

Child-directed marketing on packaged breakfast cereals in South Africa

Alice S Khan¹, Tamryn Frank², Rina Swart¹

¹Department of Dietetics and Nutrition, University of the Western Cape, Robert Sobukwe Road, Belville, 7535, Cape Town, South Africa

²School of Public Health, University of the Western Cape, Robert Sobukwe Road, Belville, 7535, Cape Town, South Africa

Corresponding author: Alice S Khan, 231 South Street, 29 Lakeview Palms, Swartkops, Centurion, 0157, askhan@uwc.ac.za, +27825553128

Short title: Child-directed marketing on breakfast cereals



This is an Accepted Manuscript for Public Health Nutrition. This peer-reviewed article has been accepted for publication but not yet copyedited or typeset, and so may be subject to change during the production process. The article is considered published and may be cited using its DOI 10.1017/S1368980023001507

Public Health Nutrition is published by Cambridge University Press on behalf of The Nutrition Society. This is an Open Access article, distributed under the terms of the Creative Commons Attribution licence (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted re-use, distribution and reproduction, provided the original article is properly cited.

Acknowledgements: We wish to thank Tyler Coates, Sikhumbule Joni, Aneeqah Latief, Zintle Nelani, Sharna Solomon, and Morongoa Tlhako for their dedication during the photographic data collection and categorisation of CDM. We also wish to thank Shu Wen Ng, Jessica Ostrowski, Bridget Hollingsworth and Stephanie Stewart for technical support. Francesca Dillman Carpentier is especially thanked for her expert advice on CDM concepts and nuances. The unknown peer reviewers are thanked for their critical review of this manuscript. The School of Public Health at the University of the Western Cape is thanked for their administrative support of the project.

Financial Support: This research was funded by Bloomberg Philanthropies sub-agreement #5108311. AK received scholarship support from DSI/NRF Centre of Excellence in Food Security (UID 91490) and TF received scholarship support from the International Research Development Canada (IDRC) Project number 108425-001.

Conflict of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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

Ethical Standards Disclosure: 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).

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 ANOVAs.

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 were 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.

Introduction

South Africa (SA) is burdened by communicable and non-communicable diseases (NCDs), 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 cardiovascular diseases, mental health disorders, and socioeconomic 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 NCD 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 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 discourages 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 ready-to-eat (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 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 was 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, Khayelitsha and Langa were included as low-income suburbs.

Codebook development

Procedural guidance in selecting appropriate strategies to include was taken from published child-directed marketing 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 10 breakfast cereals was undertaken to specify robust parameters defining an inherently subjective concept of CDM strategies, categories and subcategories.

CDM 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 pre-determined 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 ready-to-eat (RTE) breakfast cereals including energy, protein, total sugar, free sugar, saturated fat, fibre, sodium 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 CDM strategies observed

Overall, seven on-package CDM strategies were identified. Within the seven strategies, 17 categories were identified. The summary of this is found in [Figure 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 17 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, free of preservatives. Nature images (39.6%), cue on health benefits or reduction of risk (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 CDM 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 child-directed marketing (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 percent (41.2%) of breakfast cereals containing direct CDM use multiple direct CDM strategies on packaging. Of the 153 cereals with direct CDM, 20.9% used two strategies, 11.8% used three strategies and 8.5% used four or more strategies.

Nutrient composition of RTE breakfast cereals using and not using direct CDM

The overall nutrient content of RTE breakfast cereals is presented in Table 2. All nutrient analysis was conducted per 100g. 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 ($12.36\text{g} \pm 7.03$) respectively. The mean total sugar content ($17.17\text{g} \pm 10.08$; $p = 0.01$) and mean free sugar content ($17.17\text{g} \pm 10.08$; $p = 0.01$) of breakfast cereals with direct CDM were statistically significantly higher than those without direct CDM ($11.24\text{g} \pm 6.72$; $p = 0.01$ for both). The mean carbohydrate content ($60.55\text{g} \pm 16.26$; $p = 0.01$) was also statistically significantly higher in breakfast cereals with direct CDM than in breakfast cereals without direct CDM ($52.23\text{g} \pm 20.55$). No significant differences were found in breakfast cereals with direct CDM for mean energy content ($1597.20\text{g} \pm 307.17$; $p = 0.22$), mean saturated fat content ($3.62\text{g} \pm 4.42$; $p = 0.26$) and mean sodium content ($155.99\text{g} \pm 132.91$; $p = 0.88$) when compared to those without direct CDM (energy: $1667.00\text{g} \pm 298.95$; $p = 0.22$, saturated fat: $4.71\text{g} \pm 6.53$; $p = 0.26$, and sodium: $159.91\text{g} \pm 155.25$; $p = 0.88$). 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 Table S1.

Nutrient composition of RTE breakfast cereals by the number of direct CDM 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 3 strategies were found on 79.7% of breakfast cereals with direct CDM and a dichotomous grouping of less than 3 and 3 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 sodium; and significantly higher in those with less than three strategies for total energy, protein, and saturated fat, as shown in [Table 3](#).

Discussion

CDM 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. Child directed marketing was present on 95% of breakfast cereals analysed with direct CDM strategies i.e., 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 (LMICs) resulting in more rapid rising consumption of unhealthy foods than has occurred previously in high income countries (HICs)⁽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 sodium 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.

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 were 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 unhealthier choices⁽⁴⁴⁾.

Statistically significant differences were noted in four (4) 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 (3) or more direct CDM strategies) had significantly lower amounts of energy when compared those with less than 3 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, cardiovascular disease and metabolic disorders.

There was no significant differences noted in the sodium 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 sodium content was significantly higher. This could be a positive effect of the implementation of the South African sodium regulation (R214)⁽⁴⁵⁾ which restricted breakfast cereal sodium levels to below 500mg/100g in June, 2016. Although this study was conducted in 2019, data collection was completed before the stricter sodium limits (400mg/100g) of phase two of the R214 were implemented in SA in June 2019. Further reductions in sodium 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 one to nine 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 is 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 Coco-Cola Beverages South Africa (CCBSA) not to advertise or sell SSBs 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 seven months of regulation implementation there was a significant reduction in child- directed marketing 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 child-directed marketing of pre-packaged breakfast cereals and other pre-packaged foodstuffs typically high in sugar, saturated fat and sodium; 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 was 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

Child directed marketing 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.

References

1. Said-Mohamed R, Micklesfield LK, Pettifor JM, et al. (2015) Has the prevalence of stunting in South African children changed in 40 years? A systematic review. *BMC Public Health* **15**, 534–534. BioMed Central Ltd.
2. Dukhi N, Sartorius B & Taylor M (2020) A behavioural change intervention study for the prevention of childhood obesity in South Africa: protocol for a randomized controlled trial. *BMC Public Health* **20**, 179–179. BioMed Central.
3. Reilly JJ, Methven E, McDowell ZC, et al. (2003) Health consequences of obesity. *Arch Dis Child* **88**, 748–752.
4. Lobstein T & Brinsden H (2019) *Global Atlas on Childhood Obesity*. .
5. Igumbor EU, Sanders D, Puoane TR, et al. (2012) “Big Food,” the consumer food environment, health, and the policy response in South Africa. *PLoS Med* **9**, e1001253–e1001253. Public Library of Science.
6. Otterbach S, Oskorouchi HR, Rogan M, et al. (2021) Using Google data to measure the role of Big Food and fast food in South Africa's obesity epidemic. *World Dev* **140**, 105368. Elsevier Ltd.

7. Abrahams Z, Mchiza Z & Steyn NP (2011) Diet and mortality rates in Sub-Saharan Africa: Stages in the nutrition transition. *BMC Public Health* **11**, 1–12. BioMed Central.
8. Pradeilles R, Rousham EK, Norris SA, et al. (2016) Community readiness for adolescents' overweight and obesity prevention is low in urban South Africa: a case study. *BMC Public Health* **16**, 763–763.
9. Cairns G, Angus K, Hastings G, et al. (2012) Systematic reviews of the evidence on the nature, extent and effects of food marketing to children. A retrospective summary. *Appetite* **62**, 209–215.
10. Labadarios D, Mchiza ZJR, Steyn NP, et al. (2011) Food security in South Africa: A review of national surveys. *Bull World Health Organ* **89**, 891–899.
11. Armstrong MEG, Lambert MI & Lambert E v. (2011) Secular trends in the prevalence of stunting, overweight and obesity among South African children (1994-2004). *Eur J Clin Nutr* **65**, 835–840. Nature Publishing Group.
12. Kelly B, Vandevijvere S, Ng S, et al. (2019) Global benchmarking of children's exposure to television advertising of unhealthy foods and beverages across 22 countries. *Int J Environ Res Public Health* **20**, 116–128.
13. Stoltze FM, Reyes M, Smith TL, et al. (2019) Prevalence of child-directed marketing on breakfast cereal packages before and after Chile's food marketing law: A pre-and post-quantitative content analysis. *Int J Environ Res Public Health* **16**, 4501. MDPI AG.
14. Qutteina Y, De Backer C & Smits T (2019) Media food marketing and eating outcomes among pre-adolescents and adolescents: A systematic review and meta-analysis. *Obesity Reviews* **20**, 1708–1719.
15. Kovic Y, Noel JK, Ungemack JA, et al. (2018) The impact of junk food marketing regulations on food sales: an ecological study. *Obesity Reviews* **19**, 761–769.
16. Harris JL, Schwartz MB & Brownell KD (2010) Marketing foods to children and adolescents: Licensed characters and other promotions on packaged foods in the supermarket. *Public Health Nutr* **13**, 409–417.

17. Elliott C (2019) Tracking kids' food: comparing the nutritional value and marketing appeals of child-targeted supermarket products over time. *Nutrients* **11**, 1850.
18. Hawkes C (2010) Food packaging: the medium is the message. *Public Health Nutr* **13**, 297–299.
19. Omez MG, Martin-Consuegra D & Molina A (2015) The importance of packaging in purchase and usage behaviour. *Int J Consum Stud* **39**, 203–211.
20. Hota M & Charry K (2014) The impact of visual and child-oriented packaging elements versus information on children's purchase influence across various age groups. *International Journal of Retail and Distribution Management* **42**, 1069–1082.
21. Stoltze FM, Barker JO, Kanter R, et al. (2017) Prevalence of child-directed and general audience marketing strategies on the front of beverage packaging: the case of Chile. *Public Health Nutr* **21**, 454–464.
22. Russell CG, Burke PF, Waller DS, et al. (2017) The impact of front-of-pack marketing attributes versus nutrition and health information on parents' food choices. *Appetite* **116**, 323–338.
23. Chun J, Louie Y, Dunford EK, et al. (2012) Nutritional quality of Australian breakfast cereals. Are they improving? *Appetite* **59**, 464–470.
24. Allemandi L, Castronuovo L, Tiscornia MV, et al. (2020) Nutritional quality, child-oriented marketing and health/nutrition claims on sweet biscuit, breakfast cereal and dairy-based dessert packs in Argentina. *Cad Saude Publica* **36**, e00196619–e00196619.
25. Enax L, Weber B, Ahlers M, et al. (2015) Food packaging cues influence taste perception and increase effort provision for a recommended snack product in children. *Frontiers in Psychology* **1**, 882–882.
26. Ronquest-Ross LC, Vink N & Sigge GO (2015) Food consumption changes in South Africa since 1994. *S Afr J Sci* **111**, 01–12. Academy of Science of South Africa.
27. Swart R & Sambu W (2022) Foods procured, Nutritional status and Dietary Intake of People Living in South Africa: Desktop review. .

28. Senekal M, Nel J, Malczyk S, et al. (2020) Provincial dietary intake study (Pdis): Micronutrient intakes of children in a representative/random sample of 1-to <10-year-old children in two economically active and urbanized provinces in south africa. *Int J Environ Res Public Health* **17**, 1–27. MDPI AG.
29. Devi A, Eyles H, Rayner M, et al. (2014) Nutritional quality, labelling and promotion of breakfast cereals on the New Zealand market. *Appetite* **81**, 253–260.
30. Schwartz MB, Vartanian LR, Wharton CM, et al. (2008) Examining the nutritional quality of breakfast cereals marketed to children. *J Am Diet Assoc* **108**, 702–705.
31. Elliott CD (2012) Packaging fun: analyzing supermarket food messages targeted at children. *Canadian Journal of Communication* **37**, 303–318.
32. Soo J, Letona P, Chacon V, et al. (2016) Nutritional quality and child-oriented marketing of breakfast cereals in Guatemala. *Int J Obes* **40**, 39–44.
33. Song H, Halvorsen B & Harley A (2014) Marketing cereal to children: content analysis of messages on children's and adults' cereal packages. *Int J Consum Stud* **38**, 571–577. Wiley Subscription Services, Inc.
34. Stuckler D, Mckee M, Ebrahim S, et al. (2012) Manufacturing epidemics: the role of global producers in increased consumption of unhealthy commodities including processed foods, alcohol, and tobacco. *PLoS Med* **9**, e1001235–e1001235.
35. Aerts G & Smits T (2019) Child-targeted on-pack communications in Belgian supermarkets: associations with nutritional value and type of brand. *Health Promot Int* **34**, 71–81.
36. Hallez L, Qutteina Y, Raedschelders M, et al. (2020) That's my cue to eat: A systematic review of the persuasiveness of front-of-pack cues on food packages for children vs. adults. *Nutrients*, 1062. MDPI AG.
37. Vermote M, Bonnewyn S, Matthys C, et al. (2020) Nutritional content, labelling and marketing of breakfast cereals on the Belgian market and their reformulation in anticipation of the implementation of the nutri-score front-of-pack labelling system. *Nutrients* **12**, 884.
38. South Africa (2014) Proposed R429 labelling regulations, Foodstuffs Cosmetics and Disinfectants Act 1972. *Government Gazette*.

39. Connor SM (2006) Food-related advertising on preschool television: Building brand recognition in young viewers. *Pediatrics* **118**, 1478–1485. American Academy of Pediatrics.
40. Nieto C, Rincon-Gallardo Patiño S, Tolentino-Mayo L, et al. (2017) Characterization of Breakfast Cereals Available in the Mexican Market: Sodium and Sugar Content. *Nutrients* **9**.
41. Kraak VI & Story M (2015) Influence of food companies' brand mascots and entertainment companies' cartoon media characters on children's diet and health: A systematic review and research needs. *Obesity Reviews* **16**, 107–126.
42. Harris JL, Thompson JM, Schwartz MB, et al. (2011) Nutrition-related claims on children's cereals: What do they mean to parents and do they influence willingness to buy? *Public Health Nutr*, 2207–2212. Cambridge University Press.
43. Hebden L, King L & Kelly B (2011) Art of persuasion: An analysis of techniques used to market foods to children. *J Paediatr Child Health* **47**, 776–782.
44. Hawkes C, Smith TG, Jewell J, et al. (2015) Smart food policies for obesity prevention. *The Lancet* **385**, 2410–2421.
45. South Africa (2017) *Regulations Relating to the Reduction of Sodium in Certain Foodstuffs and Related Matters*. *Government Gazette*.
46. Steyn NP, Nel JH, Malczyk S, et al. (2020) Provincial dietary intake study (PDIS): Energy and macronutrient intakes of children in a representative/random sample of 1- <10-year-old children in two economically active and urbanized provinces in South Africa. *Int J Environ Res Public Health* **17**, 1717–1717.
47. Wentzel-Viljoen E, Lee S, Laubscher R, et al. (2018) Accelerated nutrition transition in the North West Province of South Africa: results from the Prospective Urban and Rural Epidemiology (PURE-NWP-SA) cohort study, 2005 to 2010. *Public Health Nutr* **21**, 2630–2641.
48. Fulgoni VL, Brauchla M, Fleige L, et al. (2020) Association of whole-grain and dietary fiber intake with cardiometabolic risk in children and adolescents. *Nutr Health* **26**, 243–251.

49. Erzse A, Christofides N, Stacey N, et al. (2021) Availability and advertising of sugar sweetened beverages in South African public primary schools following a voluntary pledge by a major beverage company: a mixed methods study. *Glob Health Action* **14**. Taylor and Francis Ltd.
50. South Africa (2020) *Draft white paper on audio visual and audiovisual content services policy framework: A new vision for South Africa 2020*. *Government Gazette*. South Africa: .

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) n (%)	Proportion of entire sample (n=222) %
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

Table 2. Nutritional composition per 100g 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	Standard Deviation	95% Confidence		n	Mean	Standard Deviation	95% Confidence		
				Lower Bound	Upper Bound				Lower Bound	Upper Bound	
Energy (kJ)	93	1 597.20	307.17	1 533.94	1 660.46	41	1 667.00	298.95	1 572.64	1 761.36	0.22
Protein (g)	92*	9.74	3.33	1.90	10.43	41	12.53	4.47	11.12	13.95	-
Carbohydrates (g)	93	60.55	16.26	57.20	63.91	41	52.23	20.55	45.74	58.71	0.01
Total Sugar (g)	93	17.17	10.08	15.10	19.25	41	11.24	6.72	9.11	13.36	0.01
Free Sugar (g)	93	17.17	10.08	15.10	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	-
Sodium (mg)	93	155.99	132.91	128.63	183.37	41	159.91	155.25	110.91	208.91	0.88

One-way ANOVA classification of nutrient content by the number for breakfast cereals with direct CDM and without direct CDM. $P < 0.05$ 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.

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

Nutrient	RTE Breakfast cereals using less than 3 direct CDM strategies					RTE Breakfast cereals using 3 or more direct CDM strategies					P-value
	n	Mean	Standard Deviation	95% Confidence Interval for Mean		n	Mean	Standard Deviation	95% Confidence Interval for Mean		
				Lower Bound	Upper Bound				Lower Bound	Upper Bound	
Energy (kJ)	64	1 668.88	272.64	1 600.77	1 736.98	29	1 439.02	324.19	1 315.70	1 562.34	<0.01
Protein (g)	63*	10.42	3.11	9.63	11.20	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	13.10	16.93	29	21.93	12.95	17.01	26.86	<0.01
Free Sugar (g)	64	15.02	7.67	13.10	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	0.80	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
Sodium (mg)	64	121.08	111.77	93.16	149.00	29	233.05	144.91	177.93	288.18	<0.01

One-way ANOVA classification of nutrient content of RTE breakfast cereals by the number of CDM strategies 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.