort should be paralleled by food marketers acknowledging their social responsibility and ethical duty to ensure the accuracy and truthfulness of information on NFP labels while actively supporting the promotion of food label information.

India perceived a fast surge in the consumption of packaged and processed foods, particularly in urban regions, over the last few decades (2). This trend has led Indian consumers, especially the younger population, to increasingly emphasize food. Consequently, it becomes imperative for the Food Safety and Standards Authority of India (FSSAI) to promptly finalize and issue comprehensive Food Safety and Standards Regulations (42) soon. These regulations should establish mandatory labelling requirements for prepackaged foods and enhance consumers'

confidence in understanding the information presented on food labels.

Considering India's notable increase in the consumption of packaged and processed foods (43), particularly in urban areas, over the past few decades, it has become increasingly apparent that Indian consumers, especially the younger demographic, are attaching greater significance to food. Therefore, the Food Safety and Standards Authority of India (FSSAI) must expedite the finalization and issuance of comprehensive Food Safety and Standards Regulations in the immediate future. These regulations should enforce labelling requirements for prepackaged foods and bolster consumers' trust and understanding of the information conveyed through food labels .

Theoretical Contribution

By emphasizing the crucial role of self-efficacy in mediating the connection between nutritional literacy and NFP label use, this research underscores the validity of the intervening mechanisms proposed in the Information-Motivation-Behavioral Skills (IMB) model. This overall finding strongly suggests that the IMB model serves as a valuable framework for comprehending and elucidating the factors influencing the utilization of Nutrition Facts Panel (NFP) labels among Indian adults.

Limitations and Future Research

Under the Information-Motivation-Behavioral Skills (IMB) model, the motivational aspect comprises personal and social motivation components. However, the present study concentrated solely on personal motivation, specifically, the attitude toward using food labels. As a result, it is recommended that forthcoming research consider investigating the impacts of both personal and social motivational factors, including aspects such as social support. This comprehensive exploration would offer a more holistic understanding of the various motivational influences on individuals' engagement with Nutrition Facts Panel (NFP) labels.

Furthermore, it is worth delving into the potential distinctions in consumers' perceptions, attitudes, and behaviours concerning food labels based on the types of foods they are associated with. Given the growing consumption of processed and

unprocessed foods, exploring potential divergences in how individuals perceive and interact with labelling information for these different food types could provide valuable insights. Understanding any variances in consumer behaviour concerning processed and unprocessed foods would contribute to developing more tailored and effective strategies for promoting informed and healthy food choices.

Conclusions

In conclusion, this comprehensive analysis sheds light on the intricate interplay between nutritional literacy, self-efficacy, and the utilization of Nutrition Facts Panel (NFP) labels among diverse populations, notably emphasizing the significant role of self-efficacy as a mediating factor. The findings underscore the relevance and applicability of the Information-Motivation-Behavioral Skills (IMB) model in elucidating the underlying mechanisms governing individuals' engagement with food labelling, particularly in the context of the Indian adult population. Nonetheless, the study highlights the necessity for future research to delve into the influence of both personal and social motivational aspects within the IMB framework, thereby enriching our understanding of the complexities involved in food label utilization.

Moreover, considering the potential disparities in consumer perceptions and behaviours concerning different food categories, particularly processed and unprocessed foods, emerges as a critical area for further exploration. Investigating these potential distinctions can offer valuable insights into the nuanced dynamics guiding individuals' decision-making processes and behaviours regarding food label usage. Such insights hold significant promise for informing the development of more targeted interventions and policies to foster improved nutritional literacy, promote healthier dietary choices, and enhance overall consumer well-being in an evolving food landscape, especially in countries experiencing rapid shifts in dietary habits, such as India.

Abbreviations
Nil

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