



Original Article

Nutritional quality of prepackaged foods carrying health or nutritional claims in KSA



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المخلص

أهداف البحث: تقييم الجودة الغذائية للمنتجات التي تحتوي على ادعاءات صحية أو غذائية لحماية المستهلكين من التعرض للتضليل وللتأكد من أن لديهم معلومات دقيقة حول المنتجات الغذائية التي تحتوي على ادعاءات صحية أو غذائية.

طرق البحث: تم استخدام مسح مقطعي لما مجموعه 1153 نوعا من الأطعمة التي تم أخذ عينات منها بشكل عشوائي من 14 متجرا في الرياض بالمملكة العربية السعودية. تم جمع البيانات من الحقائق الغذائية الموجودة على الملصقات الغذائية وتم تقييمها من خلال مقارنة المستوى المتوسط للمغذيات بين المنتجات التي تحمل ادعاءات وتلك التي لم تستخدم نموذج ملف تعريف المغذيات في المملكة المتحدة.

النتائج: بشكل عام، 29% من المنتجات تحمل ادعاءات صحية أو غذائية. 19.2% فقط من الأطعمة التي تحمل ادعاءات صحية تفي بمتطلبات الهيئة العامة للغذاء والدواء، في حين أن 28.9% من جميع المنتجات التي تحمل ادعاءات غذائية تفي بمعايير الهيئة العامة للغذاء والدواء. ومع ذلك، تشير النتائج إلى أن المنتجات التي تحمل ادعاءات صحية أو غذائية كانت أقل بشكل ملحوظ في السكر (9.67 جم / 100 جم) والدهون (9.2 جم / 100 جم) والدهون المشبعة (3.2 جم / 100 جم) والصوديوم (371.36 مجم). 100/ جرام). وفقا لنموذج تصنيف المغذيات في المملكة المتحدة، كانت 46.9% من المنتجات التي تحمل ادعاءات أقل صحة من تلك التي لا تحمل ادعاءات، ولوحظت فروق ذات دلالة إحصائية في أصل المنتج الثانوي والفئة.

الاستنتاجات: قد يؤدي التمثيل الحالي للمطالبات غير المنظمة على المنتجات الغذائية إلى تضليل المستهلك. هناك حاجة كبيرة للتشريعات الحكومية التي تحد من استخدامها إلا بشروط معينة لتوفير الحماية المثلى لصحة السكان.

الكلمات المفتاحية: ملصقات الطعام؛ الادعاءات الصحية؛ الادعاءات التغذوية؛ السمنة؛ المعرفة الغذائية

Abstract

Objectives: To evaluate the nutritional quality of products carrying health or nutritional claims to protect consumers from being misled and to ensure that they are provided with accurate information about food products that are associated with health or nutritional claims.

Methods: This was a cross-sectional survey of 1153 foods that were randomly sampled from 14 stores in Riyadh, KSA. The data were collected from nutritional facts presented on food labels and evaluated by comparing the mean level of nutrients between products that featured claims and those that did not use the UK nutrient profile model (UKNPM).

Results: Overall, 29% of products carried either health or nutritional claims. Only 19.2% of foods that carried health claims met Saudi Food and Drug Authority (SFDA) requirements, while 28.9% of all products that carried nutritional claims met SFDA criteria; however, the analysis indicated that products that carried health or nutritional claims were significantly lower in sugar (9.67 g/100 g), fat (9.2 g/100 g), saturated fat (3.2 g/100 g), and sodium (371.36 mg/100 g). According to the UKNPM, 46.9% of the products carrying claims were less healthy than those not carrying claims, and statistically significant differences were observed by product

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origin and category ($p < 0.005$ and $p < 0.000$, respectively).

Conclusion: The current representation of unregulated claims on food products may mislead the consumer. There is an urgent need for government legislation that limits their use except under certain conditions for the optimal protection of the population's health.

Keywords: Food labels; Food literacy; Health claims; Nutrition claims; Obesity

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Introduction

In KSA, the Saudi Food and Drug Authority (SFDA) regulates claims linked to dietary guidelines. Only claims related to eating patterns are recognized by the Gulf Cooperation Council (GCC), which is the appropriate national authority.¹ The SFDA reported a list of health claims that the food industry are not allowed to use. The importance of regulating these claims is to guarantee that what is presented to consumers is not misleading and is supported by sufficient scientific evidence.²

Companies commonly use health and nutritional claims as marketing tools, since research has shown that companies that present claims on food products experience increased sales, particularly when health claims link the consumption of the product with a reduced risk of a specific disease.^{3,4} Products that carry these claims can impact perceptions around food product quality because consumers tend to consider products with claims to be healthier than those without claims, which ultimately results in more favorable attitudes.⁵ However, even if food products carry claims, this does not necessarily mean that these products are healthy. The nutritional profile of products that carry claims could be misinterpreted and mislead consumers.⁶ It has been shown that individuals do not usually read nutritional profiles, and those who do are commonly unable to correctly interpret the information and may have difficulty differentiating between similar claims.⁷

Research has shown that consumers believe that food products with low calories or fat may vary in sodium content when compared to similar products.⁸ People also believe that food products with fat-related claims are lower in calories than other food products; however, research has shown that these products are not significantly lower in fat or calories than those without claims, thus making such claims misleading to consumers.⁹

Many countries regulate claims on food labels, including Denmark, Ireland, Norway, Australia, and the United Kingdom; these countries all use a nutrient profile model to control the use of claims as a marketing strategy and allow only healthy products to carry claims based on a ranking

system.¹⁰ Governments play an important role in regulating the food industry due to the potential impact of this industry on the quality of life at the individual and populational levels.¹¹ Public intervention by the government could be the most effective strategy to improve lifestyle and nutritional habits at the populational level.¹²

The impact of nutritional regulations on individual nutritional intake has not been investigated in KSA, nor has the potentially misleading nature of nutritional product labeling regarding health and nutrition. Presently, data on the accuracy of these regulations are absent and therefore, this gap must be addressed and investigated. In this study, we evaluated nutritional and health claims and assessed whether these claims were accurate and followed SFDA regulations. In addition, we compared the mean level of nutrients (e.g., energy, sugar, protein, total fat, saturated fat, and sodium) in products that carried claims to that of products without claims.

Materials and Methods

A cross-section of pre-packaged food products was sampled in Riyadh food chains and analyzed by established methods from previously published studies.^{13–15}

Selection of food chains

Nine major food chains represented the largest retail brand in Riyadh and five neighborhood grocery stores from the five regions of Riyadh were selected. Riyadh was divided into five regions (North, South, Central, West, and East) covering the 16 municipalities based on the division of the Riyadh Region Municipality to ensure that local products were covered. These stores were chosen to ensure that the selected foods represented all packaged products for sale in Riyadh.

Food categorization and selection

Products were categorized into product groups using the Codex food classification system, which is intended primarily to ensure the use of uniform nomenclature and secondarily to classify foods into groups and/or sub-groups to establish group maximum residue limits for commodities with similar characteristics and residue potential.¹⁶ The categories were beverages, bakery products, canned foods, cereals and cereal products, confectionery, convenience foods, dairy products, fruits and vegetables, sauces, spreads, and snack foods.

The sampling within each grocery store was grouped by category; then, from each group, we selected between a maximum of 10 and a minimum of 3 items. All information was entered into a data sheet for each product, with anonymous labeling to conceal food product companies and food chains. For each packaged product, the data collected included product name, store, category, origin, presence of claims, type of claims, and nutritional facts (energy, carbohydrate, sugar, protein, fat, saturated fat, trans fat, and sodium contents).

Food products that did not require mandatory labeling by SFDA regulations, such as fresh foods, were excluded. Each product was only recorded once, even if it was available at

multiple supermarkets unless the product was marketed as a different brand. If the product to be selected was found in another store, it was excluded, and another item was selected instead.

Data collection

Data were collected and analyzed across the 10 food categories for a total of 1153 products. Across all products, 32.6% were local and 67.4% were imported. Imported products were most commonly from Europe (29% of total products), followed by the USA and Canada (13%). The maximum number of items per store was 120 and the minimum was 36. Food items for each specific category were selected randomly based on the inclusion criteria.

Claim detection and categorization

The categorization of nutritional and health claims was based on the Codex guidelines on Nutrition and Health Claims (CAC/GL 23–1997).¹⁷ Nutritional claims were divided into nutrient content claims, comparative nutrient claims, and no added ingredient claims. Health claims were divided into functional claims, risk reduction claims and other health claims. Claims were included if they were visible on any surface of the packaging in Arabic or English. Claims were recorded verbatim.

Reliability

Kappa values were calculated to assess inter-rater reliability and the level of agreement between ratings by whether food products carried health or nutrition claims. Two researchers and two registered dietitians participated in the assessment of the claims on packages. All disagreements were then discussed to attain consensus on whether the information provided on food products should be considered a health or nutritional claim. There was good agreement about whether food products carried a health claim or a nutritional claim (97.7%).

Comparison of the nutritional quality of food products with or without claims

To assess the nutritional quality of the food products selected for study, we first used t-tests to compare the mean level of nutrients (energy, protein, sugars, fat, saturated fat, and sodium) per 100 g for all products and by food category. Next, we analyzed nutrient profiles for products using the UK nutrient profile model (UKNPM); this is a valid tool to assess the quality of products that carries nutrition claims. The UKNPM was scored for products carrying health or nutritional claims. Each food product that carried claims was assessed with the UKNPM scoring system which has been validated by comparing its results with expert opinion.¹⁸

The model uses a simple scoring system where points are allocated based on the nutrient content of 100g of food or drink. Foods scoring 4 or more points, and drinks scoring 1 or more points, are classified as less healthy.¹⁹

Data analysis

Descriptive analyses were conducted to determine the frequency of products carrying claims overall and for each of the food categories. In addition, compliance with SFDA regulations for food labeling was reported. Chi-squared analyses were used to assess differences in the prevalence of claims and compliance with the regulation by the products' country of origin and by product category. All statistical analyses were conducted using Stata 12 and p -values < 0.05 were considered statistically significant.

Results

Prevalence of products carrying health or nutritional claims

Overall, 29% of food products carried either health or nutritional claims. Most of these products carried at least one nutritional claim (28.6%) and fewer products carried health claims (2.3%). The full results by food category are provided in [Table 1](#). There was a statistically significant relationship between the presence of claims and the origin of the product and product category ($p < 0.001$).

Types of claims and nutrients referenced

Of the food products that carried claims, a total of 564 claims were identified. The most frequent type of claim was the nutritional content claim (17%). Of these claims, 9 health claims and 38 nutritional claims were identified. Comparative claims followed nutrient content claims (4.7%). The most common claim related to being "light" (43.8%); this was followed by claims about fat content (31.5%). Moreover, claims about no added ingredients were present in 11.5% of the total products.

Of all health claims, the most common types were functional claims; these related to being suitable for individuals with diabetes, assisting with weight reduction, being healthy, improving digestion, enhancing immunity, and other claims related to bone, skin, heart, and brain health ([Table 2](#)).

Only 22% of the nutritional claims referred to vitamins and/or minerals, and calcium was the most common mineral (e.g., "A source of calcium"). Almost half of the health claims referred to an unspecified nutrient or nutrients (e.g., "Complete nutrition for optimal growth") ([Table 3](#)).

Nutritional claims and SFDA requirements

Overall, 28.88% ($n = 92$) of the total number of products that carried nutritional claims met the SFDA criteria. Meeting the SFDA criteria was significantly associated with product origin ($p < 0.001$). Moreover, a significant relationship was also found between meeting the SFDA criteria and the product category for products with nutritional claims ($p < 0.001$) ([Table 2](#)).

Health claims and SFDA requirements

Of the products that made health claims, only 19.2% met SFDA requirements. The product category was significantly

Table 1: Proportion of all products carrying claims meeting SFDA requirements by product category in a random sample of food products available in different food chains in Riyadh, KSA.

Food category	Any claim (health or nutritional)	Health claims		Nutritional claims	
	Proportion	Proportion Met SFDA requirements		Proportion Met SFDA requirements	
	n (%)	n (%)	n (%)	n (%)	n (%)
Beverages (n = 126)	47 (37.3)	0	0	47 (14.2)	8 (17)
Bakery wares (n = 138)	31 (22.5)	4 (3)	0	30 (9.1)	9 (30)
Canned food (n = 61)	14 (23)	0	0	14 (14.2)	1 (7.1)
Cereals and cereal products (n = 170)	82 (48.2)	9 (5.3)	4 (44.4)	80 (24.2)	33 (41.3)
Confectionery (n = 118)	19 (16.1)	1 (1)	0	19 (5.8)	8 (42.1)
Convenience food (n = 84)	12 (14.3)	0	0	12 (3.6)	3 (25.6)
Dairy products (n = 148)	65 (44)	7 (4.7)	0	63 (19.1)	23 (36.5)
Fruit and vegetables (n = 76)	21 (27.6)	4 (5.3)	0	21 (6.4)	2 (9.5)
Sauces and spreads (n = 125)	18 (14.4)	0	0	18 (5.5)	1 (5.6)
Snack food (n = 107)	26 (24.3)	2 ²	0	26 (7.9)	4 (15.4)
Total (1153)	335 (29.1)	27 (2.3)	4 (14.8)	330 (28.6)	92 (27.9)

associated with meeting the SFDA criteria ($p < 0.001$) while no association was observed with the country of origin ($p = 0.052$).

Nutritional quality of prepackaged products that carried claims

Table 4 shows the difference in the mean nutrient levels between products with and without claims. Food products with claims were lower in sugar (9.7 g/100 g), fat (9.2 g/100 g), saturated fat (3.2 g/100 g) and sodium (371.4 mg/100 g) than those without claims; these differences were statistically significant ($p = 0.0055$, $p = 0.0001$, $p = 0.0048$ and $p = 0.0202$, respectively). Differences in energy and carbohydrate content were not statistically significant.

Comparison of prepackaged food products that carried claims and prepackaged food products without claims by category

Table 5 compares the mean energy, sugar, total fat, saturated fat, proteins, and sodium content by grams between food categories with and without health or

nutritional claims. There were few significant differences in mean nutrient levels between foods with and without claims between categories. There was no difference in energy except for products in the cereal and cereal products category ($p = 0.0355$) while sugar levels were significantly different across many categories such as bakery products and cereal products ($p = 0.0149$, $p = 0.0329$). Fat content was significantly different in dairy and snack products ($p = 0.0009$, $p = 0.0099$) and saturated fat varied significantly in dairy products only ($p = 0.0073$). Sodium did not show any significant differences between foods with and without claims by food category.

Evaluation of prepackaged food products that carried claims according to the UK nutrient profile model

According to the UK nutrient profiling model, 46.9% of products carrying claims were less healthy than those without claims, and statistically significant differences were observed by-product origin and category ($p < 0.005$ and $p < 0.000$, respectively). By food category, more than half of the products in different categories were considered less healthy (Table 6).

Table 2: Prevalence of health and nutritional claims in a random sample of food products (n = 1153).

Claim type	No. of products with claims	No. of claims	% of product with claims	95% CI for % of products with claims
Nutritional claim	330	523	28.6	26–31.2
Nutrient content claim	196	312	17	14.8–19.2
Nutrient comparative claim	54	73	4.68	3.5–5.9
Non-added claim	132	138	11.5	9.6–13.3
Health claim	27	41	2.3	1.4–3.1
Functional claim	22	27	1.9	1.1–2.7
Risk reduction claim	2	2	0.2	–0.07–0.4
Other	2	12	0.2	–0.07–0.4
Health or nutritional claim	335	564	29.1	26.4–31.7

Table 3: Nutrients and ingredients referred to in health and nutritional claims.

Nutrient	Nutritional claims	% of all nutritional claims	Health claims	% of all health claims
Energy	6	1.2	0	0
Protein	14	2.7	1	2.4
Carbohydrate	1	0.2	0	0
Sugar	56	10.7	0	0
Fat	68	13.00	0	0
Saturated fat	8	1.5	0	0
Trans fat	12	2.3	0	0
Omega 3 fatty acid	5	0.96	0	0
Fiber	45	8.6	5	12.2
Sodium/salt	16	3.1	0	0
Cholesterol	12	2.3	2	4.9
Folic acid	4	0.8	1	2.4
Vitamin A	15	2.9	0	0
Vitamin B complex	18	3.4	1	2.4
Vitamin C	17	3.3	0	0
Vitamin D	21	4.00	0	0
Vitamin E	6	1.2	0	0
Vitamin K	1	0.2	0	0
Niacin	1	0.2	0	0
Calcium	28	5.4	4	9.8
Magnesium	2	0.4	0	0
Iron	7	1.3	0	0
Zinc	2	0.4	0	0
Multiple nutrients	55	10.5	4	9.8
Unspecific nutrient	103	19.7	23	56.1
Total	523	100	41	100

Table 4: Mean level of nutrients in products that carried claims and those without claims.

Nutrient	Products with claims	Products without claims	<i>p</i> -value
Energy (kcal)	2162.315	2171.167	0.9955
Carbohydrate (g)	669.81 (g)	612.37	0.9123
Sugar (g)	9.657 (g)	12.637	0.0055*
Protein (g)	7.10	6.645	0.3277
Fat (g)	9.2	14.48	0.0001*
Saturated fat (g)	3.198	4.713	0.0048*
Trans fat (g)	0.0037	0.0911	0.0675
Sodium (mg)	371.36	490.61	0.0202*

* Statistically significant at $p < 0.05$.

Fat, sodium and sugar level in products with fat, sodium and sugar claims

Of the 88 products with fat claims (including claims related to saturated fat and trans fats), 19 (21.6%) were high in sugar and high in sodium based on SFDA food labeling regulations. Sixteen (18.2%) products that carried fat claims contained hydrogenated fat. Of the products with sodium claims ($n = 16$), two (12.5%) were high in sugar, 11 (68.8%) were high in fat, and only one (6.3%) contained hydrogenated fat. Of the 56 products with sugar claims, 26 (46.4%) were high in fat, three (5.4%) were high in sodium and 11 (19.6%) contained hydrogenated fat.

Table 5: Differences in the nutritional quality of products carrying health or nutritional claims compared to those without health or nutritional claims for a random sample of food products ($n = 1053$) available in Riyadh, by product category.

Category	Energy		Sugar		Protein		Fat		Saturated fat		Sodium	
	Diff.	<i>p</i>	Diff.	<i>p</i>	Diff.	<i>p</i>	Diff.	<i>p</i>	Diff.	<i>p</i>	Diff.	<i>p</i>
Beverages (n)	+3.8	0.7344	-1.5	0.255	+0.03	0.8694	-3.5	0.329	-0.44	0.2394	-21.05	0.4111
Bakery wares	+30.8	0.4265	-7.9	0.015	+1.7	0.0949	-2.04	0.3468	-0.1	0.9408	+172.4	0.0802
Canned food	+50.2	0.2396	-1.2	0.3652	+10.5	0.0002	-2.9	0.7263	-0.38	0.565	-317	0.3395
Cereals and cereal products	+42.3	0.0355	+4.7	0.0329	+1.1	0.1035	+0.5	0.6408	+0.03	0.945	+56.41	0.346
Confectionery	-26.0	0.57	-15.4	0.009	+0.33	0.8361	-0.6	0.8557	+0.1	0.9571	-12.98	0.9487
Convenience food	-2.9	0.9502	+2.2	0.0280	-1.7	0.3581	-1.8	0.4094	+0.22	0.8438	+0.7	0.9968
Dairy products	-29.8	0.216	+1.8	0.1133	-0.03	0.9816	-7.1	0.0009	-3.57	0.0073	-57.04	0.6025
Fruit and vegetables	+6.3	0.849	+2.2	0.6637	+1.2	0.4086	-2.8	0.1634	-1.33	0.296	-265.1	0.3868
Sauces and spreads	+82.9	0.1513	-0.4	0.0036	+2.8	0.1813	+8.02	0.1514	+0.6	0.5897	-67.78	0.763
Snack food	-43.6	0.423	-2.4	0.146	+0.32	0.8111	+7.21	0.0099	+2.96	0.4212	+125.7	0.4866

Table 6: Evaluation of prepackaged food products that carry health or nutritional claims in the Saudi market, according to the UK nutrient profile model.

Food category	Total products	Less healthy ^a	
	n	n	%
Beverages	47	32	68
Bakery wares	31	19	61
Canned food	14	2	14
Cereals and cereal products	82	51	62
Confectionery	19	12	63
Convenience food	12	3	25
Dairy products	65	15	23
Fruit and vegetables	21	7	33
Sauces and spreads	18	7	39
Snack food	26	9	35

^a Less healthy based on the UK nutrient profile model scoring system where points are allocated based on the nutrient content of 100g of food or drink.

Discussion

This study included major products from a variety of food categories and provided new insights into the use of nutrition and health claims on packaged food in the Saudi Arabian marketplace. In this study, 29% of products carried either health or nutritional claims on their labeling. It was found that nutritional claims were more common than health claims, and compared to products from other countries, Saudi Arabian products had fewer health claims. This lower prevalence is most likely due to SFDA regulations since the number of health claims permitted is 259 according to the Saudi technical regulation “Requirements of Food with Nutritional and Health Claims.” All of the permitted health claims have been included in the Saudi technical regulation after ensuring the existence of scientific evidence proving their authenticity. More attention should be focused on the regulation of nutritional claims.

Few surveys have assessed the claims used worldwide. A study from the UK in 2016 reported that 15% of products carried at least one health claim and 29% carried at least one nutritional claim.²⁰ In Europe, it was found that most of the claims were nutrition-related (64%), followed by health-related claims (29%). In the Irish market, 47.3% of products carried a nutritional claim, and 17.8% carried a health claim. Similar studies in the USA reported that the prevalence of products with nutritional claims was 49% compared to 9% of products carrying health claims. In Australia and New Zealand, 14% of food products were found to have health claims.^{21–25}

Of the products studied, 19.1% were marketed with low-fat claims; this could be beneficial because high fat has been found to contribute to many common diseases in KSA (e.g., cardiovascular diseases, diabetes, and hypertension).²⁶ Moreover, sodium claims were found in only 3.1% of all claims.

Claims that the product was fortified with calcium, vitamin D, or iron were less common than many of the other types of claims (5.4%, 4%, and 1.3% of total claims, respectively). It would probably be beneficial to increase the

number of products fortified with these nutrients as vitamin D deficiency and anemia (especially in women) are common in KSA.^{27,28} However, a previous study found that snack foods that carried vitamin-fortified claims may mislead customers to make less healthy food choices.²⁹ Therefore, restrictive criteria should be established to prevent less healthy food from carrying health claims. As found in previous studies, functional claims were the most common health claim. However, even with SFDA restrictions on product claims, the prevalence of health claims that meet the SFDA requirements was low (19.2%).

Furthermore, 28.9% of the total number of products that carried nutritional claims met the SFDA requirements, and meeting the requirements was significantly related to product origin. This trend can be explained by the varying adherence of different countries to the Codex regulations. Nutrient content claims commonly follow SFDA requirements (70.8%) as it is easy to identify and compare the information, thus resulting in more technical regulations.

The poor compliance of products that carried health and nutritional claims observed in this study indicate that illegal claims were not identified by regulators and that more resources need to be allocated to improve compliance assessments. However, there are many possible causes of non-compliance with food products with KSA’s regulations. Due to the priority given by the regulatory agencies to other areas (e.g., food safety), we may find that enforcement of food standards tends to react to complaints rather than proactively monitors violations. Consumers may assume that products carrying health or nutritional claims are healthy and that the claim is true, which could be potentially misleading.

Recently, the SFDA published a report that found that 56% of Saudi citizens believed the claims made about food products. The SFDA may allow health and nutritional claims to be used as a marketing tool even for unhealthy food products without a reference score that defines which food products should carry health or nutritional claims. This issue has been identified in Australia and contradicts efforts to ensure that only healthy foods can be promoted by adding a score for all products that carried claims.³⁰

Our survey found that food carrying health or nutritional claims had significantly lower levels of sugar, sodium, fat, and saturated fats than products without claims. In a similar study, researchers found that foods carrying health or nutritional claims had lower levels of energy, protein, total sugars, saturated fat, and sodium.³¹ These products were promoted as healthier products in a manner that could mislead consumers.³² However, when we compared content between food categories, there were few significant differences in the nutrient levels.

Previous studies included a small number of food groups to evaluate the nutritional quality of food products carrying claims.^{33–35} One study undertaken in the UK found that products carrying claims had a slightly healthier nutritional profile than foods that did not. This previous study found a significant difference in fat and saturated fat, and no differences in sugar or sodium levels.²⁰ Another study from Australia found that 31% of products that carried claims failed to reach the nutrient profile criteria and were not eligible to carry health or nutritional claims based on Australian regulations.³⁶ In addition, a study undertaken

in five European countries showed that products carrying health claims had slightly healthier nutrition profiles than products without claims.³¹

In our study, 21.6% of food products that carried fat claims were high in sugar and high in sodium. A previous study found that more than half of products with fat claims were not significantly lower in fat or calories when compared to similar products without fat claims; this suggests that foods with fat claims may be misleading to consumers.⁹ Another study found that products with low fat can vary in sodium depending on the food category.⁸ No similar data was found to compare products that carry sodium and sugar claims in our study.

As a cross-sectional survey, we had some limitations, including the absence of nutritional analysis in the laboratory due to limited resources, and all statistics were dependent on the validity of nutritional facts. Furthermore, there is a lack of nutritional quality studies on the region with which to compare our data. We hope to set the starting point to increase the population's and regulators' attention to the nutritional quality of the entire prepackaged food product instead of looking at it in view of separate nutrients, as nutrition and health claims tend to focus on. The results of this study will provide useful baseline data for regulators to assess the effect of proposed changes in health and nutritional claim regulations in KSA.

Conclusion

The marketing of unhealthy products using misleading claims hinders an individual's ability to select healthy food options. To improve the quality of prepackaged food products that carry claims, the implementation of a rating system could help to improve the nutritional composition of products; this could have important implications on people's ability to make wise food choices and eventually improve public health.

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Conflict of interest

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Ethical approval

This study was approved by King Abdullah International Medical Research Center (SP16/070) on 17 May, 2018.

Authors contributions

AMA collected and entered the data; HAJ designed the study. Both authors analyzed the data, interpreted the results and drafted the manuscript. All authors have critically

reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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