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Unveiling implicit and explicit packaging design features on commercial baby foods in the UK: a content analysis

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ABSTRACT

This study investigated how visual design elements on commercial baby food (CBF) packaging contribute to misleading promotional claims, specifically through implicit graphic design and selective presentation of information that may distort consumer perceptions of healthfulness. A content analysis of 35 products from the 'UK Commercially Available Baby Food' dataset assessed visual features alongside informational elements derived from the WHO Nutrient and Promotion Profile Model. Using a Claims Design Framework, discrepancies between visual cues, claims messaging, and actual nutritional content were identified. Findings revealed that CBF packaging emphasizes healthfulness, naturalness and visual appeal through strategic use of colour, imagery, and layout ratios while downplaying important nutritional information, such as total sugar content. By applying messaging strategies including incongruent visual cues, selective omission of ingredients, and exaggerated marketing language, CBF packaging reinforced the potential to mislead consumers. These implicit graphic features and explicit health claims contradict actual product composition and create misleading impressions of the product's healthfulness. This study bridges the gap between analyses which only assess explicit messaging to include implicit associations. It provides actionable insights for designers, marketers, and policymakers to create ethical and responsible packaging which comply with WHO guidelines, ensuring transparency and supporting informed consumer choices.

ARTICLE HISTORY

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KEYWORDS

Misleading health claims; visual design elements; baby food packaging; ethical design practice; nutritional transparency; consumer perception

Introduction

The World Health Organization (2023) recommends that complementary feeding begins at six months at a time when breastmilk (or breast milk substitutes) may no longer meet all the nutritional requirements of the baby. As parents prepare to incorporate complementary foods into the diets of their infants, they elect to make homemade foods (HMF) from scratch and/or include commercially available baby food products.

Comparisons between homemade and commercial baby foods (CBF) indicate that HMF tend to be served in smaller portion sizes, have a lower energy content, and cost, are higher in fibre and diversity of vegetable content than CBFs (Bernal et al. 2021). Notably, the Avon Longitudinal Study of Parents and Children (ALSPAC) cohort data also demonstrated that offering textured HMF promoted a greater diversity of intake in later childhood (Northstone et al. 2001). However, despite benefits of HMF, parents may purchase CBFs due to convenience, food preferences and ease of preparation (Synnott et al. 2007). There is therefore a tension between the potential nutritional benefits of HMF and the convenience of CBFs guiding parental choice.

In the UK, CBF consumption is highly prevalent, with a survey from 2010 indicating that two-thirds of babies received their first solid food from a commercial source and 45% of 8–10 months olds given CBFs at least once per day (García et al. 2013). During the current UK cost-of-living crisis, sales have dropped, but the market share for CBF remains high, with consumption is projected to reach £1.1 billion by 2028, growing at a rate of 3.5% per annum (Statista 2023). Growth in procurement of CBFs emphasizes the importance of understanding how CBF marketing strategies, particularly through packaging, influence parental decisions—often in ways that diverge from evidence-based nutritional recommendations (García, Menon, and Parrett 2022).

The role of packaging design in influencing consumer behaviour

Packaging serves a powerful marketing tool at the point of purchase. Previous research has demonstrated that mothers identified packaging as an important determinant of preferences and a useful, convenient means of portion control for their young child's snack intake (Tang et al. 2020). Through its visual design elements, such as typography, colour schemes, imagery, stylistic features and layout (Schifferstein, de Boer, and Lemke 2021), packaging captures the attention of the consumer and conveys both explicit claims and implicit benefits that influence consumer choices. These elements are strategically crafted to evoke emotional responses, build trust, and promote perceptions of quality and healthfulness (Chandon 2013; Festila and Chrysochou 2018; Nascimento et al. 2022; Orth and Malkewitz 2008). For instance, specific imagery—such as visuals suggesting sweetness—has been shown to influence consumers' expectations and purchase intentions, highlighting the significant impact of visual cues on consumer behaviour (Rebollar et al. 2019). Moreover, studies demonstrate that consumers, particularly adolescents and young adults, often prioritize visual cues over textual information when evaluating the healthfulness of food products (Vila-López, Küster-Boluda, and Sarabia-Sánchez 2017). Perceptions of benefits conveyed through appealing packaging may overshadow the product's actual nutritional content (Chu, Tang, and Hetherington 2024), particularly when viewed through the dual-process theory of decision-making (Kahneman, Lovallo, and Sibony 2011). This theory proposes that intuitive, emotion-driven System 1 decision-making frequently bypasses more analytical, effortful System 2 processing required to scrutinize nutritional information.

In the context of CBFs, visually appealing packaging prompts automatic, emotionally driven impressions and subsequent decisions which prioritize convenience and perceived benefits over nutritional content. This form of rapid thinking may focus attention on visual appeal, and emotional tone (Garcia et al. 2024) rather than the nutritional

benefits of the product. Conversely, packaging designed to emphasize content, and to make nutritional claims more accessible and less cognitively demanding could encourage healthy food choice.

The impact of promotional claims and regulatory gaps

Recent studies have revealed the pervasive use of promotional claims on CBF packaging in the UK. For example, Garcia, Menon, and Parrett (2022) documented 6,265 promotional claims across 724 products, with marketing (99%), composition (97%), and nutrient claims (85%) being prevalent, compared to health claims (6%). Despite existing regulations, marketing techniques that mislead or confuse consumers remain widespread, highlighting gaps in regulatory enforcement. In relatively well-regulated areas such as marketing of breastmilk substitutes (BMS), recent research shows that text and imagery nevertheless do not comply with guidance and were widespread on formula products available in in the UK (Conway et al. 2023).

The WHO has advocated for standardized promotional regulations for CBF to counter misleading promotion, as they have for BMS. The WHO European Region report on Nutrient and Promotion Profile Model (NPPM) was developed as a tool to assess the nutritional quality and marketing practices of CBFs and to avoid promotional practices that mislead consumers (WHO 2022). Figure 1 illustrates the NPPM criteria and corresponding guidance, highlighting ten main content categories and six requirements related to on-pack labelling and promotion.

Despite this WHO guidance, the absence of legally binding regulations in the UK does not compel companies to apply this guidance. A content analysis conducted by Garcia et al. (2024) of 341 CBF products available in the UK demonstrated the pervasiveness of emotional language, particularly around 'love' which is likely to affect parental decisions. Taken together, this evidence underscores the need for regulatory

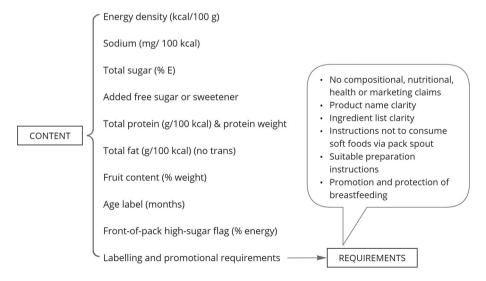


Figure 1. World Health Organisation Nutrient and Promotion Profile Model (NPPM) with content and labelling requirements (WHO 2022).

oversight to combat misleading practices. However, the research to date has included consideration mainly of explicit cues (e.g. what is claimed), what is implied (e.g. the emotional tone of text) and less on the implicit features of design which may influence parental decisions to purchase CBFs.

Research aim

The present study was designed to identify and investigate visual design elements on CBF packaging which contribute to the mismatch between what the packaging promotes and the nutritional content of the product. An innovative Claims Design Framework has been developed to classify claims made and to analyse how typography, colour, schematic elements, images and layout are used to convey nutritional, emotional and other 'benefits'. Using this framework, the study employed a content analysis to evaluate informational (textual claims, nutritional details) and visual (typography, colour, schematic elements, images and layout) elements on CBF packaging, assessing their alignment with the WHO Nutrient Profile Model (NPPM) standards. The analysis focussed on identifying discrepancies between implicit design elements and factual nutrient content, and the strategic use of persuasive visuals.

Classification of package design elements for on-pack promotional claims

Visual communication design involves creating a functional, aesthetic, and organized structure from diverse elements and plays a critical role in enhancing the effectiveness of communication on food packaging (Konstantoglou, Folinas, and Fotiadis 2021). Effective design promotes consumer engagement with information, facilitating decision-making (Silayoi and Speece 2007). Empirical studies consistently demonstrate that packaging design significantly impacts consumer behaviour (Chu, Tang, and Hetherington 2024; Cowburn and Stockley, 2005 2005). For instance, parents are often willing to pay more for innovative packaging features like portion control and may prioritize these over their usual brands (Tang et al. 2022). In the case of CBFs, where packaging can evoke trust and health perceptions, design strategies can nudge parents towards decisions that align—or even conflict—with public health guidelines, especially when promotional claims are exaggerated.

Consumers can be misled not only by the content of packaging claims but also by how that content is visually communicated. Visual design elements often operate implicitly, affecting consumer behaviour subconsciously (Festila and Chrysochou 2018). While areas like ingredient lists are strictly regulated, other claims, like those about the product's 'natural' qualities, are less controlled and may not require substantiation. Subtle design features, including typography (Ampuero and Vila 2006), colour (Gürsoy 2015), graphics (Pensasitorn 2015), and stylistic choices (Schifferstein, Lemke, and de Boer 2022), can significantly impact consumer impressions. Therefore, studies have addressed the substance of packaging claims and how these messages are presented visually (Schifferstein, de Boer, and Lemke 2021). To analyse systematically how design elements on packaging convey promotional claims, the present study introduces the



Claims Design Framework, which categorizes packaging design elements into five key aspects: typography, colour, schematic elements, images and layout.

Typography

Typography is a key component that affects readability and perceptions of product healthfulness and quality (Fligner 2013; Schifferstein, de Boer, and Lemke 2021). Elements such as font style, weight, shape, size, and arrangement significantly impact the presentation of claims. For instance, large, bold fonts are used to highlight key health claims, enhancing their visibility and perceived credibility (Schifferstein, de Boer, and Lemke 2021). Typography can evoke specific associations: serif fonts may convey tradition and trustworthiness (Childers and Jass 2002; Poffenberger and Franken 1923), while sans-serif fonts suggest modernity and approachability (Grohmann 2016; Henderson, Giese, and Cote 2004).

Colour

Colour plays a powerful role in attracting attention and triggering associations (Kumar 2017). Bright, vibrant colours like green and yellow suggest freshness, natural ingredients, and health benefits, appealing particularly to health-conscious consumers (Festila and Chrysochou 2018). Contrasting colours, such as bright fonts against dark backgrounds, can further emphasize key messages and ensure that critical information stands out (Garber, Hyatt, and Boya 2008).

Schematic elements

Schematic elements, such as lines and geometric shapes, help structure the layout and highlight essential information. These elements promote prominence of visual content, creating boundaries, and drawing focus to specific areas of packaging (Van Ooijen et al. 2016).

Images

The use of images on packaging serves to create an appealing and trustworthy impression of the product (Lowry, Wilson, and Haig 2014). Images of fresh fruits, wholesome ingredients, or happy children are commonly used to convey a sense of quality and well-being. These images imply health benefits without making explicit claims, subtly reinforcing the product's appeal. For example, an image of a smiling baby on CBF packaging can evoke positive emotions and associations of health and safety, influencing purchasing decisions (Westerman et al. 2013). The persuasive power of imagery lies in its ability to communicate complex messages instantly and emotionally, often bypassing rational scrutiny (Ewbank et al. 2009).

Layout

Layout refers to the arrangement of text, images, and other elements on the packaging. Strategic positioning of information influence how consumers interpret and

Table 1. Claims design framework: key aspects and corresponding features.

Design aspect	Corresponding features
Typography	Font style, weight, shape, width, slope, size
Colour	Font colour; background colour; colour contrast
Schematic elements	Simple, abstract shapes/forms to structure and organize content
Images	Visuals such as photographs, illustrations, or pictures
Layout	Position of various elements on packaging; ratio of space used for text and images

process what they see (Pattison, Vernik, and Phillips 2001). A well-structured layout can make critical details, like nutritional information or product suitability, stand out and allow parents to quickly identify key elements (Kelly et al. 2024). Effective layouts use visual hierarchies, such as the prominent placement of health claims or nutritional information, to lead the consumer's eye towards the most persuasive parts of the packaging, subtly shaping interpretations and influencing buying decisions (Pattison, Vernik, and Phillips 2001). Kelly et al. (2024) reported that packaging often combined explicit claims with implicit visual and emotional cues, creating an overall positive impression. This strategy enables consumers to quickly assess product qualities, making layout a critical factor in decision-making at the point of sale.

The Claims Design Framework in Table 1 categorizes key packaging design into discrete elements. This framework offers a structured approach for analysing CBF packaging, particularly in how design features may contribute to exaggerating or misleading promotional claims.

Methods

To investigate how visual design elements on CBF packaging may contribute to exaggerated or misleading promotional claims, a sub-sample of CBFs were identified, and product packaging subjected to analysis involving two main processes: (1) uploading package images of each product and scrutinizing discrete elements of packaging from CBF products, and (2) conducting content analyses of the design elements on these packages using the Claims Design Framework derived from the literature and analysing text content of claims.

Sample selection

To select CBF products, exemplars were selected from the 470 UK baby food products which have been tested against the WHO NPPM criteria and made publicly available by Bozkir et al. (2023). The dataset 'UK Commercially Available Baby Food' is accessible at https://archive.researchdata.leeds.ac.uk/1185/.To identify a sub-sample as exemplar CBFs seven criteria were applied which aligned with NPPM standards (Threapleton 2023). CBFs were included if they failed on any the following NPPM requirements (Table 2):

- High total sugar content (>30% energy in fruit or vegetable purees, desserts, and dry fruit snacks; > 40% energy in dairy foods)
- Addition of free sugars¹
- Below minimum age recommendation of 6m, maximum age recommendation for puréed foods of 12 m

Table 2. Characteristics of selected CBF product samples with food category, percentage of energy from sugar, any added sugar, age recommendation in months (m), inappropriate claims, product name is misleading, missing ingredients, and whether appropriate breastfeeding (BF) support statements were given. Shaded cells indicate exemplar products within each category: light blue highlights products that fail to comply with specifications (least compliant), while light green highlights products that are relatively compliant (most compliant).

Catagory	ID	High total sugar content (%TE) (exceeds WHO	With added	Age label (m)	Inappropriate	Name misleading	Ingredient missing information	Appropriate breastfeeding BF information
Category		guide)	sugar	• • •	claims			
Confectionery	CY1	83% (N/A)	Yes	12	Yes	Yes	Yes	No
(CY1-4)	CY2	78% (N/A)	Yes	12	Yes	Yes	No	No
	CY3	57% (N/A)	No	24	Yes	Yes	No	No
6 1 1	CY4	70% (N/A)	No	12	Yes	No	No	No
Snacks and	SF1	34% (Yes)	Yes	12	Yes	Yes	No	No
finger foods	SF2	27% (Yes)	Yes	12	Yes	Yes	No	No
/ -	SF3	64% (Yes)	No	24	Yes	Yes	No	No
(SF1-7)	SF4	13% (No)	Yes	12	Yes	Yes	No	No
	SF5	8% (No)	Yes	12	Yes	Yes	No	No
	SF6	80% (Yes)	No	12	Yes	No	No	No
	SF7	<1% (No)	No	10	Yes	No	No	No
Fruit and	FV1	85% (Yes)	No	4	Yes	Yes	Yes	No
vegetable	FV2	84% (Yes)	No	4	Yes	Yes	No	No
	FV3	83% (Yes)	No	6	Yes	Yes	No	No
(FV 1-8)	FV4	62% (Yes)	No	4	Yes	Yes	No	No
	FV5	53% (Yes)	Yes	6	Yes	Yes	No	No
	FV6	48% (Yes)	No	4	Yes	Yes	No	No
	FV7	74% (Yes)	No	6	Yes	Yes	No	No
	FV8	6% (No)	No	6	Yes	No	No	No
Cereal	CL1	33% (Yes)	Yes	6	Yes	No	Yes	No
	CL2	29% (No)	Yes	6	Yes	Yes	No	No
(CL1-7)	CL3	23% (No)	Yes	10	Yes	Yes	No	No
	CL4	7% (No)	No	6	Yes	Yes	Yes	No
	CL5	7% (No)	Yes	6	Yes	Yes	No	No
	CL6	33% (Yes)	No	4	Yes	No	No	No
	CL7	7% (No)	No	7	Yes	No	No	Yes
Savoury meal	SM1	9% (No)	Yes	12	Yes	Yes	No	No
	SM2	34% (Yes)	No	4	Yes	No	No	No
(SM 1-7)	SM3	29% (Yes)	No	7	Yes	Yes	No	No
	SM4	21% (Yes)	No	10	Yes	Yes	No	No
	SM5	20% (Yes)	No	7	Yes	Yes	No	No
	SM6	16% (Yes)	No	6	Yes	Yes	No	No
	SM7	12% (No)	No	6	Yes	No	No	Yes
Dairy (DY1-2)	DY1	39% (No)	Yes	6	Yes	No	No	No
•	DY2	16% (No)	No	6	Yes	No	No	Yes

i. Examples of inappropriate claims on packaging: (a) Composition and nutrition claims: 'no...,' 'no added...,' 'low in..., 'nutritionally balanced,' 'Source of fibre'. (b) Health claims: 'good for...,' 'supports...,' 'improves...,' 'perfectly balanced to support growth'. (c) Marketing claims: 'super smooth', 'tasty/yummy/delicious', 'just good stuff...', 'Made using real, first-class ingredients from nature...not nonsense'.

Inappropriate promotion such as health and nutrition claims, idealizing the product implying that it is better than family foods and masking risks

ii. Examples of misleading names: 'Peach and Banana Fruity Bakes, but contains 41% apple', 'Nature Mango Chicken Curry, but contains 30% carrots, only 8% chicken and mango'.

iii. Examples of missing ingredients: The ingredient list does not clearly indicate the proportion (%) of the largest single ingredient,, 'No amount of added water/stock (except when used for rehydration of legumes/grains etc.)'. Shaded cells indicate exemplar products within each category: light blue highlights products that fail to comply with specifications (least compliant), while light green highlights products that are relatively compliant (most compliant).

- Product name clarity: indicate contents in descending order
- Missing ingredient information
- Include relevant statements to protect and promote breastfeeding

To select a balanced set of exemplar CBFs the least compliant and the most compliant products were chosen across different food categories, where compliance was defined as meeting or failing on the NPPM requirements. In total 35 CBFs were chosen, distributed across six categories: confectionery (n=4); snacks and finger foods (n=7); fruit & vegetable (n=8); cereals (n=7); savoury meals (n=7); and dairy (n=2). CBF details of packaging and nutritional content were collected online from multiple sources, ensuring that all sides of the packaging were visible for analysis. This comprehensive collection allowed for an in-depth analysis of both informational and visual design elements, capturing all relevant promotional claims, nutritional information, and graphic elements used on the packaging. Detailed sample information and corresponding IDs are available in Supplement 1.

Content analysis of packaging design

A content analysis was conducted based on previous research (White et al. 2006). The analysis followed three main steps:

Analytical Framework and coding scheme

The coding framework included four key design aspects: typography, colour, graphics, and layout. This framework helped categorize claims and then evaluate their presentation on the packaging, as shown in Table 3.

Table 3. Coding sheet for packaging design evaluation.

Packaging elements	Description				
On-pack claims					
Specific claims	Record all promotional claims on the packaging				
Claim category	Categorize claims into: Marketing; Composition; Nutrition; Health.				
Typography	Analyse font style, weight, shape, width, slope, and size				
Font style	Includes: Serifs; Sans serifs; Script (decorative, handwritten, etc.)				
Font weight	Includes: Bold; Light				
Font shape	Includes: Uppercase; Lower case; Mixed				
Font width	Includes: Expanded; Condensed				
Font slope	Includes: Roman; Italic				
Font size	Includes: Large; Medium, Small				
Colour	Analyse colour of the text used in claims				
Font colour	The colour of the text used in claims				
Background colour	The background colour behind the text				
Contrast	Contrast between text and background: High, Middle, Low				
Schematic elements	Identify shape/forms in visual design to structure and organize content				
Lines or arrows	Includes: Straight; Curve; Broken etc.				
Framing shapes	Includes: Circle; Square; Triangle; Clouds etc.				
Symbols	Like hearts, stars etc.				
Marks	Like asterisks or check marks				
Images	Product; Ingredient; Brand /Logo; Icon; Label; Award etc.				
	Types include photographs, illustrations, or pictures				
Layout	Analyse the location and arrangement of claims (position and the percentage of its coverage on packaging)				
Further design issues	Record non-compliant or potentially misleading packaging design issues.				

Data collection and coding

Promotional claims on the selected packaging were extracted and categorized into four themes based on their content: Composition, Nutrition, Marketing, and Health (Garcia, Menon, and Parrett (2022). Each claim was analysed based on how typography. colour, graphics, and layout potentially influenced consumer perceptions. An example of the analysis can be found in Supplement 2.

The layout and composition analysis were adapted from Kelly et al. (2024) applying evaluation of the visual hierarchy—how the arrangement and prominence of packaging elements direct consumer attention. The goal was to identify how design hierarchies prioritize claims related to ingredients or product benefits over critical nutritional information, The placement, size, and prominence of promotional claims versus health-related text on front and back-of-pack. Each inappropriate claim was categorized and its visual occupation on the packing was calculated. Details are available in Supplement 3. For instance, if a claim occupies one-third of the horizontal dimension and one-fifth of the vertical dimension of the front panel, then it occupies one-fifteenth (7%) of the front pack.

Comparative analysis across categories

Design contents on the baby food packaging were compared across different food categories to identify variations in design elements between more compliant and less compliant products (WHO 2022). The design of claims made on packaging that might influence consumer interpretation was then analysed in detail to identify and compare any discrepancies between the design elements and specified nutritional content or relevant regulations.

Results

The results from the content analyses are given below—firstly presenting findings from coding the design elements (Table 3) to reveal implicit messaging and secondly presenting results from the analysis of explicit messaging.

Implicit messaging

Typography, colour, schematic elements, images, and layout are used to convey explicit messages but also to communicate implicit cues implying health benefits, quality, and suitability for infants. These elements work in concert to create an overall impression of trustworthiness, safety, and nutritional value.

Typography

Typography is a pivotal element in emphasizing promotional claims on baby food packaging. Variations in font size, style, and capitalization provides a visual hierarchy, quiding consumer focus to critical information. Table 4 illustrates how these typographical variations highlight key claims across various products.

Table 4. Examples of typography design.

		Font size	variations		
CY1	SF1	FV2	FV6	CL5	SM7
MAZING TASTE SAT THE WEAT OF EVENT WHITE ME COLUMN AMELIAN STACKS &	NO. artificial flavours NO. artificial colors artificial NO! preservatives	inside me you'll find No acide super or sell No Durpte or the and noting critical Just yearny organic lood for bobie Lookin naturally occurring supers	Minimized Process PACKED WITH GOODNESS We have carefully created our suffered rish respect to be better than a	NO ADDED SUGAR NO PALM OIL	YUMMY YUMMY
		Special f	ont style		
CY2	CY4	SF7	SF1	SF3	SF7
I,m olayuic	Why not try?	just good stuff NO added sugar or salt NO concentrate. NO added sugar or salt NO concentrate. I contain naturally occurring sugars.	little ones' development. There is something for everyone from supported attent to busy todders and we guarantee it will be borsting with bits of younge flavours and different textures. Packed in perfect snack sited	REAL FRUIT REAL FLAVOUR REAL FUN!	finger food

Uppercase letters were applied selectively to specific words or entire claims to make them stand out. Fully capitalized claims like 'NO ADDED SUGAR' (CL5) and 'PACKED WITH GOODNESS' (FV6) were prominent across different products, serving to underscore the importance of these benefits. Uppercase lettering exerts an authoritative and urgent tone, suggesting that these are crucial product features. This typography choice makes the claims more impactful, especially when paired with larger font sizes.

The strategic use of font size helps prioritize certain messages over others. Larger fonts highlight primary claims, such as 'NO... NO... NO!' (SF1) or 'AMAZING TASTE' (CY1), ensuring these elements capture attention first. Smaller fonts, by contrast, were used for supporting information that complements the main claims, providing additional details without detracting from the key messages.

Additionally, 'handwritten' or script fonts were employed, particularly in snack and finger food categories (e.g. CY2, SF7), conveying a sense of personalization and friendliness. These fonts are informal and playful, evoking a homemade, caring touch. The appeal to caregivers was clear—these fonts suggested that the product was made with care and suitable for infants, fostering trust in the brand.

Serif fonts, known for their traditional and formal appearance, are rarely used on baby food packaging. This design choice reflects a preference for modern, clean, and sans-serif fonts that convey simplicity, approachability, and ease of reading. The absence of serif fonts further supports the intent to present the product as contemporary and relatable, aligning with consumer expectations for baby food products.

Colour

Colour is a fundamental design element that significantly enhances the visibility and appeal of promotional claims on baby food packaging. It serves not only to attract attention but also to convey implicit messages related to health, purity, and safety. The analysis revealed a pattern of high-contrast colour combinations designed to

Table 5. Examples of colour usage in claims.

CY1	CY2	SF3	SF5	FV2	SM6













		Rectangu	ılar figures		
CY3	FV6	SF7	FV8	CL3	SM1
no added sugar only natural ingredients	Ingredients from na The anythind as greened that a systemated fixed MITORION Tread-vides are 100, 101 101 101 102 103 103 103 103 103 103 103 103 103 103	bay and way me crops just good stuff. In about good and constrain No addition of coloring. Constraint and occurring upon which is not a more and to be color which is family and then a belong one is which is family and then a belong one is	Process of Particular Control of Particular	your biblys nutritional needs at all stages of their development. Our smooth should be started in produce to the started in produce to the started in produce to the started in the start	SOURCE OF FIBRE
		Symbol	ic figures		
CY1	CY2	SF3	SF5	FV2	DY1
10F5	No Junk	1 of your gaday	de code de cod	from 4 months. I'm diso ready for more taxture, of to t. spened, rs. Loon	AREA STEP VIOLENTIAL OF CONTROL O

attract attention to key claims (see Table 5). For instance, claims were frequently presented using white fonts on green or orange backgrounds, as seen in examples like CY1 (green heart with white text) and SF3 (bright orange background with '1 of your 5 a day'). The table below provides examples of how different colours are strategically employed to enhance the prominence of promotional messages.

Across various products, green was often used in association with organic or natural ingredients, while orange and red hues suggest vitality and energy. The recurring use of blue, white, and green links these products to notions of health, cleanliness, and trust. These themes were observed both within specific product lines and across different brands in our sample, indicating a broader pattern of using colour strategically to imply health-related benefits. High-saturation, high-contrast backgrounds, typically paired with white text, were a common feature designed to maximize the visibility and persuasive impact of health-related claims.

Schematic elements

The analysis of CBF revealed a widespread use of schematic elements, such as geometric shapes, symbols, and special graphical surroundings, to frame or enhance promotional claims. These elements visually emphasized claims, making them more prominent and with the power to subtly influence consumer perceptions.

'Labelled' claims. Geometric shapes enclosing claims, created visually independent panels. As shown in Table 6, by framing promotional text within distinct shapes, the brands emphasized their claims, ensuring they were prominent and not overlooked. The use of familiar symbolic figures—such as hearts, water drops, leaves, shields, bowls, notice boards, and signs—serves as visual backgrounds for both compositional and promotional claims on packaging. These shapes complemented the textual claims and conveyed product benefits, such as freshness, purity, and organic prevenance.

Rectangular figures. Rectangular shapes are simple, geometric schematic elements used to frame and highlight specific promotional claims. These contrasting colours make rectangular areas stand out against the background. For example, packaging such as CY3 and SF7 used simple rectangular backgrounds to draw attention to claims like 'no added sugar' or 'just good stuff', effectively delineating these assertions from surrounding text. By creating a visually distinct panel, these rectangular figures prioritized specific information, enhanced readability, and ensured that key information was not overlooked.

Symbolic figures. Symbolic figures are schematic elements and include shapes that carry iconic or representational meaning, Symbols such as hearts (CY1), water drops (SF3), leaves (FV2) and shields (FV2) convey implicit messages about the product's health, safety and naturalness. For instance, the green heart symbol on packaging (CY1) served to highlight the organic nature of the product, eliciting feelings of trust and reassurance among consumers. Similarly, symbols like water drops (SF3) and leaves (SF5) convey freshness, purity, and naturalness, further enhancing the perceived quality and appeal of the product. Additionally, shields (FV2) symbolize protection and safety, reinforcing the notion of product reliability and adherence to high quality standards. Yet in one case (FV2) this was done despite marketing the product as suitable for infants from four months of age—contrary to the WHO's (2023) recommendation that complementary feeding should begin at six months. While a 'from 4 months' label may help parents differentiate purées from more textured foods, its

Table 7. Packa	ging examples w	ith special surro	undings.		
	Special lines in	cluding speech bu	bbles, thought clou	ds and arrows	
CY4	SF6	SF6	SF2	SF3	CL2
Televan into 1 Matter and Seri 1 Matter and Seri 1 Matter and Seri 2 Feb.	The state of the s	Id a child's	High in Care	Total student student	Mile
	Speci	al marks such as c	heck marks and aste	erisks	
CY3	FV4	FV6	SM4	SM6	CL4
*contains naturall	No added sugar – contain Guten free Suitable for venetarians	**Contains	the tastiest	✓1 of your 5 a day	no a

presence contradicts WHO guidance and risks normalizing early weaning. Clearer alignment with international recommendations would reduce this inconsistency. These visual cues strategically influence consumer perceptions, implying safety, naturalness and suitability for babies.

'Special' surroundings. Special graphical elements, such as marks and lines make claims distinctive, emphasizing their importance. For example, elements such as the check mark and asterisk make text content stand out on the packaging. Arrows and clouds visually connected the claims with product images, creating a direct link between the claim and the food product itself. The table below illustrates how different schematic elements contributed to the distinctiveness of claims (Table 7).

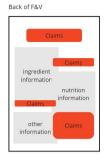
Special marks. Special marks such as asterisks, check marks, and exclamation points emphasized claims. These marks are typically placed at the beginning or end of claims. For instance, CY3 used asterisks to highlight sugar content, while SM6 and CL4 used check marks to validate health claims and signal approval or certification. Ticks and checks are used in schoolwork to indicate that something is correct, so serve as visual indicators of credibility and draw the consumer's attention to accuracy.

Special lines. Lines such as arrows (e.g. SF6, SF2, SF3 and CL2) and thinking clouds (e.g. CY4; SF6) connect schematic elements used to create a visual link between the claims and a product image or another part of the packaging. This direct connection helps consumers quickly associate the claim with the product. For instance, SF6 and SF2 used arrows to guide the consumer's eye from the promotional text to the corresponding product image, reinforcing the connection between the two. CY4 used thought clouds to highlight key claims, making them more visually engaging. By guiding the consumer's eye, these lines ensure that the connection between the claim and the product is clear and intuitive. Special lines made the design more interactive and engaging, encouraging consumers to explore the packaging more closely and directly focus onto claims.

Images

The inclusion of appealing images, such as cartoon representations of food ingredients, illustrations, and icons were strategically placed near or around claims to make them more appealing and easier to understand. For instance, in Table 8, CY1 uses cartoon illustrations of fruits near the product claims to visually emphasize the natural content of the product. In CL3, realistic vegetable images were placed near claims that

Table 8. Examp	oles of image usa	age in promotic	onal claims.			
	Attractive images including cartoon characters					
CY1	SF3	SF4	FV6	CL3	SM6	
modali ungun	no added sugar	No added NO colourings or sail	sted our better than first-class not nonsense. the blend of organic pples, peas, courgette	A special properties. A princip conjugation. A princip configuration of the princip configuration of	Find us made this tacky man land	



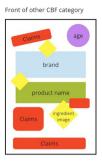




Figure 2. Illustration of front and back design differences (including the main elements on the CBF packaging) of F&V category CBF and other CBF categories (adapted from Kelly et al. 2024).

highlight the health benefits of the product and create a strong association between the product and its healthy ingredients.

These images act as visual shortcuts, capturing attention quickly and communicating the product's attributes (e.g. natural, healthy, organic) without the need to read extensive text. These illustrative elements are used as visual anchors to enhance the appeal and clarity of the product claims.

Layout

The analysis of CBF packaging layout revealed differences between categories, differentiating between compliant products and less compliant products. Compliant products tended to present more detailed information on the back of the packaging rather than the front. This strategic placement suggests an implicit attempt to appeal to a more discerning consumer base, who may scrutinize packaging details more thoroughly (at the back) and who spend more time examining ingredients back-of-pack.

The distribution of claims on the front and back of packaging was inconsistent across all product categories, with no clear preference for placing claims predominantly on one side. The exception to this was found in fruit and vegetable (F&V) category, where there was a tendency to place fewer promotional claims on the front. Instead, these claims were more prominently displayed on back or the other sides, while the front was dominated by ingredient images, product names and descriptions.

The visual representation in Figure 2 demonstrates the contrasting layout strategies between the F&V category and other baby food categories. In the F&V category, promotional claims are minimal on the front, and the space was often allocated to imagery that reflects the product's content, such as fresh fruits or vegetables.

Explicit messaging in baby food packaging

Disconnect between visual representation and main ingredients

More explicit misalignment between visual representations and the actual content of ingredients was observed through analysis in the following ways:

Table 9. Examples of packaging design discrepancies with actual ingredient content.

Example ID (product ID) Actual ingredients On-pack design Example A (SF1) WHAT'S IN THEM? (Ingredients) Whole wheat flour (39%) Fruit filling (35%) (apple juice concentrate (41%), apples (41%), peaches (9%), bananas (7%), carrot fibre, lemon juice Main ingredient: apple No main ingredient pictured (apple) Example B (SM4) 100% natural ingredients ingredients: Carrot (30%), Tomatoes (11%), Courgettes (8%), Onion (8%), Chicken (8%), Mango (8%) Main ingredient: carrot Mismatch in ingredient prominence; larger image for mango, despite carrot being the main ingredient

Table 10. Comparison of included and omitted ingredients from visual elements on packaging from CBF products.

ID	Packaging image	Included	Omitted
CY1	NO ARTIFICIAL 15 ADDITIVES	'NO artificial flavours or colours'; 'NO added preservatives'; 'NO ARTIFICIAL ADDITIVES'	Added sugar (fruit purees)
SF5	40 salt	'No added salt No colours, flavours or preservatives'	Added sugar (puree and juice concentrate)
CY3	no added sugar only natural ingredients	'no added sugar' 'only natural ingredients'	High total sugar content (57% of energy from intrinsic sugars
FV6	HO ADDED SE	'NO ADDED SUGAR'	High sugar content (68% of total energy from intrinsic sugars

Table 11. WHO (2022) requirements and examples of products with sugar content exceeding recommended percentages without notice.

WHO requirement	Actual sugar content
Snack and Finger food need a high sugar flag if ≥15%	64% (SF3)
Fruit and vegetable food need a high sugar flag if ≥30%	84% (FV2)
Cereals need a high sugar flag if ≥30%	33% (CL1)
Savoury meals need a high sugar flag if ≥15%	29% (SM2)

- A) Invisibility of main ingredients: Some packaging failed to depict the main ingredient of the product despite its prominence in the product. For example, in Example A (SF1) from Table 9, the product's main ingredient was apple (41%), but apples were not featured on the packaging, instead peaches (9%) and bananas (7%) (which constitute a small percentage of the ingredients) were featured. The most visually prominent fruit might be used to signal flavour rather than quantitative predominance (e.g. peaches and bananas on SF1, where apples are 41% of content). Although flavour-led imagery is common marketing practice, it may still mislead when it visually under-represents ingredients contributing most to the baby foods.
- B) Misrepresentation of ingredient proportions: The visual prominence of ingredients on the packaging often did not correspond to their actual proportions in the product, suggesting greater ingredient content relative to actual content. Example B (SM4) in Table 9 illustrates this issue, where the packaging highlights ingredients like chicken and mango more visually dominant than carrot, despite carrot being the main ingredient. While it could be argued that visual proportions reflect aspects such as edible volume or design aesthetics, the effect remains potentially misleading, especially without corresponding quantitative cues.

These design choices create a visual impression of the product which differs from the listed contents.

Incongruent messaging around ingredients

Selective omission of key ingredients affecting health benefits was observed, especially regarding total sugar content. Total sugars comprise all mono- and disaccharides present in the product. Added (free) sugars include both sugars added during manufacture and those released from fruit or vegetable cell walls during juicing or puréeing (WHO 2015; SACN UK 2015).

Packaging claims such as 'natural' or 'healthy' did not match the product's actual total (high) sugar content, as shown in Table 10:

- Incongruent messaging regarding sugar content: Products that prominently displayed 'no added sugar' yet contained high total sugar levels could be construed as incongruent. Example CY3 illustrates this issue with the product packaging legimatimely claiming 'no added sugar' yet the overall total sugar contributed 57% to the total energy content of the product, a discrepancy likely to mislead consumers.
- Non-Compliance with WHO Recommendations: Some products exhibited sugar levels far exceeding the WHO recommendation without appropriate warnings



Table 12. Examples of '1 of 5 a day' application in various baby food categories.

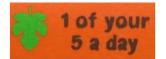
Confectionery (CY1)

Confectionery (CY4)

Snacks and finger foods (SF3)







Savoury meal (SM4)

Dairy (DY2)

Fruit and vegetable (FV6)







Table 13. Comparison of age recommendations and breastfeeding statement.

Non-compliant with age recommendation

Complies with age recommendation

Fruit and vegetable (FV2) Fruit and vegetable (FV6) Cereal (CL5) Savoury meal (SM3)









Inappropriate breastfeeding statement Fruit and vegetable (FV4) Fruit and vegetable (FV6) 'The Government advises that you don't need to wean your little one until they are 6 months. Every baby is different!' 'Government guidelines advise weaning from 6 months. Every baby is different'.

Savoury meal (SM1)

'Ingredients suitable from 4 months. Government guidelines advise weaning from 6 months. Every baby is different'.

No statement Cereal (CL5)

Breastfeeding not mentioned

'Made for Mums'

Appropriate feeding statement Cereal (CL7)

'We support the WHO recommendation on exclusive breastfeeding for the first 6 months and continuing with breast milk until at least 2 years of age, when possible'

on their packaging as requested by the WHO (p. 29 of NPPM document). Table 11 outlines these discrepancies, emphasizing the need for clear communication regarding sugar content in CBF packaging.

Selective health claims—some products stated that they had 'no artificial preservatives' or 'no added salt' but the packaging did not then disclose the presence of added sugar. For example, CY1 showcases this selective omission.

Table 14. Examples of visible portion size claims on cereal packaging.

Cereal (CL1) Cereal (CL4) Cereal (CL5)







Table 15. Examples of first-person tone claims and exaggerated expressions on baby food packaging.

	First-person tone		Exaggerated expression
ID	Claims and expressions	ID	Claims and expressions
CY2	I'm 100% organic fruit	SF7	just good stuff
SF4	I have yummy fruit, spelt + oats inside me.	SF4	I am perfect for little ones to nibble their way through when they are very hungry too!
SF7	I'm just the right size + shape for little ones developing finger+thumb 'pincer grip' and I'm super melty to disappear in little mouths.	DY2	Simply made with love, we select the tastiest ingredients for your little one!
SM3	I'm yummy and perfectly balanced for growing babies.	FV7	our organic fruit pouches are lovingly made with only the <i>yummiest</i> ingredients, making them perfect for your little one.
FV2	I contain naturally occurring sugars	CL5	We combine the finest ingredients with our 60 years expertise
FV7	I'm crammed with fruit—nothing else!	SM1	We have carefully created our nutrient-rich recipes to be better than best . Made using real, first-class ingredients from naturenot nonsense

Products displayed claims of what was not included in the product, such as no added salt or no added sugar, but where total sugar content was high or where added sugar was omitted from the packaging, this then provides insufficient information to identify whether this is a healthy product or not.

Misuse of '1 of 5 a day' claim

The use of labels with '1 of 5 a day' placed on food products was originally designed for adults to encourage the consumption of more fruits and vegetables to meet the 5-a-day recommendation (NHS, 2002). This claim was found on several CBFs across different categories, including confectionery, snack and finger food, dairy, fruit and vegetable, savoury meal. This claim was applied within categories where it may not be appropriate, such as confectionery and processed snacks. The widespread use of this claim on CBF could be familiar to consumers from other products for adults, and is attention grabbing, but not appropriate, as shown in Table 12.

Mismatch in age recommendations and implications for infant feeding

Age recommendations on some CBFs did not comply with World Health Organization (2023) guidelines, which advocate for exclusive breastfeeding for the first six months

of life (Dewey, 2001). Some packaging (e.g. FV2, FV6, CL5 in Table 13) for complementary foods gives the age recommendation as early as four months, contrary to WHO guidelines. Certain products lacked appropriate breastfeeding statements or included misleading ones, potentially implying that the product could replace breast milk or formula earlier than recommended. For instance, the term 'weaning' (which is incorrect) was used in some cases as seen in FV4 and SM1 in Table 13. In contrast, CL7 was the only product with clear reference to WHO recommendation to breastfeed exclusively for the first 6 months statements. The inconsistency in messaging highlights a significant gap in how infant feeding recommendations are communicated through product packaging.

'Invisible' portion recommendation

A recurring issue identified in CBFs sampled here, was that they did not consistently have a clear portion recommendation, leaving caregivers to decide how much to offer their infant. In addition, the packaging size of baby food was usually small, with a concomitant scaling down of font which made on-pack information hard to read including ingredients. Unlike other food categories, cereal products were most likely to include advice on portion size, as detailed in Table 14. However, since some CBFs were individually packed this may imply that it is a single serving. Nonetheless, snack and meal CBFs without portion guidance indicated an inconsistency of portion size recommendations across food categories.

Intimate tone and 'strong' words

CBF packaging contained frequent use of words with an intimate tone, baby-like phrasing and exaggerated language (Table 15). The aim could be to reach out to caregivers to be relatable and appealing. For example:

- First-person tone: text on packaging adopted a first-person narrative, creating a conversational and personalized connection with the caregiver, as seen in claims that start with phrases like 'I'm' (CY2; SM3) or 'I have inside me' (SF4). Presenting the product as a 'speaker', humanizing the product and fostering an emotional bond with the consumer.
- Baby-like and playful phrasing—Words such as 'yummy', 'super melty', 'yummiest', 'tummy', 'play', 'fun' 'super cute', 'tasty' are conversational, informal, and can evoke playful ways adults speak to children, this downplays the seriousness of conveying details about the content of CBF products.
- Exaggerated expressions: language to promote their qualities, often without providing evidence to back these claims. Examples include: 'crammed with fruit', 'absolutely, 'finest', 'perfect', 'super', 'tastiest ingredients' 'just good stuff' and 'better than best'. These descriptions suggest appeal but may not reflect actual benefits.

Discussion

Analysis of implicit and explicit design features including claims on CBF packaging revealed a series of ways in which packaging cues were incongruent with nutritional content. The potential for incongruence was demonstrated through specific design features such as typography, colour schemes, schematic elements, images and overall visual hierarchy of the packaging. In parallel, messaging on nutritional content, ingredients and claims demonstrated the potential for incongruity through visual misrepresentation, selective omission of important nutritional information, misuse of health claims, and inappropriate age recommendations. Through both implicit and explicit elements, brands selectively emphasized favourable attributes while minimizing or obscuring less favourable attributes. These design choices designed to promote the products also have the potential to confuse caregivers. They raise ethical questions and highlight the need for strict regulation and oversight to ensure transparency and accuracy in packaging to protect parents and caregivers who make decisions for babies.

Impact of design elements on consumer behaviour

When transitioning to complementary foods, parents often rely on CBFs due to convenience for out-of-home consumption, trust in brands, and time constraints. Packaging plays a pivotal role in this reliance, acting as a 'silent salesperson' that appeals to both the emotional and rational aspects of decision-making (Schifferstein, de Boer, and Lemke 2021). The present analysis demonstrated the potential for informational and visual elements to influence consumer perception.

While Garcia, Menon, and Parrett (2022) focussed on the impact of promotional claims, the present analysis expanded the discussion by showing how these claims were often paired with visual design strategies that further reinforced a sense of healthfulness and trustworthiness. Packaging used imagery of fresh ingredients, vibrant colours, and bold typography to draw attention to positive associations with health, engaging fast, intuitive decision-making processes (Kahneman, Lovallo, and Sibony 2011). Claims like 'No added sugar' or 'Just good stuff' when prominently displayed, may lead consumers to focus on these attributes without scrutinizing the full nutritional profile, which may include high total sugar content or low protein levels. The visual design amplified the message of promotional claims, making it more likely that parents will focus on these appealing elements and overlook the more nuanced, factual nutritional information typically placed in less prominent positions (back of pack). This dynamic suggests that not only the claims but also the entire design of packaging contributes to shaping consumer behaviour and decision-making, which can ultimately lead parents to choose products based on perceived benefits that may not align with the actual nutritional quality of the baby food.

Clarity and transparency of information delivery

A central issue identified on CBF packaging was the selective presentation of information, where packaging emphasized positive attributes while obscuring or minimizing less favourable details. This supports findings of Bernal et al. (2021), who noted that while homemade foods tend to be nutritionally superior in terms of fibre and vegetable diversity, CBF often emphasized claims like 'organic' or '1 of 5 a day' to create

a 'health halo'. These claims may distract consumers from noticing high levels of total sugar or low protein content of the product.

Typography and layout were crucial in this selective presentation. Large fonts and bold text are often reserved for promotional claims rather than nutritional information (Schifferstein et al., 2021). Brands strategically use friendly, approachable sans-serif fonts that convey trust and safety, further enhancing the appeal of the packaging. In contrast, the critical information on nutrition was often presented in smaller, less noticeable font sizes, undermining its visibility and significance. This approach may lead consumers to identify the product as having the appearance of a healthier product, emphasizing only some attributes while downplaying other essential details.

Balancing regulatory constraints and creative freedom in packaging design

The tension between regulatory constraints on nutritional content and creative freedom to design attractive packaging was noted in this analysis. While food manufacturers must meet strict safety and nutritional standards, there are relatively few limitations on how they design their packaging. This regulatory gap may explain why companies prioritize the aesthetic appeal over nutritional accuracy (Konstantoglou, Folinas, and Fotiadis 2021). Packaging that emphasizes bright colours, appealing images of fresh ingredients, or aspirational claims can obscure the actual nutritional content of the product, which is often less healthy than suggested (Silayoi and Speece 2007). In food marketing, branding and packaging design are integral to consumer appeal (Schifferstein, de Boer, and Lemke 2021). Marketeers understand that parents are often swayed by emotional cues—such as images of smiling babies or nature scenes—that evoke positive associations, even when the product does not meet health expectations.

Forward-looking design

To address ethical concerns and promote transparency in consumer choice, packaging should be leveraged as a tool for conveying vital information to parents and caregivers, moving beyond superficial promotional claims. Packaging plays a critical role in shaping consumer perceptions and behaviours regarding food content, nutritional information, and feeding guidelines. By strategically enhancing design elements, brands can help consumers make informed decisions while supporting healthy eating habits from an early age.

Communication of food content and nutritional details

Effective packaging must serve as an informative tool, presenting essential product details in an accessible and engaging manner. Designers can repurpose underutilized areas of packaging—such as sealing strips and side panels—to provide critical information on portion sizes, nutritional content, and age-appropriate feeding guidelines (Tang et al. 2022). This approach not only increases the availability of useful information but also ensures clarity and visual appeal.

By aligning with global health guidelines such as the WHO's Nutrient and Promotion Profile Model (NPPM), which advocates for standardizing promotional practices and improving communication about product content (WHO 2022), packaging can utilize bold typography, contrasting colours, and intuitive icons to strengthen the delivery of key nutritional messages. For example, clear, well-positioned nutritional panels, supported by strategic design choices like larger font sizes and enhanced colour contrast, can draw attention to important content, such as ingredients and health claims. This helps caregivers quickly identify vital information, empowering them to make more informed purchasing decisions.

Clear labelling of sugar content

Particularly important is the clear labelling of sugar content, including explicit warnings or front-of-pack indicators for high sugar levels, which helps prevent misleading perceptions about product healthiness. By highlighting this information with distinct design elements, such as bold colours or symbols, consumers can remain fully informed about a product's sugar content, supporting public health efforts to reduce excessive sugar consumption.

The present study confirms evidence published by The Food Foundation (2023) in which based on data from Action on Sugar, revealed that 97% of CBFs which are marketed for infants under 36 months had nutritional and health claims, contrary to WHO recommendations. This report specifically highlighted the ways in which CBFs present with a 'health halo' for example, suggesting a healthy food despite having a high total sugar content. Labels state that the product contains 'no added sugars', but if they are high in pureed fruit, then the process of pureeing releases sugars from plant cells which is not equivalent to the intrinsic sugar contained in whole fruits. It is not clear to what extent consumers are aware of this incongruency in product promotion.

Communicating portion sizes and feeding guidance

Clearly communicating essential information such as portion sizes and feeding guidance can significantly enhance consumer trust. Rather than relying on superficial claims, packaging should offer clear and intuitive guidance that helps parents make informed decisions about their children's nutrition. Current packaging often lacks clear instructions on appropriate feeding quantities, leading to confusion (Tang et al. 2020, 2022). To address this, designers should incorporate user-friendly features like clear icons, resealable packaging, and easy-to-read labels that simplify portion control and enhance usability. Research indicates that parents value these practical, user-friendly features and are willing to pay more for packaging that prioritizes usability (Tang et al. 2022). By focusing on both effective communication and usability, brands can demonstrate a commitment to transparency and the promotion of informed, healthier choices.

Ethical design practices

Focusing on ethical design practices—such as emphasizing nutritional information and caregivers' needs over marketing claims—reinforces transparency and builds trust between the brand and the consumer. Designers have the responsibility to ensure that food content is communicated effectively, avoiding misleading tactics that prioritize promotional messaging over clarity and honesty. Packaging should serve as a medium that informs and supports caregivers in their daily feeding practices that are beneficial for their children's nutrition and health.

Regulatory guidance for responsible packaging design

The current analysis evidenced a significant regulatory gap that allows baby food brands to employ misleading marketing strategies with minimal oversight. While the nutritional content of baby food is regulated, packaging design and promotional claims are left unchecked. Stricter quidelines are needed to prevent deceptive practices, especially in a category as sensitive as baby food. For example, mandatory front-of-pack labels, such as traffic-light systems or simplified nutritional guides, could standardize the prominence and layout of nutritional information while limiting unsubstantiated promotional claims. A successful example of such regulation can be observed in Chile, through their Law of Food Labelling and Advertising, which came into force in 2016 (Quintiliano Scarpelli et al. 2020). This law introduced mandatory black-and-white front-of-pack labels that clearly warn consumers about high levels of sugar, salt, or fat in products. As a result, consumers have been prompted to reconsider their purchasing decisions, leading to nearly a 25% reduction in sugary drink purchases within two years (Bridge, Flint, and Tench 2020). By adopting similar measures, packaging design could better align with public health objectives, supporting informed decision-making while allowing for ethical creativity.

Conclusion

This analysis of CBF packaging revealed significant insights into the implicit and explicit cues on packaging which may be incongruent with the actual content of the products. This study identified that CBF packaging often selectively presented information and emphasized certain health benefits while omitting or downplaying crucial nutritional details. These practices exploit visual and informational elements to emphasize health benefits, potentially misleading consumers, and creating a perception of healthfulness or quality that is not always supported by evidence-based nutritional guidelines. The strategic use of design elements like colour, schematic designs, imagery and visual hierarchy to prioritize claims over essential nutritional facts conflicts with public health guidelines including the standards set by the WHO.

This study has made the case for stricter regulations and greater transparency in marketing of the CBF. Policymakers, health professionals, and designers must work together to ensure that packaging design not only aligns with public health objectives but also conveys truthful and transparent product information. Additionally, the findings suggest that designers should take greater responsibility for their role in misleading the consumer. Rather than merely enhancing visual appeal for promotional purposes, designers should prioritize supporting consumers in making informed decisions, potentially affecting long-term health outcomes.

Limitations of this study include its focus on a specific region (UK), and a small sub-sample of CBFs available in the market. Thus, future research could explore how similar packaging strategies are employed in other markets across a wider span of products. Additionally, while this study focused on perceived consumer influence, future research could investigate the actual impact of these design elements on consumer behaviour to provide deeper insights into how effectively packaging misleads or informs purchasing decisions. Packaging imagery operates through both literal (e.g. photographic depictions) and symbolic or flavour-led imagery (e.g. flavour-coded icons), which respectively suggest ingredient presence and evoke sensory or emotional cues. This dual semiotic strategy may further shape caregiver perceptions and merits future research.

In conclusion, this study explored the powerful role that packaging design plays in the competitive baby food market and calls for a responsible and ethical design approach that harmonizes marketing strategies with public health standards and evidence-based nutritional guidelines. The Claims Design Framework can serve as a foundation, guiding brands and designers to communicate complex nutritional information through visual strategies that ensure transparency and potentially reduce confusion.

Note

The definition of free sugars includes: all added sugars in any form; all sugars naturally present in fruit and vegetable juices, purées and pastes and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks); and lactose and galactose added as ingredients. The sugars naturally present in milk and dairy products, fresh and most types of processed fruit and vegetables and in cereal grains, nuts and seeds are excluded from the definition.

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References

Ampuero, O., and N. Vila. 2006. "Consumer Perceptions of Product Packaging." Journal of Consumer Marketing 23 (2): 100-112. https://doi.org/10.1108/07363760610655032.

Bernal, M. J., S. Roman, M. Klerks, J. F. Haro-Vicente, and L. M. Sanchez-Siles. 2021. "Are Homemade and Commercial Infant Foods Different? A Nutritional Profile and Food Variety Analysis in Spain." Nutrients 13 (3): 777. https://doi.org/10.3390/nu13030777.



- Bozkir, C., H. Rippin, D. Threapleton, A. Morpeth, V. Jenneson, and J. Cade. 2023. "Evaluating Compliance of UK Baby Food Products with WHO Nutrient and Promotion Profile Model (NPPM) Guidelines." Proceedings of the Nutrition Society 82 (OCE5): E294. https://doi.org/10.1017/ S0029665123003932.
- Bridge, G., S. W. Flint, and R. Tench. 2020. "An Exploration of the Portrayal of the UK Soft Drinks Industry Levy in UK National Newspapers." Public Health Nutrition 23 (17): 3241–3249. https:// doi.org/10.1017/S1368980020000208.
- Chandon, P. 2013. "How Package Design and Packaged-Based Marketing Claims Lead to Overeating." Applied Economic Perspectives and Policy 35 (1): 7-31. https://doi.org/10.1093/ aepp/pps028.
- Childers, T. L., and J. Jass. 2002. "All Dressed up with Something to Say: Effects of Typeface Semantic Associations on Brand Perceptions and Consumer Memory." Journal of Consumer Psychology 12 (2): 93-106. https://doi.org/10.1207/S15327663JCP1202_03.
- Chu, R., T. Tang, and M. M. Hetherington. 2024. "The Impact of Packaging Attributes on Portion Decisions: Consumer Values Are Important." Nutrition Bulletin 49 (3): 314-326. https://doi. org/10.1111/nbu.12688.
- Conway, R., S. Esser, A. Steptoe, A. D. Smith, and C. Llewellyn. 2023. "Content Analysis of On-Package Formula Labelling in Great Britain: use of Marketing Messages on Infant, Follow-on, Growing-up and Specialist Formula." Public Health Nutrition 26 (8): 1696-1705. https://doi.org/10.1017/S1368980023000216.
- Cowburn, Gill, and, Lynn Stockley. 2005. "Consumer Understanding and Use of Nutrition Labelling: A Systematic Review." Public Health Nutrition 8 (1): 21–28. https://doi.org/10.1079/ phn2005666.
- Dewey, K. G. 2001. "Nutrition, Growth, and Complementary Feeding of the Breastfed Infant." Pediatric Clinics of North America 48 (1): 87-104. https://doi.org/10.1016/s0031-3955(05)70287-x.
- Ewbank, M. P., P. J. Barnard, C. J. Croucher, C. Ramponi, and A. J. Calder. 2009. "The Amygdala Response to Images with Impact." Social Cognitive and Affective Neuroscience 4 (2): 127–133. https://doi.org/10.1093/scan/nsn048.
- Festila, A., and P. Chrysochou. 2018. "Implicit Communication of Food Product Healthfulness through Package Design: A Content Analysis." Journal of Consumer Behaviour 17 (5): 461-476. https://doi.org/10.1002/cb.1732.
- Fligner, A. 2013. "The Effect of Packaging Typeface on Product Perception and Evaluation." Undergraduate Honors Thesis, Ohio State University, United States.
- Foundation, F. 2023. "The Broken Plate 2023: The State of the Nation's Food System." https:// foodfoundation.org.uk/publication/broken-plate-2023
- Garber, L. L., Jr, E. M. Hyatt, and Ü. Ö. Boya. 2008. "The Mediating Effects of the Appearance of Nondurable Consumer Goods and Their Packaging on Consumer Behavior." In: Schifferstein HNJ, Hekkert P, editors. Product experience. London, UK: Elsevier; 2008. p. 581-602.
- Garcia, A. L., N. Chee, E. J. Vargas-Garcia, and A. Parrett. 2024. "Survey of Emotional Themes Used in Marketing of Commercial Baby Foods in the UK—Implications for Nutrition Promotion in Early Childhood." International Journal of Environmental Research and Public Health 21 (3): 258. https://doi.org/10.3390/ijerph21030258.
- Garcia, A. L., R. Menon, and A. Parrett. 2022. "Extensive Use of On-Pack Promotional Claims on Commercial Baby Foods in the UK." Archives of Disease in Childhood 107 (6): 606-611. https:// doi.org/10.1136/archdischild-2021-322851.
- García, A. L., S. Raza, A. Parrett, and C. M. Wright. 2013. "Nutritional Content of Infant Commercial Weaning Foods in the UK." Archives of Disease in Childhood 98 (10): 793-797. https://doi. org/10.1136/archdischild-2012-303386.
- Grohmann, B. 2016. "Communicating Brand Gender through Type Fonts." Journal of Marketing Communications 22 (4): 403-418. https://doi.org/10.1080/13527266.2014.918050.
- Gürsoy, Ş. 2015. "Using Typography and Colour in Packaging Design." Global Journal on Humanities & Social Sciences 1: 521-526.
- Henderson, P. W., J. L. Giese, and J. A. Cote. 2004. "Impression Management Using Typeface Design." Journal of Marketing 68 (4): 60-72. https://doi.org/10.1509/jmkg.68.4.60.42736.

- Kahneman, D., D. Lovallo, and O. Sibony. 2011. "Before You Make That Big Decision." https:// hbr.org/2011/06/the-big-idea-before-you-make-that-big-decision
- Kelly, M., J. R. McCann, C. I. Chapple, J. Woods, and C. G. Russell. 2024. "Visual Communication Design: A Neglected Factor in Nutrition Promotion via Packaged Food Labels." Frontiers in Public Health 12: 1296704. https://doi.org/10.3389/fpubh.2024.1296704.
- Konstantoglou, A., D. Folinas, and T. Fotiadis. 2021. "Comparison of Consumers and Industry Managers concerning Food Packaging Elements." British Food Journal 123 (3): 1103-1120. https://doi.org/10.1108/BFJ-04-2020-0295.
- Kumar, J. S. 2017. "The Psychology of Colour Influences Consumers' Buying Behaviour-A Diagnostic Study." Ushus - Journal of Business Management 16 (4): 1–13. https://doi.org/10.12725/ uibm.41.1.
- Lowry, P. B., D. W. Wilson, and W. L. Haig. 2014. "A Picture Is Worth a Thousand Words: Source Credibility Theory Applied to Logo and Website Design for Heightened Credibility and Consumer Trust." International Journal of Human-Computer Interaction 30 (1): 63–93. https:// doi.org/10.1080/10447318.2013.839899.
- Nascimento, A. G., B. S. Toledo, J. T. Guimarães, G. L. Ramos, D. T. da Cunha, T. C. Pimentel, A. G. Cruz, M. Q. Freitas, E. A. Esmerino, and E. T. Mársico. 2022. "The Impact of Packaging Design on the Perceived Quality of Honey by Brazilian Consumers." Food Research International 151: 110887. https://doi.org/10.1016/j.foodres.2021.110887.
- NHS. 2002. "Why 5 A Day?" Accessed Oct 2025. https://www.nhs.uk/live-well/eat-well/5-a-day/ why-5-a-day/
- Northstone, K., P. Emmett, F. Nethersole, and A. S. Team. 2001. "The Effect of Age of Introduction to Lumpy Solids on Foods Eaten and Reported Feeding Difficulties at 6 and 15 Months." Journal of Human Nutrition and Dietetics 14 (1): 43–54. https://doi.org/10.1046/j.1365-277x.2001.00264.x.
- Orth, U. R., and K. Malkewitz. 2008. "Holistic Package Design and Consumer Brand Impressions." Journal of Marketing 72 (3): 64-81. https://doi.org/10.1509/JMKG.72.3.064.
- Pattison, T., R. Vernik, and M. Phillips. 2001. Information Visualisation Using Composable Layouts and Visual Sets. Edinburgh: DSTO Electronics and Surveillance Research Laboratory.
- Pensasitorn, W. 2015. "The Use of Images in Graphic Design on Packaging of Food and Beverages." Journal of Economics, Business and Management 3 (12): 1159-1163. https://doi.org/10.7763/ JOEBM.2015.V3.351.
- Poffenberger, A. T., and R. Franken. 1923. "A Study of the Appropriateness of Type Faces." Journal of Applied Psychology 7 (4): 312-329. https://doi.org/10.1037/h0071591.
- Quintiliano Scarpelli, D., A. C. Pinheiro Fernandes, L. Rodriguez Osiac, and T. Pizarro Quevedo. 2020. "Changes in Nutrient Declaration after the Food Labeling and Advertising Law in Chile: A Longitudinal Approach." Nutrients 12 (8): 2371. https://doi.org/10.3390/nu12082371.
- Rebollar, R., I. Lidón, I. Gil-Pérez, and J. Martín. 2019. "How Should I Tell You This? The Effects of the Image Used to Convey That a Natural Yogurt Is Sweetened on Consumer Expectations and Willingness to Buy." Food Research International 126: 108721. https://doi.org/10.1016/j. foodres.2019.108721.
- SACN UK. 2015. "Scientific Advisory Committee on Nutrition Carbohydrates and Health." Accessed May 2024. http://www.gov.uk/government/uploads/system/uploads/attachment_data/ file/445503/SACN_Carbohydrates_and_Health.pdf. https://doi.org/10.1016/j. foodres.2019.108721.
- Schifferstein, H. N. J., A. de Boer, and M. Lemke. 2021. "Conveying Information through Food Packaging: A Literature Review Comparing Legislation with Consumer Perception." Journal of Functional Foods 86: 104734. https://doi.org/10.1016/j.jff.2021.104734.
- Schifferstein, H. N., M. Lemke, and A. de Boer. 2022. "An Exploratory Study Using Graphic Design to Communicate Consumer Benefits on Food Packaging." Food Quality and Preference 97: 104458. https://doi.org/10.1016/j.foodgual.2021.104458.
- Silayoi, P., and M. Speece. 2007. "The Importance of Packaging Attributes: A Conjoint Analysis Approach." European Journal of Marketing 41 (11/12): 1495–1517. https://doi.org/ 10.1108/03090560710821279.



- Statista. 2023. "Baby Food: market Data & Analysis." https://www.statista.com/study/48837/ baby-food-market-data-and-analysis/
- Synnott, K., J. Bogue, C. A. Edwards, J. A. Scott, S. Higgins, E. Norin, D. Frias, S. Amarri, and R. Adam. 2007. "Parental Perceptions of Feeding Practices in Five European Countries: An Exploratory Study." European Journal of Clinical Nutrition 61 (8): 946-956. https://doi.org/10.1038/ sj.ejcn.1602604.
- Tang, T., L. R. Chawner, R. Chu, C. Nekitsing, and M. M. Hetherington. 2022. "Downsizing by Design-Investigating Acceptance, Choice and Willingness to Pay for Portion Control Design Concepts." Food Quality and Preference 96: 104434. https://doi.org/10.1016/j.foodqual.2021.104434.
- Tang, T., W. Wang, F. Croden, M. Vazirian, and M. M. Hetherington. 2020. "Wrap Healthy Snacks with Cool Packaging"-A Qualitative Study of Mothers' Portion Size Strategies for Their Children." Appetite 147: 104537. https://doi.org/10.1016/j.appet.2019.104537.
- Threapleton, D. 2023. Nutrient Profile and Promotion Model Baby Food-Stata Code. Leeds: University of Leeds.
- Van Ooijen, I., M. L. Fransen, P. W. Verlegh, and E. G. Smit. 2016. "Atypical Food Packaging Affects the Persuasive Impact of Product Claims." Food Quality and Preference 48: 33-40. https://doi.org/10.1016/j.foodgual.2015.08.002.
- Vila-López, N., I. Küster-Boluda, and F. Sarabia-Sánchez. 2017. "Designing a Packaging to Promote Healthy and Low-Fat Foods: Adolescents versus Young-Adults." Food Research International 99 (Pt 1): 815-820. https://doi.org/10.1016/j.foodres.2017.06.063.
- Westerman, S. J., E. J. Sutherland, P. H. Gardner, N. Baig, C. Critchley, C. Hickey, S. Mehigan, A. Solway, and Z. Zervos. 2013. "The Design of Consumer Packaging: Effects of Manipulations of Shape, Orientation, and Alignment of Graphical Forms on Consumers' Assessments." Food Quality and Preference 27 (1): 8-17. https://doi.org/10.1016/j.foodqual.2012.05.007.
- White, M. D., E. E. Marsh, E. E. Marsh, and M. D. White. 2006. "Content Analysis: A Flexible Methodology." Library Trends 55 (1): 22-45. https://doi.org/10.1353/lib.2006.0053.
- World Health Organization, 2023, WHO Guideline for Complementary Feeding of Infants and Young Children 6-23 Months of Age. Geneva: World Health Organization.
- WHO. 2015. "World Health Organization Guideline: Sugars Intake for Adults and Children." Accessed May 2024. https://iris.who.int/bitstream/10665/149782/1/9789241549028_eng. pdf?ua=1.
- WHO. 2022. "Nutrient and Promotion Profile Model: Supporting Appropriate Promotion of Food Products for Infants and Young Children 6-36 Months in the WHO European Region." In Nutrient and Promotion Profile Model: supporting Appropriate Promotion of Food Products for Infants and Young Children 6-36 Months in the WHO European Region. Geneva: World Health Organization.