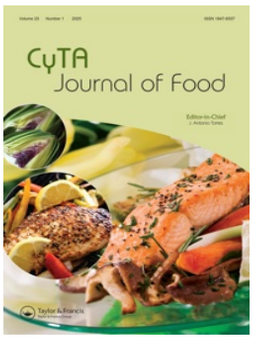

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Classification and analysis of nutrition and health claims on Indian packaged food products

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ABSTRACT

Nutrition and health (NH) claims are extensively used on food packages to convey health benefits of food products to consumers in India. However, Indian regulatory guidelines do not provide a detailed classification of NH claims. Hence, first comprehensive NH claim sub-types are identified by studying regulatory guidelines of various countries as well as the academic literature. Next, 1123 claims on 112 health-based packaged food products from India are analysed based on typologies identified. The results reveal a high occurrence of NH claims. Within NH claims, there was a higher presence of nutrition claims over health claims; components to encourage over limit; and non-numeric over numeric claims. Moreover, claim types that are popular in the market but have received limited research attention, such as numeric, non-addition, nutrient comparative, component to limit, and implied claims, are highlighted. This work can help Indian policymakers to re-evaluate and revise current claim guidelines.

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Health claims; nutrition claims; NH claims; classification framework; health food; content analysis

Introduction

Consumers are becoming increasingly conscious about their health and the impact of food products they eat on their health (Japutra et al., 2022). This is driving the demand for health-based packaged food products. The emergence of the middle class has further fuelled the growth of health food products in the Asia Pacific countries like India (Friel & Baker, 2009). India is one of the fastest-growing packaged health food markets in the world (Mascaraque, 2018). Indian health food product market is growing rapidly at 20% per annum and is projected to become a 30 bn USD industry by 2026 (India Unjunking: A USD 30 billion appetite for health food, Avendus (2022)). Nutrition and health claims are widely used to communicate health on food packages due to the simplicity of the message (Kaur et al., 2017; Leathwood et al., 2007; Van Trijp & Van der Lans, 2007). This study aims to examine the nature of textual nutrition and health claims as presented on health-based packaged food products in the Indian marketplace.

Nutrition and Health (also called NH or HNR) claims are mechanisms for information disclosure categorized under the techniques of information remedies (Beales et al., 1981; Nocella & Kennedy, 2012). Information remedies are techniques used for information dissemination. These rely on private economic inducements to accomplish regulatory goals over expensive direct enforcement by the regulator (Beales et al., 1981).

"Nutrition claim means any representation which states, suggests or implies that a food has particular nutritional properties which are not limited to the energy value and to protein, fat, carbohydrates, vitamins and minerals." (e.g. "Source of calcium", "Low in fat" and "Contains Probiotic") (Codex Alimentarius, 2013, p. 1; Food Safety and Standards Authority of India [FSSAI], 2011).

"Health claim means any representation that states, suggests or implies that a relationship exists between a food or a constituent of that food and health and includes nutrition claims which describe the physiological role of the nutrient in growth, development and normal functions of the body, other functional claims concerning the specific beneficial effect of the consumption of food or its constituents, in the context of the total diet, on normal functions or biological activities of the body and such claims relate to a positive contribution to health or the improvement of function or to modifying or preserving health, or disease, risk reduction claim relating to the consumption of a food or food constituents, in the context of the total diet, to the reduced risk of developing a disease or health-related condition." (e.g. "Builds immunity" and "Reduces the risk of heart disease") (FSSAI, 2011)

However, there are no standardized conceptual tools to traverse the variety of complex sub-types of NH claims present in the marketplace (André et al., 2016). A large number of claims present on food packages are inadequate and cannot be classified against the guidelines provided by to Food Safety and Standards of India (Soni & Kaur, 2023). India follows both pre- and post-marketing strategies for different claim types (FSSAI, 2018). Further, the Indian regulatory system defines only NH claims; the subtypes of the claims are not provided (Food Safety and Standards Authority of India, 2011). Further, these guidelines were laid out almost a decade ago. Hence, a need was felt to identify the typologies of NH claims prevalent in regulatory guidelines of various countries and the academic literature and then to examine the nature of Indian textual NH claims vis-à-vis the NH typologies used globally. This would help Indian policymakers revise claim guidelines per global best practices, which are suitable for the Indian NH claim landscape. Moreover, food marketers will also be able to evaluate different possibilities of positioning food products through unique claims.

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In the following sections, prior research on NH claims and regulatory guidelines of various countries is examined to conceptualise the classification framework of claims. Next, the NH claims prevalent in the Indian market were analysed based on the conceptualised classification typologies.

Classification framework of NH claims

The regulatory guidelines of Internationally recognised Codex Alimentarius (FAO/WHO, 2018), and countries like U.S.A. (U.S. Food & Drug Administration, 2016), EU (European Commission, 2012), Australia and New Zealand (Food Standards Australia New Zealand, 2016), Singapore (Agri food and Veterinary Authority of Singapore, 2016), and India (Food Safety and Standards Authority of India, 2011) were examined. It was found that regulatory bodies from different countries have used diverse terminologies to describe the same claim type. For example, the claims which describe the content of a nutrient in the product are called *Nutrient* content claims by U.S. Food and Drug Administration (2016) and *Nutrition* content claims by Food Standards Australia New Zealand (2016).

Further, in pursuit of finding a standard classification framework for NH claims, academic literature was also thoroughly searched. Electronic databases like Scopus, Ebsco, and ProQuest were searched for journal papers with the keywords of "Nutrition claim", "Health claim", "NH claims", and "Health-related claim". On reviewing the seminal papers, it was found that prior academic research also exhibits a lot of confusion in typology and nomenclature of claims (Refer Table 1 for different nomenclatures of NH claims used in literature). Such as, claim about a health benefit without specifying the component or nutrient is called "Product claim" by Van Trijp and Van der Lans (2007), "Enhance function claim" by Van Kleef et al. (2005), and "Benefit claim" by Dean et al. (2012). Further, the majority of the prior research on health food products has been conducted in developed countries, the U.S.A. and Europe. The rising population of health-conscious consumers in developing countries poses a need for research in such countries like India (Lwin et al., 2015). Hence, after a thorough examination of regulatory guidelines and academic literature, we concluded that though last modified in 2013, the guidelines of Codex Alimentarius subsume most of the types and sub-types of NH claims existing in many countries as well as academic literature. It also provides well-defined explanations for each claim type. Codex Alimentarius offers a set of internationally recognized standards, codes of practice, guidelines, and other recommendations relating to foods, food production, and food safety (FAO/WHO, 2018). It has 188 member countries including U.S.A., UK, Australia, Ireland, India, China, and Brazil. Hence, we decided to lay the foundation of our classification on typologies given by Codex Alimentarius. It proposes three sub-types of nutrition claims: nutrient content claim, nutrient comparative claim, and non-addition claim; and three sub-types of health claims: nutrient function claim, other function claim, and reduction of disease risk claim. Even after being fairly detailed, we found that many types of NH claims cannot be classified under any head in Codex Alimentarius. Like, recently, implied claims can be seen pervading the food packages. This could have led countries like Singapore and Canada to regulate them (Agri food and Veterinary Authority of Singapore, 2016). Such as, Singaporean food regulatory authorities define implied NH claims as letter(s), word(s), statement, name, numeral or brand which singly or with affix, acronyms or sound-like

Table 1. Nutrition and health claim nomenclatures used in seminal journal articles.

Author(s)	Countries	Claims studied	Nomenclature used
Ares et al. (2009)	Uruguay	Milk dessert containing fiber. Fiber consumption encourages calcium absorption and growth of beneficial bacteria in the gut.	Enhanced function claim
		Milk dessert containing fiber. Fiber consumption reduces the risk of cancer in the gut.	Reduced disease risk claim
Bech-Larsen and Grunert (2003)	USA Finland Denmark	Omega-3s increase blood circulation in the legs.	Physiological claim
		Omega-3s reduce the risk of heart disease.	Prevention claim
Dean et al. (2012)	UK	Contains whole grain.	Nutrition claim
	Finland	Promotes regulation of blood sugar balance.	Benefit claim
	Germany Italy	Contains cereal-based compounds which balance the blood glucose levels and, therefore, lower the risk of type 2 diabetes.	Risk reduction claim
Roe et al. (1999)	USA	Low fat, low cholesterol.	Nutrient content claim
		Diets with enough folic acid may reduce the risk of certain birth defects.	Health claim
Van Kleef et al. (2005)	Netherland	Helps maintaining healthy cholesterol levels.	Enhance function format
		Reduces the risk of heart diseases.	Disease risk reduction format
Van Trijp and Van der Lans (2007)	USA UK Germany Italy	This yoghurt contains probiotics.	Content claim
		This yoghurt helps strengthen the body's natural defence system, because it contains probiotics.	Structure–function claim
		This yoghurt helps strengthen the body's natural defence system.	Product claim
		This yoghurt may reduce the incidence of intestinal infections, because it contains probiotics.	Disease-risk reduction claim
		This yoghurt helps you build resistance to common diseases, because it contains probiotics.	Marketing claim
Verbeke et al. (2009)	Belgium	Fruit juice enriched with calcium.	Nutrition claim
		Fruit juice enriched with calcium can strengthen bones.	Health claim
		Fruit juice enriched with calcium reduces risk in the development of osteoporosis.	Reduction of disease risk claim
Urala et al. (2003)	Finland	Product contains added sitostanol.	Functional component claim
		Product contains added sitostanol. Sitostanol lowers blood cholesterol.	Functional component with functional benefit claim
		The sitostanol in the product reduces the risk of coronary heart disease.	Functional component with reduction of disease risk claim
		The sitostanol in the product prevents coronary heart disease.	Functional component with prevention of illness claim

imply nutrition or health claims (Agri food and Veterinary Authority of Singapore, 2016). So, we included implied NH claims also in the framework.

Further, from the academic literature, we found unique claim types that had not been described in any of the regulatory guidelines. These are functional component health claims (Urala et al., 2003; Van Trijp & Van der Lans, 2007), functional benefit health claims (Dean et al., 2012; Van Kleef et al., 2005), prevention of illness health claim (Urala et al., 2003), and generic nutrition claim (Andrews et al., 2000; Parker, 2003; Nan et al., 2013). These claim types were also added to the framework.

Hence, by the amalgamation of claim typologies from regulatory guidelines of various countries and academic literature, a classification framework of NH claims was obtained. It is presented in Figure 1. The definitions and examples of each of the sub-types are discussed in Table 2.

Analysis of NH claims as per the framework

NH claims displayed on the packaged food products positioned on health were analysed using the typologies of the conceptualised classification framework. For the purpose of study, the health food product categories were selected based on low–high health dimensions and processing level. The four product categories selected were: a) healthy and low-processed, b) unhealthy and low-processed, c) healthy and high-processed, and d) unhealthy and high-processed. Products were categorized as low-processed and high-processed based on the level of processing (Barrett et al., 2023; Monteiro, 2012). Categories on the health dimension were chosen based on previous literature (Fenko et al., 2015; Murphy et al., 2007; Roininen et al., 2000; Wansink & Chandon, 2006). The list of products for the content analysis was taken from the database of the report – health and wellness in India by Euromonitor (2018). In this report, the highest turnover food product categories were dairy, oil and fats, and biscuits and cereal bars. Hence, the four product categories chosen for this study were milk (healthy and low-processed), edible oils (unhealthy and low-processed), cereal bars (healthy and high-processed), and biscuits (unhealthy and high-processed).

From the Euromonitor report, a list of 107 Indian health products (14 edible oils, 17 milks, 59 biscuits, and 17 cereal bars) was obtained. For each of these products in the list, all the side (front, back, sides, top, and bottom) images of the pack were obtained by photographing the physical product or downloading the images from the internet. There were a few products for which only the front of pack images could be found (15 in number). And some products were neither available physically in the market nor their image could be found on the internet (22 in number). Hence, these products were dropped from the list. To compensate for the dropped products, 27 other products widely available in the marketplace were included in the list. From the product images, all claims displayed on various sides of packages were listed down. Hence, a total of 112 Indian health products (19 edible oils, 16 milks, 54 biscuits, and 23 cereal bars) and 1123 claims (173 in edible oils, 141 in milks, 460 in biscuits, and 349 in cereal bars) were examined using the content analysis methodology.

The content analysis was based on the procedure cited by Kassarjian (1977). A coding manual was created (Please refer Appendix). The manual stated clear definitions and examples for each of the textual claim as per the classification framework. Further, nutrition or component type (encourage versus limit) and the presence of numbers in claims were also coded. The nature of NH claims was investigated based on the following parameters:

(1) Proportion of NH claims versus all claims;
(2) Proportion of nutrition versus health claims;
(3) Frequency of sub-types of NH claims: generic, nutrient content, nutrient comparative, non-addition, functional component, implied nutrition (Nutrition claims); and nutrient function, other function, functional benefit, reduction of disease risk, prevention of illness, implied health (Health claims)
(4) Proportion of nutrient or component to encourage versus limit in NH claims;
(5) Proportion of numeric versus non-numeric NH claims;

The frequency of the claims was calculated for all sides of the pack and front of pack separately.

Two coders were recruited and trained extensively. As a pilot, first, the coders coded 100 (10%) claims. This was followed by a discussion of coding output in the presence of the first author

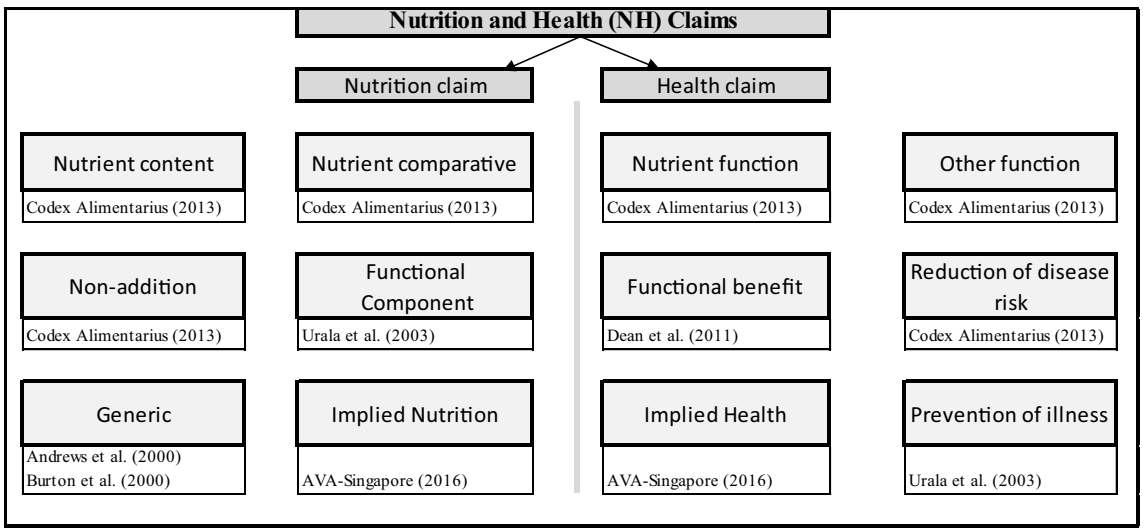

Figure 1. Nutrition and health claims classification framework.

Table 2. Typology of nutrition and health claims.

Claim type	Description	Examples	References
Nutrition claims			
Nutrient content claim	Describes the level of a nutrient contained in a food.	High in fiber, Low in fat	Codex Alimentarius (2013)
Nutrient comparative claim	Compares the nutrient levels and/or energy value of two or more foods.	Reduced, More than	Codex Alimentarius (2013)
Non-addition claim	Claims that an ingredient has not been added to a food, either directly or indirectly.	No added sugar; No added salt	Codex Alimentarius (2013)
Generic claim	Claim which offers general health benefits to consumers.	Nutritious	Andrews et al. (2000)
Functional component claim	States the presence of a useful dietary ingredient in the food product which cannot be classified as nutrient.	Probiotic, Sitostanol, Beta-carotene	Urala et al. (2003)
Health claims			
Nutrient function claim	Describes the physiological role of the nutrient in growth, development and normal functions of the body.	Calcium helps in improving bone density. This product is high in Calcium.	Codex Alimentarius (2013)
Other function claim	Concerns specific beneficial effects of the consumption of foods or their constituents, in the context of the total diet on normal functions or biological activities of the body. Such claims relate to a positive contribution to health or to the improvement of a function or to modifying or preserving health.	Probiotic helps strengthen body's defence system. This product contains probiotic.	Codex Alimentarius (2013)
Functional benefit claim	Relates to a positive contribution to health or to the improvement of a function or to modifying or preserving health without specifically mentioning the nutrient or substance which leads to the benefit.	Helps in improving bone density; Helps strengthen body's natural defence system.	Dean et al. (2012)
Reduction of disease risk claim	Relates the consumption of a food or food constituent, in the context of the total diet, to the reduced risk of developing a disease or health-related condition.	A healthful diet rich in calcium may reduce the risk of development of osteoporosis. This product is rich in calcium.	Codex Alimentarius (2013)
Prevention of illness claim	Claim which asserts that consumption of food product will inhibit the occurrence of a disease.	Prevents osteoporosis	Urala et al. (2003)
Implied nutrition and health claims	These claims are letter(s), word(s), statement, name, numeral or brand which singly or with affix, acronyms or sound-like imply nutrition or health claims.	Calci-Vita Plus, KiD Bone (contains vitamin K and vitamin D)	Agri food and Veterinary authority of Singapore (2016)

to achieve 100% consensus. Post this pilot, the whole of the data was coded independently by the two coders.

At the end of the coding process, inter-coder reliability for the complete output was measured using Cohen's kappa. Wherever the intercoder reliability was less than 0.75, coders relooked at the point of differences and recoded those after discussion. Post-recording, the agreement ranged from 0.84 to 1 for each of the variables.

Results

The proposed classification framework is found useful as all 697 NH claims could fit in one of the 12 different sub-types. Other results from the content analysis are discussed below.

Data description: NH claims

On average, 10 claims were found per food package, out of which 6.2 claims were NH claims. On the front of pack, 4.3 claims were found on average, out of which 2.7 claims were NH claims (Refer Table 3). It was found that claims were being repeated many times on various sides of the pack. Also, multiple NH claims were used on a single pack. Like, a pack of skimmed milk product had three NH claims on the front of pack itself – "Slim" as an implied health claim, ".2% fat" as a numeric nutrient content claim, and "Rich in calcium and Protein" as another nutrient content claim.

NH claims versus all claims

Out of total 1123 claims found on the 112 food packages, 62% claims ($n = 697$) were NH claims. On the front of pack, out of total 487 claims analysed, 61% claims ($n = 301$) were NH claims. The usage of NH claims over other claims was more prevalent on unhealthy product categories (Biscuits – 70% all sides & 71% front, Oil – 65% all sides & 71% front) than healthy product categories (Milk – 40% all sides & 50% front, Cereal bar – 59% all sides & 48% front) (Refer Table 3). Chi-square test of independence between product categories and claim type was significant for NH claims on all sides (χ^2 [df = 3, $N = 1123$] = 41.958, $p < .001$) as well as on front of pack (χ^2 [df = 3, $N = 487$] = 25.311, $p < .001$).

Nutrition versus health claims

Out of a total 697 NH claims analyzed, 75% claims ($n = 525$) were found as nutrition claims and 25% claims ($n = 172$) as health claims. On the front of pack, a similar high prevalence of nutrition claims (72%, $n = 217$) over health claims (28%, $n = 84$) was observed. The usage of nutrition claims over health claims was higher in all categories, however, the proportion varied. Nutrition claims were most prevalent in high processed healthy cereal bar (88% all sides, 86% front), followed by high processed unhealthy biscuit (73% all sides, 74% front), followed by low processed unhealthy oil (65% all sides, 63% front), and lowest in low processed healthy milk (65% all sides, 53% front) (Refer Table 3). The chi-square test

Table 3. Frequency of NH claim subtypes.

	Oil				Milk				Biscuits				Cereal bars				Total			
	All	%	Front	%	All	%	Front	%	All	%	Front	%	All	%	Front	%	All	%	Front	%
Total products	19				16				54				23				112			
Total claims	173		79		141		64		460		212		349		132		1123		487	
NH claims	113		56		57		32		320		150		207		63		697		301	
Nutrition claims	73	65%	35	63%	37	65%	17	53%	233	73%	111	74%	182	88%	54	86%	525	75%	217	72%
1–Generic	12	11%	7	13%	4	7%	3	10%	49	15%	22	15%	11	5%	3	5%	76	11%	35	12%
2-Nutrient content	21	19%	14	25%	30	53%	12	39%	60	19%	35	23%	99	48%	33	52%	210	30%	94	31%
3-Nutrient comparative	1	1%	0	0%	0	0%	0	0%	7	2%	4	3%	2	1%	0	0%	10	1%	4	1%
4-Non-addition claim	0	0%	0	0%	1	2%	1	3%	17	5%	6	4%	12	6%	2	3%	30	4%	9	3%
5-Functional component	37	33%	12	21%	0	0%	0	0%	51	16%	22	15%	48	23%	11	17%	136	20%	45	15%
6-Implied nutrition	2	2%	2	4%	2	4%	1	3%	49	15%	22	15%	10	5%	5	8%	63	9%	30	10%
Health claims	40	35%	21	37%	20	35%	15	47%	87	27%	39	26%	25	12%	9	14%	172	25%	84	28%
7-Nutrient function	5	4%	1	2%	11	19%	7	23%	8	3%	0	0%	0	0%	0	0%	24	3%	8	3%
8-Other function	8	7%	1	2%	0	0%	0	0%	5	2%	0	0%	1	0%	0	0%	14	2%	1	0%
9-Functional benefit	6	5%	5	9%	1	2%	1	3%	12	4%	7	5%	18	9%	7	11%	37	5%	20	7%
10-Reduction of disease risk	6	5%	3	5%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	6	1%	3	1%
11-Prevention of illness	1	1%	0	0%	0	0%	0	0%	1	0%	1	1%	3	1%	0	0%	5	1%	1	0%
12-Implied Health	14	12%	11	20%	8	14%	7	22%	61	19%	31	21%	3	1%	2	3%	86	12%	51	17%

of independence between product categories and NH claim type was significant for NH claims on all sides (χ^2 [df = 3, N = 697] = 28.753, $p < .001$) as well as front of pack (χ^2 [df = 3, N = 301] = 14.075, $p = .003$).

Frequency of various sub-types of NH claims

Nutrient content claims like "High calcium or Low fat" emerged as the most frequently used NH claim sub-type (30% all sides, 31% front). Other frequently used sub-types were functional component claims like "Probiotic" (20% all sides, 15% front), implied health claims like "Slim" (12% all sides, 17% front), and generic claims like "Nutritious" (11% all sides, 12% front). The least used sub-types were other function claim ($n = 1$), prevention of illness claim ($n = 1$), reduction of disease risk claim ($n = 3$), and nutrient comparative claims ($n = 4$) (Refer Table 3). As the frequency of many sub-types was less than 5, Fisher's exact test was used to determine the association between NH claim sub-type and product type. The test revealed that NH claim sub-type classification varied with product type for both on all sides of pack ($p < .001$, Fisher's exact test) as well as front of pack ($p < .001$, Fisher's exact test).

Nutrient or component to encourage versus limit in NH claims

Out of total 697 NH claims, 428 claims had a nutrient or functional component mentioned in them. Out of these 428 claims, 272 claims (64%) were about nutrient or functional component to encourage (like calcium, vitamin, and omega-3), and 156 claims (36%) were about nutrient or functional component to limit (like fat, cholesterol, and sugar). Usage of a nutrient or functional component to encourage was most prevalent in high processed healthy cereal bar (78%), followed by low processed unhealthy oil (64%). In the other two categories, nutrients or components to limit were more prevalent, with high processed unhealthy biscuit at 56% and low processed healthy milk at 57%. The chi-square test of independence between product categories and nutrient or functional component type was significant (χ^2 [df = 3, N = 428] = 39.934, $p < .001$).

Numeric versus non-numeric NH claims

Amongst NH claims, 21% ($n = 146$) claims were numeric in nature. Use of numeric claims was more prevalent in healthy categories of high processed cereal bar (32%) and low processed milk (26%) compared to unhealthy categories of biscuit (16%) and oil (13%). Chi-square test of independence between product categories and numeric or non-numeric NH claim type was significant (χ^2 [df = 3, $N = 697$] = 25.56, $p < .001$).

Within 146 numeric claims, 64 claims denoted the level using percentage. Percentage numeric claims were found to be quite popular in milk front of pack like "2% fat" or "99% fat free". Alternatively, absolute numeric claims were popular in cereal bar like "20 g protein".

Discussion

We examined the textual NH claims found on packaged food products in India through a content analysis of 1123 claims taken from 112 health-based packaged food products. The study revealed, overall, a high presence of NH claims on packaged food products. Additionally, a high presence of nutrition versus health claims, nutrient or functional component to encourage versus limit, and non-numeric versus numeric claims was found. Within the NH claim sub-type, a high presence of nutrient content claims, functional component claims, implied health claims, and generic claims was found.

Prior content analysis studies on NH claims were conducted on the food advertisements which appeared in US print magazines by Parker (2003) and Nan et al. (2013). The current content analysis study has been conducted on the NH claims occurring on food packages in India, which is a fast developing country in the Asian subcontinent. Further, unlike prior studies which looked at the broad level classification of claims into three types (Nutrient Content, health, and structure–function claims), this study delved deeper and looked at 12 different subtypes and various other attributes of NH claims. In line with Parker (2003) and Nan et al. (2013), high usage of NH claims, high usage of nutrition as compared to health claims, and high usage of specific compared to generic claims was found. Apart from Parker (2003) and Nan et al. (2013); Pereira et al. (2019) also conducted a content analysis of NH claims

as part of their larger objective to explore the marketing techniques on Brazilian packaged food products. They analysed six types of NH claims as per Codex Alimentarius claim guidelines and like us found higher presence of nutrition compared to health claims and high presence of nutrient content claims among sub-types of nutrition claims. This indicates that owing to rapid globalization, the situation of health food products and claims in developing countries like India and Brazil is becoming similar to that of developed countries like U.S.A.

Further, in our study, a high presence of multiple NH claims of the same type or different sub-types was found on packages. Extant literature has always focused on gauging the consumer perception of one NH claim on a food product (Orquin & Scholderer, 2015). However, this study on actual food packages shows that a consumer faces multiple NH claims on the packaging, communicating either the same or different benefits. All these claims together create complete health imagery of the product. Hence, there is a need to study consumer perception about products carrying multiple NH claims on the package. Further, the focus of extant literature has mostly been on health claims, nutrition claims have been largely neglected (Orquin & Scholderer, 2015). Yet, a higher presence of nutrition claims over health claims was found across all product categories in this study. However, one cannot be sure if consumers prefer nutrition claims over health claims as prior comparative studies on consumer preference of claim type have yielded contradictory results (Annunziata & Mariani, 2019; Dean et al., 2012; Franco-Arellano et al., 2020; Kelly et al., 2024; Roe et al., 1999; Urala et al., 2003; Van Trijp & Van der Lans, 2007; Verbeke et al., 2009). Thus, more comparative studies between various subtypes of NH claims are very much required.

Within nutrition claims, it was found in this study that nutrient or functional components to encourage, like calcium, vitamins, and omega-3, are more prevalent on food products than nutrient or functional components to limit, like fat, cholesterol, and sugar. As the "encouraging" claims seem to emphasize positive contribution to life and hence are preferred by the food industry (Coussement, 2002). However, it is not yet known if consumers too prefer such claims. Further research is required to probe consumer preference about encouraging versus limiting nutrition claims.

In this study, four different product types varying on health and level of processing were compared on the nature of NH claims. It was found that the usage of NH claim type varies with the product categories. A higher usage of NH claims was found on unhealthy compared to healthy product categories. This shows that marketers are using NH claims extensively to change the perception of unhealthy products amongst consumers. This might not be the best strategy as consumers are found to dislike NH claims on unhealthy products (Siegrist, Stampfli, & Kastenholz, 2008). Moreover, it can lead to consumer skepticism towards NH claims (Chaudhary et al., 2024; Fenko et al., 2015). A high presence of nutrition claims compared to health claims on high processed food categories was found. This shows that food companies are relying heavily on nutrition claims to position processed food products as healthy. Further, the use of numeric claims was found to be more prevalent on healthy product categories. It seems that, to achieve unique health positioning for already healthy products, food companies are stressing on amount of nutrition benefits. However, whether these strategies are proving to be effective remains to be seen. Consumer perception of NH claims across the food categories (healthy-unhealthy and high-low processed) should be a subject of future research.

Implications

This paper provides a framework of NH claims, offering a ready reckoner of all possible claim types in one place for policymakers, researchers, and practitioners. This is primarily helpful for policymakers in India, as the framework can help in setting detailed guidelines for properly defining sub-types of NH claims. Further, this paper also introduces new types of NH claims that are prevalent in the market like numeric NH claims, non-addition claims, and nutrient comparative claims. It also highlights some claim types which are prevalent in the market but have received limited attention from researchers like NH claims on nutrients or components to limit and implied NH claims. Thus, this paper paves way for many new areas of future research.

This framework can help food companies map various products within a category based on NH claims. Managers can then identify NH claim types that are not currently being used and use those NH claim types on their products. Such as, it is observed from this study that the nutrient comparative claims, other function claims (claims explaining the health benefits of functional components), prevention of illness claims, and reduction of disease risk claims are rarely used in India. Hence, there is a scope for positioning food products on these NH claims in India.

Limitations and areas of future research

This study analysed the NH claims found on Indian packaged food products. On similar lines, NH claims of other countries can be analysed as well. Moreover, market data from only four product categories could be analysed here. In future, more product categories should be examined to validate the findings of this study. Another limitation of this study is the use of only two coders for coding; using multiple coders in future studies is recommended. Further, the scope of this study was limited to textual claims found on packaged food products. However, the images and visuals on food products may also have a nutrition or health-based connotation. Hence, examining the health-based images and visuals found on food products can be an important area of future research. Similarly, analysis of NH claims found in print, TV and digital media can be another area of future research. Additionally, it will be very interesting to see how consumers comprehend the NH claims used by the marketers (Kim et al., 2012). It can help marketers in selecting claims that appeal to consumers. Further, it can be a foundation for policymakers to create regulations to help consumers.

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Author contributions

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Appendix. Coding manual

For each pack, all the claims are recorded in the worksheet. Observe the pack, and please code each textual claim according to the below-mentioned guidelines.

1) If NH (Nutrition or Health) claim is present, then code 1, if another claim is present then code 0

Nutrition claim – This means any representation that states, suggests, or implies that a food has particular nutritional properties, including but not limited to the energy value and the content of protein, fat, and carbohydrates, as well as the content of vitamins and minerals.

Health claim – This means any representation that states, suggests, or implies that a relationship exists between a food or a constituent of that food and health. If the claim follows any one of the above definitions, then the NH claim is present.

Other claim – All other types of claims occurring on a food pack like composition claims (e.g. Multigrain, No Added Preservatives, Pure, Real), naturalness claims (e.g. All Natural, Organic), processing claims (e.g. Baked, Popped), safety and quality claims (e.g. Best in quality), promotional claims (e.g. New and improved), or any other claim which cannot be classified as nutrition or health claim.

2) NH claim type

2.1 If nutrition claim is present code 1, if health claim is present code 2 and for not applicable code 0

2.2 Code the type of Nutrition or Health claims as (1–6 are Nutrition claims, 7-12 are Health claims):

1 – Generic claim – claim which does not refer to any specific benefits, instead suggests general nutrition or health benefit in the food

e.g. – Healthy, Wholesome, Nutritious

2 – Nutrient content claim – nutrition claim that describes the level of a nutrient contained in the food

e.g. – Source of calcium, high in fibre, low in fat

3 – Nutrient comparative claim – claim that compares the nutrient levels and/or energy value of two or more foods

e.g. – Reduced fat, fewercalories, increased protein, more than, less than

4 – Non-addition claim – suggests that an ingredient has not been added to a food, either directly or indirectly. The ingredient is one whose presence or addition is permitted in the food, and which consumers would normally expect to find in the food (not including claims on preservatives, colour or MSG)

e.g. – No added sugar, no added salt

5 – Functional Component – describes the level of a functional component or substance in food. Functional components are technologically developed ingredients added to food products that aim at providing specific health benefits. These do not include claims on basic ingredients of food (like not including claims about fruit, vegetables, and wholegrains)

e.g. – Probiotic, prebiotic,high in omega-3, contains sitostanol, has beta-carotene

6 – Implied Nutrition claim – words which singly or with affix, acronyms, or "sound-like" implynutrition claim. These may include brand name also.

e.g. – Calci-Vita Plus, Vita-Power

7 – Nutrient function claims – claim that describes the physiological role of the nutrient in growth, development, and normal functions of the body

e.g. – Calcium helps in improving bone density, folate is important for red cell formation

8 – Other function claims – claim which describes positive contribution of functional component to health or to the improvement of a function or to modifying or preserving health

e.g. – Probiotic helps strengthen body's defence system

9 – Functional benefit claim – claims relating to a positive contribution to health or to the improvement of a bodily function or to modifying or preserving health; growth and development of normal functions of body WITHOUT mentioning the related nutrient or functional component

e.g. – Helps strengthen the body's natural defence system, helps in improving bone density.

10 – Reduction of disease risk claims – claims relating the consumption of a food or food constituent, in the context of the total diet, to the reduced risk of developing a disease or health-related condition

e.g. – Reduces risk of development of osteoporosis, reduces risk of heart attack.

11 – Prevention of illness claim – Claims relating to the consumption of a food or food constituent leading to prevention of illness

e.g. – Prevents osteoporosis, prevents heart disease

12 – Implied health claim – words which singly or with affix, acronyms, or "sound-like" imply health claim. These may include brand name also

e.g. – KiD Bone – it means the product contains vitamin K and vitamin D, which work synergistically on bone metabolism to build strongbones

2.2.1 For implied NH claim, code 1 if the claim is part of brand name else code 2. Code 0 if not implied NH claim

If the NH claim cannot be classified into any of the above categories, please mention in the comments at end of the sheet

3) For NH claim containing nutrition or component information code nutrient/component as:

1 – Nutrients or components to encourage whose intake should be encouraged like vitamins, minerals, iron, omega-3, etc.

2 – Nutrients or components to limit whose intake should be restricted like fat, cholesterol, salt, sugar, calories, etc.

0 – Not applicable (NA)

4) Numeric NH claims

4.1 If Numeric claim is present, code 1. If numeric claim is not present code 2

4.2 For Numeric claim; if it is a number (absolute), code 1. If it is percentage or relative claim (e.g. 3 times), code 2 and if not applicable, code 0