






Child-directed marketing on packaged breakfast cereals in South Africa

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Abstract

Objective: Childhood obesity is on the rise in South Africa (SA), and child-directed marketing (CDM) is one of the contributing factors to children's unhealthy food choices. This study assessed CDM on packaged breakfast cereals available in SA supermarkets and their nutritional quality.

Design: Photographic images were examined in a descriptive quantitative study. A codebook of definitions of CDM was developed for this purpose. REDCap, an online research database, was used for data capturing, and SPSS was used for data analyses including cross-tabulations and one-way ANOVA.

Setting: The current study was set in the Western Cape province of SA.

Subjects: Photographic images of all packaged breakfast cereals sold in major retailers in the Western Cape province of SA in 2019 were studied.

Results: CDM strategies were classified as direct (to the child) or indirect (through the parent). A total of 222 breakfast cereals were studied, of which 96.9% had a nutritional or health claim, 95.0% had illustrations, 75.2% had product and consumption appeals, 10.8% had characters, 10.8% consisted of different appeals, 8.6% alluded to fantasy and 7.7% had role models. In breakfast cereals with direct CDM, the protein and fibre content was significantly lower than in breakfast cereals without direct CDM. This study found a significantly higher total carbohydrate and total sugar content in breakfast cereals with direct CDM than those without direct CDM.

Conclusion: CDM was highly prevalent in breakfast cereals sold in SA. Regulations to curb the marketing of packaged foods high in nutrients of concern is recommended.

Keywords

Child-directed marketing
Direct and indirect CDM
Breakfast cereals
South Africa

South Africa (SA) is burdened by communicable and non-communicable diseases, undernutrition and obesity. Nationally, stunting persists⁽¹⁾ whilst there is a concurrent increase in overweight and obesity among South African children⁽²⁾. Research has documented a tendency for childhood obesity to persist into young adulthood, leading to consequences such as CVD, mental health disorders and socio-economic burden⁽³⁾. In SA, more than 1.3 million children aged 5–9 years and over 2.7 million children aged 10–19 years are predicted to be obese by 2030⁽⁴⁾. This is an estimated 27.1% increase in childhood obesity by 2030⁽⁴⁾.

Obesity is a repercussion of urbanisation, changing food environments and lifestyle changes. Poverty also affects peoples' food choices resulting in cheaper energy-dense foods being purchased and consumed^(3,5). SA has a vast

proliferation of supermarkets and fast-food chains, even in communities of low socio-economic status when compared to the rest of sub-Saharan Africa and thus a thriving unhealthy food retail environment⁽⁶⁾.

The nutrition transition from traditional, healthy foods to ultra-processed foods has played a role in the increased rate of non-communicable disease-related morbidity and mortality^(7,8). Children are growing up in obesogenic environments with energy excess caused by changing types, availability, affordability and marketing of foods⁽⁵⁾. In SA, multinational food companies hold the majority of market share⁽⁵⁾. Dietary preferences among youth exposed to food marketing, that promote ultra-processed, nutrient-poor food and beverages which are typically high in saturated fat, sugars and salt⁽⁹⁾, lean towards choosing

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packaged branded foods⁽⁵⁾. Availability of healthy food options are limited and expensive⁽¹⁰⁾, while unhealthy food options that are cheap, energy-dense and ultra-processed are available and preferred⁽¹¹⁾.

Marketing negatively influences children's food knowledge, preferences, consumption, diet quality and health⁽¹²⁾. Children and adolescents are most vulnerable to the effects of marketing due to limited cognitive and executive skills⁽¹³⁾. This results in increased preference towards unhealthy products, and purchase requests for these products, resulting in the development of unhealthy dietary patterns⁽¹⁴⁾. Advertisements are shown to positively affect attitudes towards branded foods and discourage healthy food choices⁽¹⁴⁾. Studies show that media characters on packaging alters a child's perception of taste and child-targeted advertising impacts family purchases of snacks and meal preparations⁽¹⁵⁾. Marketing strategies on packaging are designed to influence consumers at point of purchase and during consumption⁽¹³⁾. An American study found that two-thirds of packaged food marketing was in the cereals, fruit snacks, meal products, frozen desserts and candy categories⁽¹⁶⁾.

Product packaging is a powerful food marketing technique⁽¹⁷⁾ and on package marketing targets children directly, and indirectly, via their parents⁽¹⁸⁾. Packaging attracts consumers' attention, positions a product within a specific category and communicates brand identity⁽¹⁹⁾. Packaging becomes a critical factor in consumers' purchase decision as it communicates to them in the store when they are making a decision⁽¹⁹⁾. Visual and child-oriented elements of breakfast cereal packaging such as images, brand mascots, brand logos, licensed characters and premiums trigger an increased purchase influence in younger children⁽²⁰⁾. Illustrations⁽²¹⁾, animations or cartoon characters, games and gifts within packaging are techniques used to market packaged products to children⁽¹⁸⁾.

Apart from regulated nutritional information, marketers control most of the information on food packages and FoP features and have the potential to influence a large proportion of consumers' food choices and therefore affect the health of a population⁽²²⁾. Amongst packaged foods, studies have shown that many of the packaged breakfast cereals are unhealthy and typically higher in sugar while low in protein and fibre^(23,24). On-package marketing cues, both visual and text, promoting product qualities such as taste, texture or fun elements such as enjoyment are targeted to children, and children perceive these products as tastier than a plain product⁽²⁵⁾. Another technique used is the notion of fantasy or creating a magical mood through visual cues or text to appeal to children⁽¹³⁾.

In SA, breakfast cereal consumption of both hot and ready-to-eat (RTE) cereals has increased by more than 42.9% between 1999 and 2012⁽²⁶⁾. Of the top five most frequently advertised food and beverage categories on television in SA, breakfast cereals were number one at 15%

of all advertisements⁽¹²⁾. Processed breakfast cereals have become increasingly popular with consumption of hot cereals (primarily instant hot cereals) increasing by 67% and RTE cereals by 50% between 2005 and 2019⁽²⁷⁾. Maize porridge contributed most to total food intake in grams among children 1 to <10 years of age in the Western Cape and Gauteng provinces in SA⁽²⁸⁾. There is a paucity of evidence from SA on marketing of packaged foods to children. Studies in other countries show that packaged breakfast cereals are unhealthy and high in nutrients of concern^(23,29,30).

The purpose of this study was to investigate and describe the nature and extent of child-directed marketing (CDM) on packaged breakfast cereals sold in supermarkets in SA and understand their nutritional content and quality.

Materials and methods

Study design and sample

In this cross-sectional study, photographic evidence of 222 breakfast cereal packaging collected in 2019 was studied and the types of CDM on these packages were categorised and coded for quantitative analysis using a codebook. Additionally, nutrient content information of these products was recorded to allow for a quantitative comparison of nutrients of concern.

A total sample of 223 breakfast cereals were obtained from eight supermarkets within three suburbs in the Western Cape province of SA representing the six largest retail chains in SA. Only one breakfast cereal was excluded for not having a nutritional information label on package bringing the total sample to 222. The supermarkets are situated in different socio-economic areas and selected to account for variation in stock as supermarkets in different socio-economic areas may carry different selections of products. Durbanville was included as the middle-class suburb, whereas Khayelitsha and Langa were included as low-income suburbs.

Codebook development

Procedural guidance in selecting appropriate strategies to include was taken from published CDM studies^(9,21,31) and adapted to develop a codebook for the South African context. A generic codebook was designed to capture all on-package CDM observed on any packaged food item to allow for wider application of the codebook to other food categories. The development of the codebook was an iterative process of refinement through constant engagement with the literature, nutrition and research experts in SA, as well as international experts on mass media effects and CDM. A pilot study of ten breakfast cereals was undertaken to specify robust parameters defining an



inherently subjective concept of CDM strategies, categories and subcategories.

Child-directed marketing categories

CDM was defined as marketing techniques targeting children under the age of 18 years (aligned to the definition by the SA Constitution as a child), consisting of the following CDM strategies: illustrations (includes ingredients, fruit, vegetable, animal, object or imaginary creature), characters (includes personified animal, object or imaginary creature), role models (includes youth or non-youth celebrities, sports athletes or superheroes), different appeals (includes school, toy, family, sports, social media, cross-promotions and gift references), fantasy, product (quality enhancements, traditional, improved product, affordability, comparison to competitor and money back guarantees) and consumption appeals (positive emotional appeals and consumption suggestions). Two types of CDM were identified: direct and indirect. Direct CDM is defined as any marketing technique used to target children directly, while indirect CDM is defined as marketing to children via the parents or primary caregiver. While a superhero on a breakfast cereal package is CDM directly targeting children, a nutritional claim or product affordability aspect is directed at a parent although the product is targeting children. A full definitions list is available to readers by email request.

Data collection and entry

Photographs of all packaged breakfast cereals that contained a barcode and nutritional information were collected in stores. Photographs were taken of the front of pack, nutrition facts panel, barcode, package size, ingredients, manufacturer and distributor. The photographs were stored on SharePoint, a web-based collaborative platform that integrates with Microsoft Office. The corresponding data extracted from the photographs were entered, quality-checked, cleaned and stored in a secure, password-protected Research Electronic Data Capture (REDCap) project.

A team of seven graduates with nutrition training and previous experience in capturing nutritional information of packaged food items were trained as coders for CDM. The training was an iterative process with two rounds of data entry whereby each coder entered ten products in each round followed by discussions to streamline definitions of the variables of interest to improve both inter- and intra-coder reliability. One coder entered all 223 breakfast cereals' CDM data into REDCap. All 223 breakfast cereals were divided among the other six coders to study CDM data on the FoP as per the predetermined criteria for CDM on packaged breakfast cereals and re-enter into REDCap as double entry. The independent coders' entries were compared in Microsoft Excel, and there was a 5%

difference which was resolved through discussion until consensus was reached.

Statistical analysis

Descriptive statistics were run to determine the frequency of marketing strategies, categories and specific subcategories. The nutritional composition of RTE breakfast cereals including energy, protein, total sugar, free sugar, saturated fat, fibre, Na and carbohydrates was compared across breakfast cereals by direct CDM usage to understand if there was a significant difference in the nutritional content in breakfast cereals where direct CDM was used. Products requiring preparation were excluded from analyses as the packaged product do not reflect the nutritional composition of the product that will be consumed. The presence of non-sugar sweeteners was documented. One-way ANOVA tests were used to determine the differences in nutritional composition of breakfast cereals with direct CDM and without direct CDM and to compare the nutritional composition of breakfast cereals by the number of CDM strategies used. Cross-tabulation and chi-squared tests were used to understand the differences in the prevalence of RTE breakfast cereals in those with direct CDM and those without direct CDM. *P*-value less than 0.05 was taken as significant. Statistical Package for Social Sciences (SPSS) version 27 (2020) was used for analysis.

Results

Summary of child-directed marketing strategies observed

Overall, seven on-package CDM strategies were identified. Within the seven strategies, seventeen categories were identified. The summary of this is found in Fig. 1. The most frequently used CDM strategies were nutrition and health claims (96.9%), followed by illustrations (95.0%) and then product and consumption appeals (75.2%).

Of the seventeen CDM categories, the top four categories were nutritional claims which appeared on 95.5% of the products, followed by illustrations (95.0%), health claims (67.6%) and product appeals (66.2%). Consumption appeals was the fifth most used CDM category (25.2%). Less frequently used CDM categories were characters (10.8%), fantasy (8.6%), non-youth (7.2%) and family (5.0%). Six of the CDM categories had minimal presence (less than 3.5% of breakfast cereals). No products made any reference to toys or cross-promotions.

Amongst the health claims, portion consumption recommendation (71.2%) is most common, which was coded as the depiction of the cereal product in a bowl. This was followed by health purity (40.1%) claims such as being gluten-free, lactose-free and free of preservatives. Nature images (39.6%), cue on health benefits or reduction of risk

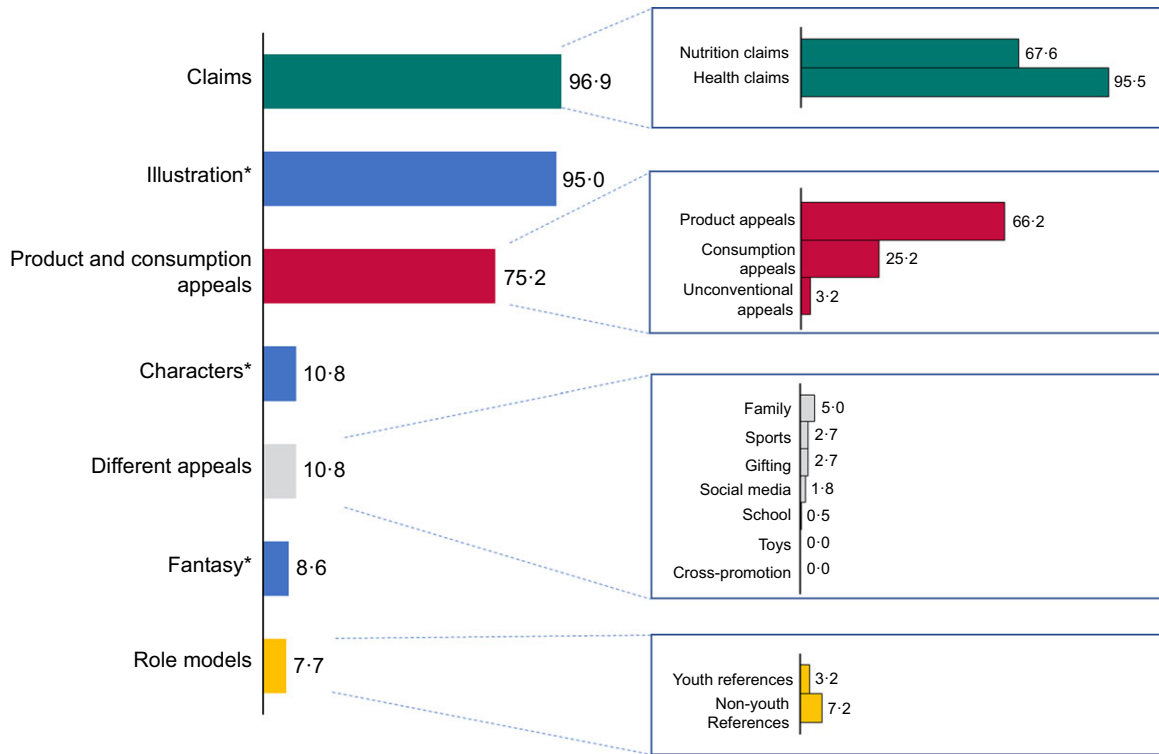


Fig. 1 A graphical representation of the prevalence of the seven marketing strategies and their categories on South African packaged breakfast cereals. *Strategies are not divided into categories but only on subcategory level.

(32.0%) and health seals from professional bodies (18.5%) were also present on breakfast cereals.

Of the 67.6% of nutritional claims present, the most prevalent was presence of fibre (32.4%), followed by text cues suggesting the breakfast cereal is a good source of nutrients (24.8%) and the addition of vitamins other than vitamin C (19.8%). The addition of vitamin C (0.5%) was the least prevalent nutritional claim, and claims on the reduction of salt, saturated fat, trans fat and cholesterol were also less prevalent at 3.2% for all four.

Summary of direct and indirect child-directed marketing strategies observed

Of the 222 breakfast cereals studied, 153 (69.0%) used direct CDM (those directly targeted at children) on their packaging. Only one product with direct CDM had no indirect CDM (those targeted at children via parents and caregivers) present, and almost all (221, 99.5%) products had indirect CDM on packaging.

Nutrition claims, health claims, certain illustrations (product, ingredient, fruit and vegetable) and product appeals (except taste and texture) are considered as indirect CDM. For the remainder of the results, the focus will be on direct CDM. Table 1 depicts the number and percentage of products using one or more direct CDM strategies. Forty-one per cent (41.2%) of breakfast cereals containing direct CDM use multiple direct CDM strategies on packaging. Of the 153 cereals with direct CDM, 20.9%

Table 1 Percentage of products using one or more direct child-directed marketing (CDM) strategies

Number of direct CDM marketing strategies used on packaging	Breakfast cereals with direct CDM (n 153)		Proportion of entire sample (n 222)
	n	%	%
1	90	58.8	40.5
2	32	20.9	14.5
3	18	11.8	8.1
4	4	5.2	1.8
5	5	3.3	2.3

used two strategies, 11.8% used three strategies and 8.5% used four or more strategies.

Nutrient composition of ready-to-eat breakfast cereals using and not using direct child-directed marketing

The overall nutrient content of RTE breakfast cereals is presented in Table 2. All nutrient analysis was conducted per 100 g. Statistically significant differences between products with and without direct CDM were identified for five nutrients. The mean protein content ($9.74 \text{ g} \pm 3.33$; $P < 0.00$) and mean fibre content ($7.85 \text{ g} \pm 4.73$; $P < 0.00$) were statistically significantly lower in breakfast cereals with direct CDM than in breakfast cereals without direct CDM which had protein ($12.53 \text{ g} \pm 4.47$) and fibre

Table 2 Nutritional composition per 100 g of RTE breakfast cereals with and without direct child-directed marketing (CDM)

Nutrient	RTE breakfast cereals using direct CDM strategies				RTE breakfast cereals not using direct CDM strategies				P-value		
	n	Mean	SD	95 % CI for mean		n	Mean	SD		95 % CI for mean	
				Lower bound	upper bound					Lower bound	upper bound
Energy (kJ)	93	1597.2	307.17	1533.94	1660.46	41	1667	298.95	1572.64	1761.36	0.22
Protein (g)	92*	9.74	3.33	1.9	10.43	41	12.53	4.47	11.12	13.95	0
Carbohydrates (g)	93	60.55	16.26	57.2	63.91	41	52.23	20.55	45.74	58.71	0.01
Total sugar (g)	93	17.17	10.08	15.1	19.25	41	11.24	6.72	9.11	13.36	0.01
Free sugar (g)	93	17.17	10.08	15.1	19.25	41	11.24	6.72	9.11	13.36	0.01
Saturated fat (g)	93	3.62	4.42	2.71	4.53	41	4.71	6.53	2.65	6.77	0.26
Fibre (g)	93	7.85	4.73	6.88	8.82	41	12.36	7.03	10.15	14.58	0
Na (mg)	93	155.99	132.91	128.63	183.37	41	159.91	155.25	110.91	208.91	0.88

RTE, ready-to-eat.

One-way ANOVA classification of nutrient content by the number for breakfast cereals with direct CDM and without direct CDM is used. $P < 0.05$ is taken as statistically significant. Nutrient content of breakfast cereals is normally distributed.

*One breakfast cereal using direct CDM did not contain a protein value on the nutritional facts panel.

(12.36 g \pm 7.03), respectively. The mean total sugar content (17.17 g \pm 10.08; $P = 0.01$) and mean free sugar content (17.17 g \pm 10.08; $P = 0.01$) of breakfast cereals with direct CDM were statistically significantly higher than those without direct CDM (11.24 g \pm 6.72; $P = 0.01$ for both). The mean carbohydrate content (60.55 g \pm 16.26; $P = 0.01$) was also statistically significantly higher in breakfast cereals with direct CDM than in breakfast cereals without direct CDM (52.23 g \pm 20.55). No significant differences were found in breakfast cereals with direct CDM for mean energy content (1597.20 g \pm 307.17; $P = 0.22$), mean saturated fat content (3.62 g \pm 4.42; $P = 0.26$) and mean Na content (155.99 g \pm 132.91; $P = 0.88$) when compared to those without direct CDM (energy: 1667.00 g \pm 298.95; $P = 0.22$, saturated fat: 4.71 g \pm 6.53; $P = 0.26$, and Na: 159.91 g \pm 155.25; $P = 0.88$). None of the breakfast cereals contained non-sugar sweeteners. All RTE breakfast cereals had indirect CDM present. See detailed information on the nutrient content of RTE breakfast cereals in online Supplementary Table S1.

Nutrient composition of ready-to-eat breakfast cereals by the number of direct child-directed marketing strategies used

Nutritional composition of RTE breakfast cereals by number of direct CDM strategies was compared in two groups (less than three strategies, and three or more strategies). Less than three strategies were found on 79.7 % of breakfast cereals with direct CDM, and a dichotomous grouping of less than three and three or more was used to determine the intensity of CDM strategies. There were no statistically significant differences in the mean carbohydrate or fibre content. However, means were statistically higher in those with more than three strategies for total sugar, free sugar and Na and significantly higher in those with less than three strategies for total energy, protein and saturated fat, as shown in Table 3.

Discussion

Child-directed marketing strategies

This study describes the observed CDM strategies and the nutritional composition of packaged RTE breakfast cereals sold at major South African retailers in 2019. CDM was present on 95 % of breakfast cereals analysed with direct CDM strategies, that is, those strategies directed primarily at the child him/herself rather than the adult parent or caretaker, present on the majority (69 %) of packaged breakfast cereals.

Elsewhere, CDM prevalence on breakfast cereals is lower in Guatemala at 50.9 %⁽³²⁾, in Chile at 35.7 %⁽¹³⁾ and in USA at 31 %⁽³³⁾. The pervasiveness of CDM in SA and Guatemala is aligned with evidence that points to more aggressive marketing strategies used by multinational companies in low- and middle-income countries resulting in more rapid rising consumption of unhealthy foods than has occurred previously in high-income countries⁽³⁴⁾. Chile has introduced effective regulations to restrict CDM⁽¹³⁾, and this explains their lower prevalence of CDM.

Just under half (41.2 %) of the products in this study with CDM made use of multiple CDM strategies. Products with multiple direct CDM strategies had a higher sugar and Na content. This is similar to another study that found when more on-package marketing techniques are featured on a product, the product has a lower nutritional quality⁽³⁵⁾.

Illustrations as a strategy was the most predominantly (95 %) used on-package CDM, of which animal illustration (16.7 %), object illustration (12.2 %) and imaginary creature illustration (2.7 %) were the direct CDM illustrations strategies used. Among visual marketing tactics, illustrations in general have been shown to negatively influence children's choice of food products towards non-core foods⁽³⁶⁾. Cues of emotional consumption appeal (13.1 %) pertaining to enjoyment, pleasure and creating a positive mood was the most used consumption appeal type noticed.

Table 3 Nutritional composition per 100 g of RTE breakfast cereals with less than three and three or more direct child-directed marketing (CDM) strategies

Nutrient	RTE Breakfast cereals using less than three direct CDM strategies				RTE breakfast cereals using three or more direct CDM strategies				P-value		
	n	Mean	SD	95 % CI for mean		n	Mean	SD		95 % CI for mean	
				Lower bound	Upper bound					Lower bound	Upper bound
Energy (kJ)	64	1668.88	272.64	1600.77	1736.98	29	1439.02	324.19	1315.7	1562.34	< 0.01
Protein (g)	63*	10.42	3.11	9.63	11.2	29	8.26	3.37	6.97	9.54	< 0.01
Carbohydrates (g)	64	58.34	14.89	54.62	62.06	29	65.42	18.29	58.46	72.38	0.05
Total sugar (g)	64	15.02	7.67	13.1	16.93	29	21.93	12.95	17.01	26.86	< 0.01
Free sugar (g)	64	15.02	7.67	13.1	16.93	29	21.93	12.95	17.01	26.86	< 0.01
Saturated fat (g)	64	4.63	4.92	3.41	5.86	29	1.39	1.54	0.8	1.97	< 0.01
Fibre (g)	64	8.44	4.02	7.44	9.45	29	6.54	5.89	4.31	8.78	0.07
Na (mg)	64	121.08	111.77	93.16	149	29	233.05	144.91	177.93	288.18	< 0.01

RTE, ready-to-eat.

One-way ANOVA classification of nutrient content of RTE breakfast cereals by the number of CDM strategies is used. $P < 0.05$ is taken as statistically significant. Nutrient content of breakfast cereals is normally distributed.

*One breakfast cereal using direct CDM did not contain a protein value on the nutritional facts panel.

Character strategies which were defined as personified animals, objects or imaginary creatures in this study were present on 10.8% of breakfast cereals. This strategy was less prevalent on South African breakfast cereals when compared to Guatemala (31%)⁽³²⁾, Belgium (18.8%)⁽³⁷⁾, Chile (29.7%)⁽¹³⁾ and Argentina (29%)⁽²⁴⁾. Although SA does not have regulations on marketing, the SA National Department of Health's draft R429⁽³⁸⁾ of 2014 recommends that images directed at children and the inclusion of toys should not be used to advertise foods containing nutrients of concern above nutrient cut-off points, and this may account for the low use of character strategies. Character strategy in this study relates to cartoon characters or promotional characters as referred to in several studies. The use of characters on products is shown to increase purchase request from children⁽³⁹⁾. Characters make packaged foods more appealing to children, while health and nutritional claims reassure the parent in their choice to purchase these items for their children⁽¹⁷⁾. A Mexican study found that claims were displayed more frequently in less healthy cereals as classified by the United Kingdom Nutrient Profiling Model (UKNPM)⁽⁴⁰⁾. The use of characters and media branding could be a strategy to positively influence children's food preferences towards fruits and vegetables⁽⁴¹⁾.

Fantasy strategy defined as a display of fantastical or magical effects was found on 8.6% of breakfast cereals. Role models (7.7%) constituting of non-youth (7.2%) which are adult role models and youth who looked like a child younger than 13 years of age (3.2%) were observed. This was slightly lower than role models observed in Chile (9.52%)⁽¹³⁾. Family (5%) reference to image or text about family situations was also observed.

None of the breakfast cereals sold in SA made any reference to toys or cross-promotions which contrasts with Chile with 6% toy reference and 3.6% cross-promotions. The draft R429⁽³⁸⁾ proposing prohibition on the use of toys to promote foods high in nutrients of concern may account

for the absence of toys in breakfast cereals packaging. This is encouraging as the use of gifts, toys and cross-promotions as marketing techniques have been shown to influence purchase decisions⁽¹³⁾.

Health and nutritional claims

South African breakfast cereals have a high prevalence of health and nutritional claims. UK and Argentina show a lower prevalence of health claims but a higher prevalence of nutritional claims when compared to SA⁽²⁴⁾.

Front-of-package nutritional claims on children's cereals are potentially misleading, especially when placed on products with a high amount of nutrients of concern⁽⁴²⁾. Food marketing is likely to directly address parents to promote foods for children's consumption⁽⁴³⁾ leading to an increased consumption of breakfast cereals high in nutrients of concern. Portion recommendations have been shown to influence parent's purchase choice the most⁽²²⁾. Visual cues such as nature images are also shown to influence parents' purchase choice⁽²²⁾.

Dietary patterns need to change, and an environment should be created that encourages the increased intake of nutritious and traditional foods while reducing the intake of packaged unhealthy foods. This requires regulation of the food industry to curb harmful CDM which entices children towards healthier choices⁽⁴⁴⁾.

Statistically significant differences were noted in four nutrients: protein, fibre, total sugar and total carbohydrates. In breakfast cereals with direct CDM, the protein and fibre content was significantly lower than in breakfast cereals without direct CDM. This finding was similar to studies in New Zealand⁽²⁹⁾, Australia⁽²³⁾ and the USA⁽³⁰⁾. RTE breakfast cereals in SA with a higher dose of direct CDM (using three or more direct CDM strategies) had significantly lower amounts of energy when compared those with less than three direct CDM strategies. This is in contrast to finding in



New Zealand and Australia where 'cereals for kids' had a marginally higher energy density when compared to other breakfast cereals^(23,29).

The mean total sugar content was significantly higher in breakfast cereals with CDM compared to those without CDM. Similarly, significantly high sugar content was found in breakfast cereals with CDM in New Zealand⁽²⁹⁾, Australia⁽²³⁾, Guatemala⁽³²⁾ and the USA⁽³⁰⁾. Foods high in sugar have a negative impact on children's nutrition preferences, purchase behaviour, consumption patterns and diet-related health⁽¹²⁾, and excessive consumption has been linked to adverse health outcomes, such as dental caries, CVD and metabolic disorders.

There was no significant differences noted in the Na content of breakfast cereals with direct CDM when compared to those without direct CDM, which was similar to Guatemala⁽³²⁾ but different to New Zealand⁽²⁹⁾ where the Na content was significantly higher. This could be a positive effect of the implementation of the South African Na regulation (R214)⁽⁴⁵⁾ which restricted breakfast cereal Na levels to below 500 mg/100 g in June 2016. Although this study was conducted in 2019, data collection was completed before the stricter Na limits (400 mg/100 g) of phase two of the R214 were implemented in SA in June 2019. Further reductions in Na levels may be likely.

It is concerning that breakfast cereals marketed to children are substantially higher in sugar, a nutrient if consumed in excess is associated with poor health outcomes and free sugar is excessively consumed by South African children^(5,46). Although protein content in breakfast cereals with direct CDM is low compared to those without direct CDM, adequate intake of protein among South African children⁽⁴⁶⁾ causes some concern. Given SA's burden of undernutrition and stunting, adequate protein intake is important⁽⁷⁾. The lower fibre content of breakfast cereals with direct CDM is worrisome as majority of South African children from 1 to 9 years of age have a very low fibre intake⁽⁴⁶⁾ and fibre intake is linked with good health outcomes⁽⁴⁷⁾ and shown to reduce elevated cholesterol, blood pressure and obesity risk among adolescents⁽⁴⁸⁾. Fibre intake is linked to the prevention of non-communicable diseases and improved immunity⁽⁴⁷⁾. This study finds the nutritional content of breakfast cereals marketed to children to be unhealthier than those not targeted to children and yet more than 95 % of all breakfast cereals carry a health or nutritional claim. This is misleading to parents who may assume, due to on-package marketing, that these products are healthy and fit for children's consumption and thereby influence their purchase decision^(15,22).

Although any one single food cannot necessarily be identified as the cause of obesity, but rather the overall dietary intake, the proliferation of products as well as increased consumption of these products high in nutrients such as sugar and saturated fat are likely to contribute to obesity unless the consumption of these items is

accompanied by a reduction in overall energy, sugar and saturated fat from other food products.

Regulations

Given the excessive use of marketing techniques and high sugar content of breakfast cereals found in this study, implementing restrictions on the marketing of unhealthy packaged breakfast cereals is important. The Advertising Standards Authority (ASA) initiated the South African Marketing to Children pledge in 2008 which was signed by members of the major food corporations in 2009. This voluntary pledge is the only form of regulation that exists in SA as an industry self-regulation effort and remains ineffective. The pledge violation by Coca-Cola Beverages South Africa (CCBSA) not to advertise or sell SSB around school premises is a clear indicator of the ineffectiveness of self-regulation⁽⁴⁹⁾. Neither the current draft R429 nor the draft Department of Communications and Digital Technology Audio- and Audio-Visual Content Services Policy Framework (AAVCS) white paper are adequate to curb unhealthy food marketing to children⁽⁵⁰⁾. R429 could be strengthened by regulating CDM on packaging, among various forms of media and the internet. AAVCS could expand on food-related marketing to children rather than promoting industry self-regulation.

Chile has one of the highest obesity rates worldwide and introduced their marketing to children regulation in 2016⁽¹²⁾ and within 7 months of regulation implementation there was a significant reduction in CDM in products with high levels of nutrients of concern and calories⁽¹³⁾.

Recommendations

CDM is known to influence purchase choices and has been linked to increased intake of unhealthy foods⁽¹²⁾, and thus the presence of CDM strategies on South African breakfast cereals is cause for concern. CDM strategies such as illustrations could be utilised on healthier breakfast cereals to attract children to healthier choices⁽³⁶⁾. Based on the results of this study, it is advisable to consider government-led, mandatory regulations restricting CDM of pre-packaged breakfast cereals and other pre-packaged foodstuffs typically high in sugar, saturated fat and Na and implementing front-of-pack labels that could increase the awareness of the 'high-in' nutrients of concern on breakfast cereals.

Further research is required on the pester power of children and the influences on parents to purchase breakfast cereals and other packaged food products with undesirable nutrient profiles when it contains CDM, in SA. Differentiation in pester power between younger children and adolescents may also be beneficial. The prevalence and benefit of CDM on fresh produce and packaged foods without excessive amounts of nutrients of concern should be explored.



Limitations

Data were collected from large, established supermarket chains, and hence CDM on breakfast cereal products informally imported and sold in stores in ethnic enclaves around SA (Indian enclave, Somalian enclave and Chinese enclave to name a few) was not captured. Another potential limitation is the exclusion of specific brands if they are sold exclusively in a province other than the Western Cape. The lack of adequate photographic evidence of the back of packs and sides of packs limited the study to the FoP.

Conclusions

CDM was commonly observed on breakfast cereal packaging in SA. The nutritional composition of breakfast cereals with CDM is significantly higher in nutrients of concern to limit compared to those not marketed to children. Overall children's breakfast cereals with CDM are less nutritious with significantly less protein and fibre while containing significantly high levels of sugar. There is an urgent need for regulation of the food industry to protect children from unhealthy food products with a combination of CDM on products and harmful nutritional compositions. South African children deserve better.

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Conflict of interest

The authors declare no conflict of interest. The funders had no role in the design of the study, in the collection,

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Authorship

A.S.K., T.F. and R.E.S. conceptualised and planned the methodology for the manuscript; the first draft was written by A.K., while review and editing were performed by T.F. and R.E.S. All authors have read and agreed to the published version of the manuscript.

Ethics of human subject participation

This study was approved by the Humanities and Social Sciences Research Ethics Committee of the University of the Western Cape (ethics reference number HS20–4–3).

Supplementary material

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