

Content analysis of breast milk substitutes marketing on Chinese e-commerce platforms

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Abstract

China has the largest and fastest-growing breast milk substitutes (BMSs) market and a disproportionately low exclusive breastfeeding rate. Many BMS manufacturers have established Chinese e-commerce stores. This marketing is of concern as it is likely to undermine breastfeeding. This study aimed to identify: (1) the marketing themes and strategies used to promote BMSs on the Chinese BMSs e-commerce websites; (2) if and how digital BMSs marketing may deviate from the World Health Organization Code of Marketing of Breast Milk Substitutes (the Code) recommendations. Content analysis was conducted on the flagship websites of 10 BMSs companies on the Chinese e-commerce platform “TMall” in July 2019. The main landing page ($n = 10$) of the flagship TMall website and the product description page ($n = 113$) of all individual formulas (Stages 1–3) within each company's TMall website were examined. The content was analysed and coded using an iterative thematic analysis approach. Emphasis on Premiumization and Science & Nutrition was the most commonly used marketing approaches. A total of 27.4% of the product description pages sampled used images of infants (<12 months), 33.6% made favourable comparisons of BMSs to breast milk, and only 34.5% included probreastfeeding statements. Marketing strategies were often inconsistent with the Code, and companies used “creative” ways to target mothers, often circumventing the Code recommendations. Unsubstantiated information was commonplace and of concern, because the e-commerce platform provided easy opportunities for bulk purchases. National regulatory actions are urgently needed to monitor online BMS marketing and the undermining of breastfeeding in China.

KEYWORDS

breastfeeding, breast milk substitutes, e-commerce, food policy, health promotion, marketing, public health

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1 | INTRODUCTION

Exclusive breastfeeding (EBF) is strongly recommended by the World Health Organization (WHO, 2011) for its impact on reduced infant morbidity and mortality, lower risk of childhood obesity and improved child cognitive development (Victora et al., 2016; Duan et al., 2018). In addition, for women, it reduces the risk of type 2 diabetes as well as ovarian and breast cancer (Victora et al., 2016). China has a very low rate of EBF—around 29% in 2019 (China Development Research Foundation, 2019) and a median breastfeeding duration is 8.6 months (Wu et al., 2021). By contrast, other middle-income countries like India and Brazil have much higher EBF rates, with 55% (estimated in 2015) and 41% (estimated in 2008), respectively (The World Bank, 2019), and longer breastfeeding duration (Neves et al., 2021). In China, the early introduction and marketing of breast milk substitutes (BMSs), often times referred to as infant formula, were found to be one of the most common factors for the discontinuation of EBF (Guo et al., 2013). BMSs are ultra-processed commercial milk formulas that include products for infants and toddlers that displace breastfeeding. Perceived breast milk insufficiency, employment status, and maternal and child illness were among the main reasons for mothers to cease breastfeeding (Xu et al., 2009). Globally, marketing practices of BMS have been found to influence mothers' breastfeeding decisions (Piwoz & Huffman, 2015).

In 1981, in response to documented aggressive promotion of BMS and the associated increase in infant mortality in some regions, the 34th World Health Assembly (WHA) adopted the WHO International Code of Marketing for BMS (the Code; WHO, 1981). The purpose of the Code is to protect and promote breastfeeding, and other recommended infant feeding practices through restricting inappropriate and intrusive marketing of BMS (WHO, 1981). WHA34.22(21) resolution emphasises that all countries should adopt and adhere to the Code and subsequent related WHA Resolutions, and it should be implemented “in its entirety” (Thirty-fourth World Health Assembly, 1981). China introduced the Code and included most of the provisions in 1995 through the “Management Measure of Marketing of Breast-milk Substitutes” national law (1995). However, the 2018 Code Implementation Report found that China had implemented few provisions and was one of the few countries that took “retrogressive steps” (WHO, 2018). This was because national legal measures had been repealed in 2017 without any alternative measures to hold BMS manufacturers legally accountable.

At this moment, there is only a voluntary code of conduct established by the China Advertising Association in 2016 and updated in 2019 (China Advertising Association, 2016). This lack of regulation enables the BMS manufacturers and distributors to disregard Code regulations and standards (Robinson et al., 2019).

The global BMS industry market is projected to reach USD 90 billion by 2025, representing a 9.35% increase from 2017 (Cooper, 2019), with the largest growth in middle-income countries. China has already surpassed the United States and become the world's largest market for infant formula with an estimated market value of USD 23 billion in 2017 (ASKCI Consulting, 2018), accounting for one-third of

Key messages

- China is the largest market for breast milk substitutes (BMSs) and has a disproportionately low exclusive breastfeeding rate.
- E-commerce platforms are becoming a popular channel of BMSs marketing and bulk purchases.
- Marketing BMS messages focus heavily on claims for improved child health and development outcomes that are oftentimes not backed up by scientific evidence.
- There is an urgent need for national actions to monitor online BMSs marketing and reestablish regulatory policies that enforce the World Health Organization Code for Marketing of BMSs in China.

the global market (Robinson et al., 2019). The baby food industry has dedicated an overwhelming amount of resources to online marketing strategies for BMS brands and products (Euromonitor International, 2016).

A Save the Children's report (2019) documented that BMS manufacturers have invested heavily in “targeted digital marketing programs” to attract new parents' attention online. The Chinese BMS market is expected to continue its growth with the surge of the infant population due to the replacement of the one-child policy with a universal two-child policy in 2015 (Zeng & Hesketh, 2016). In addition, many BMS manufacturers and distributors have started to utilise online platforms as new marketing and distribution channels, leveraging the deep and growing penetration of the e-commerce market in China (Hoffmann & Lannes, 2013). In fact, China has the largest Business to Consumer (B2C) e-commerce activities in the Asia-Pacific region and contributes to over one-third of the global e-commerce sales (eshopworld, 2018; Li et al., 2019). The widespread practice of online shopping coupled with the lack of e-commerce marketing regulation in China positions e-commerce sites as effective modes for BMS marketing practices that are relatively inexpensive and beyond scrutiny and accountability. The e-commerce websites are often the main marketing distribution centre for BMS companies to directly provide consumers with education and additional product information, an aspect of promotion which falls within the scope of the Code (*Article 4: Information and education; Article 9: Labeling*; WHO, 1981). A study that examined how pregnancy and parenting smartphone apps are used to promote BMS products in China also found that 75 out of 79 apps investigated linked directly to an e-commerce site (Zhao et al., 2019). Hence, unregulated BMS online marketing is expected to negatively impact breastfeeding practices (Robinson et al., 2019; Zhang et al., 2013).

Recent research has examined BMS traditional online marketing practices by manufacturers and distributors (Berry & Gribble, 2017; Ching et al., 2021; Pomeranz et al., 2021), yet none focused on Chinese BMS marketing practices on e-commerce platforms, nor if or how online BMS marketing may comply with

Code provisions. Hence, this study aimed to identify: (1) the marketing themes and strategies used to target consumers on the Chinese BMS e-commerce websites; (2) compliance of digital BMS marketing to Code recommendations. It is hoped that this study will inform effective and sustained mechanisms and monitoring to strengthen legislation and the enabling environments to protect and promote breastfeeding in China.

2 | METHODS

2.1 | Design

The content analysis methodology was used to systematically examine a large amount of visual and textual information through coding frameworks to identify thematic trends and patterns (Berry & Gribble, 2017). Content analysis was conducted on the flagship websites of the 10 BMS companies with the largest sales volume (shown on Tmall website) on the

largest Chinese e-commerce platform (Tmall). This study incorporated both quantitative and qualitative techniques. The quantitative approach consisted of describing the frequency of different outcomes, including thematic appeals, deviations from the Code articles, and types of images used. The qualitative data, such as specific texts and language used, were extracted to provide more context and to examine in-depth the marketing appeals and strategies. This study did not require IRB approval because all data were publicly available information without any personal identification variables.

2.2 | Data sampling and collection

All data were collected from Tmall in July 2019. Flagship websites of BMS companies were searched using the keyword "infant formula" on Tmall (Figure 1). The websites of the top five domestic and top five foreign BMS companies that control the vast majority of the BMS market in China websites were identified using the sort by

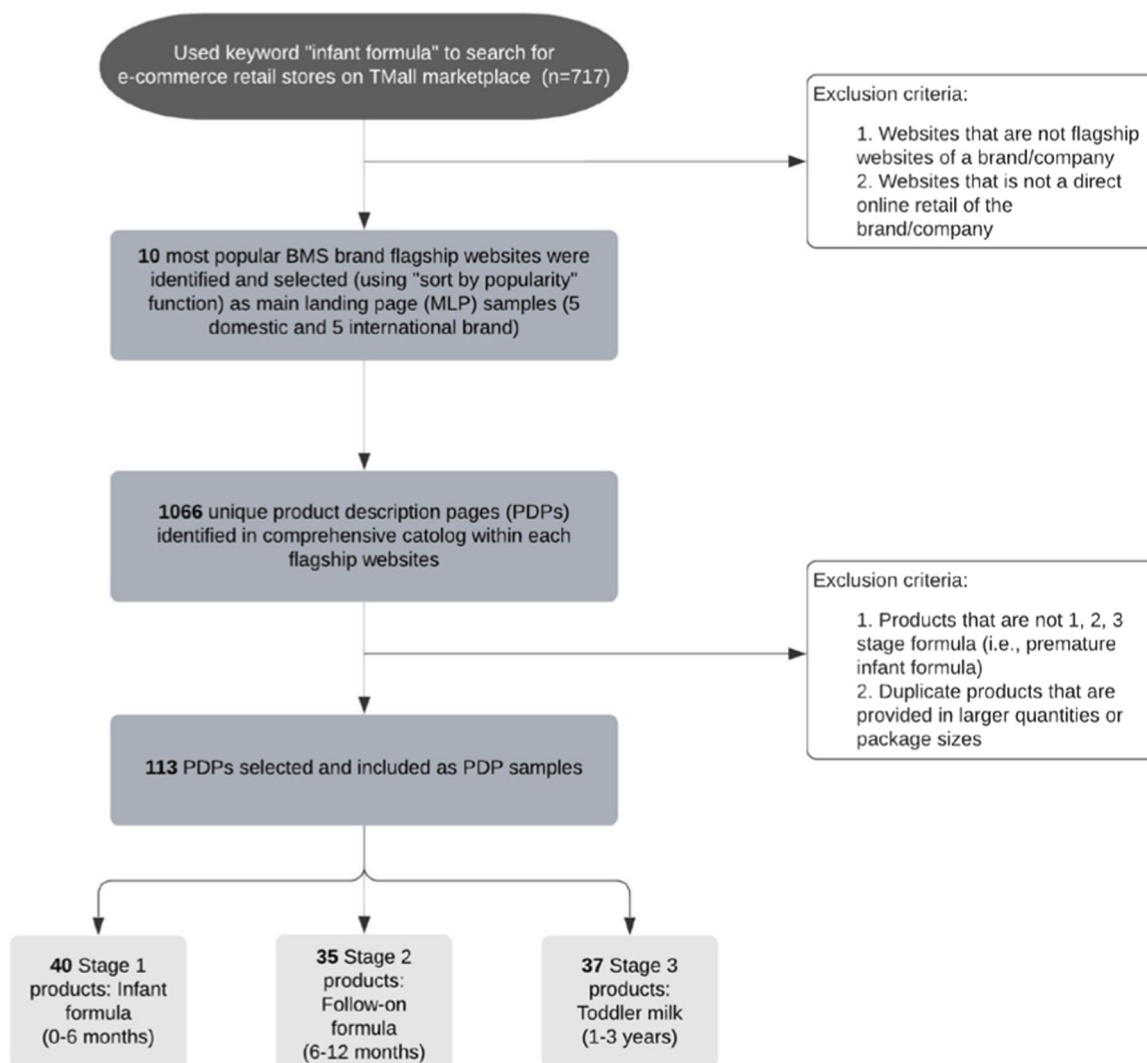


FIGURE 1 Selection of MLP and PDP samples on Tmall e-commerce platform. BMS, breast milk substitute

“popularity” function available within Tmall. The main landing page (MLP) and the corresponding product description page (PDP) was identified and analysed for each website. First, the MLP was captured ($n = 10$); then, the PDP of all unique individual formula products (Stages 1–3) listed in the comprehensive catalogue of each e-commerce site was identified ($n = 113$). Products that were not categorised as Stages 1–3, such as prenatal or premature infant formulas, were excluded. To avoid duplicate sampling, when the same product was listed in separate PDPs in different volume units, the PDP with the smallest size was included in the analysis. This was done to avoid overrepresenting the same product from the same company. All webpages were accessed using the browser Google Chrome, captured with a Chrome extension (“Full Page Screen Capture”), and downloaded as PDF files during the 1 month of July 2019.

2.3 | Coding and data analysis

Coding was developed and adapted based on previous studies that analysed the content of web-based marketing of children's food (Hebden et al., 2011; Kelly et al., 2008) and BMS (Zhao et al., 2019). Two separate codebooks were created to categorise marketing techniques used on the MLP and PDP within each company's website (see Supporting Information Appendix A).

2.4 | Main landing page

Two native Mandarin Chinese-speaking researchers (SH and HC) independently coded all 10 MLPs using the same codebook. The MLP was separated into two sections, primary and secondary displays, based on the location of the information on the webpage. The primary display included the main content that comes first into sight when opening the webpage without scrolling; the secondary display included the rest of the webpage content scrolling down. This distinction was made because the content on the primary display is expected to have a more direct impact on the audience due to its prime location. By contrast, the secondary display consists of smaller units that can be easily distinguished by their section headlines.

Website characteristics and marketing themes in both primary and secondary displays were coded independently by each researcher viewing the downloaded PDF samples. MLP intercoder agreement was very strong (93.3%), and disagreements were resolved through a consensus iterative process among the coders. A third researcher (Rafael Pérez-Escamilla) was brought as needed to reach final consensus. The variables coded included the following:

1. *Marketing appeals* (defined in Supporting Information Appendix B): Nine marketing “appeals” were identified in formative work. The three most frequent appeals in the primary and secondary displays were noted. The exact Chinese characters and images used to portray the appeals were documented and captured.

2. *Other marketing characteristics*: That is, membership information, breastfeeding promotion, and human images.

2.5 | Product description page

Each PDP sample was coded using its unique codebook (Supporting Information Appendix A). Information on the following three domains of information was collected:

1. *Basic product information*: Product name, brand, brand variant, product stage, unit price, country of origin, monthly numbers of sale, and number of comments.
2. *Marketing appeals*: The presence of the nine marketing appeals and their subcategories (see Table 2); the exact Chinese characters used to portray each appeal, promotion of breastfeeding superiority, and comparison with breast milk.
3. *Images used*: Celebrities, parents, infant (<12 months old), child, fictional characters, animals, and other imageries.

All 113 PDPs were coded by SH; a 25% randomly selected sample was independently evaluated by HC ($n = 28$), this number of samples was sufficient for both coders to reach standardisation. Indeed, PDP's intercoder agreement was high (85.2%). Disagreements were resolved through an iterative consensus approach. The specific contexts of marketing appeal and code violations, including text and images used, were also recorded in Excel for further thematic analysis. The coded data were analysed using MS Excel to generate descriptive results.

3 | RESULTS

3.1 | Descriptive characteristics

3.1.1 | General characteristics

The websites of five International companies (1-Abbot, 2-Mead Johnson, 3-Nestle [NAN], 4-Danone, 5-Wyeth [Illuma]) and five Chinese-owned companies (6-Junlebao, 7-Yili, 8-Feihe [Firmus], 9-Beingmate, 10-Health & Happiness [Biostime]) were evaluated. Among the 113 PDP sampled, 40 (35%) was infant formula (Stage 1), 35 (31%) was follow-on formula (Stage 2), and 37 (33%) was toddler milk (Stage 3). Supporting Information Appendix C shows all brands, brand variants, and product stages evaluated, including the corresponding averages of the price (CNY/gram), number of sales, and number of comments from customers.

3.1.2 | Main landing page

Figure 2 illustrates the frequency of the nine marketing appeals in the 10 MLP coded. The appeals *Premiumization* (i.e., statements assuring the quality of their products) and *Science & Nutrition*, and *Economic*

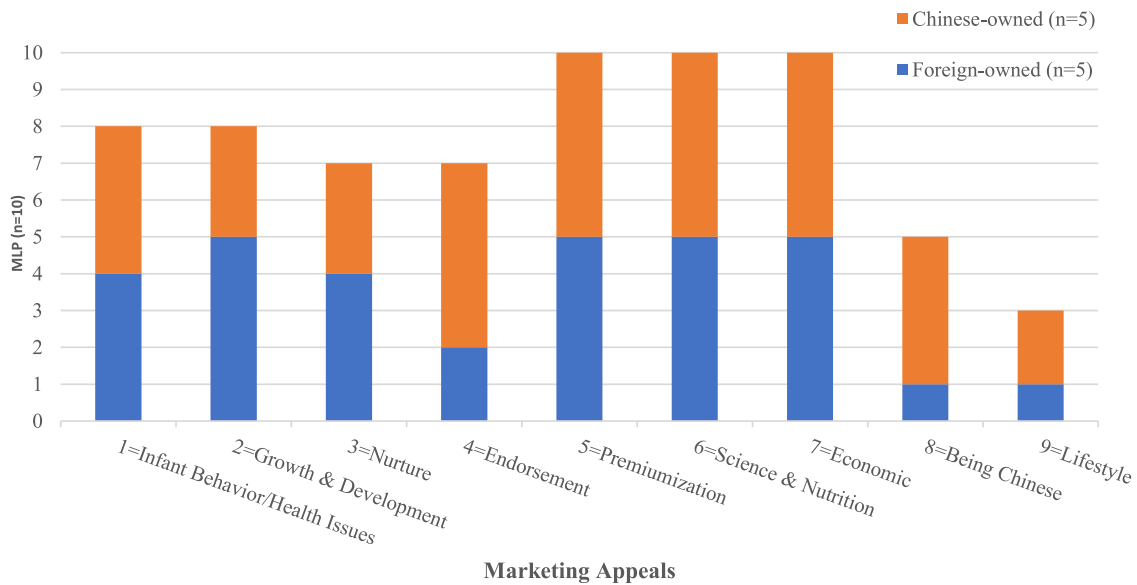


FIGURE 2 Marketing Appeals on Tmall Main Landing Page (MLP) of 10 Companies

were present in all 10 MLPs. *Lifestyle* marketing appeals were observed in 3 (30%) of the 10 MLPs. An emphasis on *Growth & Development* was found in the MLPs of all five international companies. Likewise, the *Endorsement* marketing appeal was used in the MLPs of all five Chinese-owned companies. The *Chinese identity* appeal was frequently found in the MLPs of Chinese-owned companies ($n = 4$ of 5, 80%) compared with those of the international companies ($n = 1$ of 5, 20%).

Table 1 presents an overview of the top marketing appeals used on each MLP. Overall, the commonest marketing appeals were *Premiumization*, *Science & Nutrition* and *Economic*. Promotions (discounts and/or gift bundles) for new customers were observed in all MLPs. Most companies ($n = 8$, 80%) also offered membership benefits (discounts and/or gift bundles). Of the 10 companies sampled, 5 (50%) included some mention of breastfeeding promotion (i.e., support for breastfeeding). Only one of those included breastfeeding content that explicitly endorsed the WHO recommendation of EBF for the first 6 months. Images of human characters were displayed in 7 (70%) of the 10 MLPs, six of the main characters used were Chinese celebrities and the other character was a young Caucasian child between the age of 1 and 3 years. All Chinese-owned companies used celebrity endorsement on their MLPs, with well-known Chinese celebrity mothers and fathers, including one actress with the most followed account on the social media site Weibo (Weibo Followers Ranking, n.d.; Xie Na's Weibo, n.d.).

3.1.3 | Product description page

Table 2 shows the frequency of the subcategories of the nine marketing appeals used in the product descriptions as well as other variables, such as potential code deviations and the use of visual images. *Science & nutrition* was the most frequently used marketing appeal observed in 111 (98.2%) of the 113 PDPs,

followed by *Premiumization* ($n = 106$, 93.8%) and *Endorsement* ($n = 106$, 93.8%) appeals. More than half of the PDPs made reference to *Growth & Development* ($n = 69$, 61.1%), *Infant behaviour & health* ($n = 64$, 56.6%), *Nurturing* ($n = 61$, 54.0%) and *Lifestyle* ($n = 59$, 52.2%) appeals. Less than half of the PDPs included marketing appeals relating to *Economic* ($n = 45$, 39.8%) and *Chinese identity* ($n = 54$, 47.8%).

The nine marketing appeals were organised and coded into subcategories (Supporting Information Appendix B). The most frequent appeal subcategory identified was "... added nutrient constituents," in which 103 (90.3%) of all PDPs included marketing claims regarding nutritional benefits (*Science & Nutrition*). A total of 89 (78.8%) focused on (*Premiumization*), 76 (67.3%) highlighted their product as foreign-made or made with imported ingredients (*Premiumization*) and 70 (61.9%) suggested that research and innovation were employed in the product's development and manufacture processes (*Science & Nutrition*). Other prominent subcategories included an emphasis on "physical growth" ($n = 52$, 46.0%), "trust" ($n = 51$, 45.1%), "endorsement from community members" ($n = 46$, 40.7%), "breast milk research" ($n = 46$, 40.7%) and "nature" ($n = 44$, 38.9%). In addition, more than half of all PDPs used images of children ($n = 67$, 59.3%). Other images used included parent figures ($n = 23$, 20.4%), celebrities ($n = 19$, 16.8%) and animals, mostly dairy cattle ($n = 21$, 18.6%).

Adherence to three components of the Code, that is, *Article 4* and *Article 9*, was measured, including (1) *statement of the superiority of breastfeeding*, (2) *prohibition of using pictures of infants (<12 months)* and (3) *using terminologies that makes a comparison with breast milk like "humanised" and "materialised."* Among the 113 PDPs, 39 (34.5%) mentioned and/or endorsed breastfeeding. However, only 11 (9.7%) of those provided details regarding the superiority of EBF for the first 6 months. Also, 38 (33.6%) samples inferred comparisons with and similarities to breast milk, and 31 (27.4%) samples used images of infants (<12 months) in their product descriptions, representing a code deviation.

TABLE 1 Marketing elements of each Tmall main landing page (MLP)

Parent company	Most frequent marketing appeal			Image: Character	Membership promotion	New customer promotion	Headline slogans
1 = Abbot ^a	5	6	7	x ^c	x QR code	x	Double protection, focus on good health
2 = Mead Johnson ^a				x	x link	x	Explore the new world, grow without limits
3 = Nestle (Nan) ^b	1	6	7		x tab	x	Professional protection, guarding more potentials
4 = Danone ^a	5	6	7		x link	x	Pure source of milk, quality assurance and tracking
5 = Wyeth (Illuma) ^b	5	6	7			x	Human-friendly formula
6 = Junlebao	2	3	6	x ^c		x	For the more comfortable growth of babies
7 = Yili	4	5	7	x ^c	x tab	x	Deals all summer, starting from 20% off
8 = Feihe (Firmus)	4	5	8	x ^c	x tab	x	More suitable for the body of Chinese babies
9 = Beingmate	5	6	7	x ^c	x	x	Cheering with all people, witnessing the glory of champions
10 = H&H (Biostime)	5	6	7	x ^c	x	x	New upgrades, guarding babies

Note: Marketing appeal theme: 1 = Infant Behaviour & Health; 2 = Growth & Development; 3 = Nurturing; 4 = Endorsement; 5 = Premiumization; 6 = Science & Nutrition; 7 = Economic; 8 = Chinese Identity; 9 = Lifestyle.

^aForeign-owned company.

^bWHO Recommendation of exclusive breastfeeding for at least 6 months.

^cCelebrity used as the main character.

TABLE 2 Frequency of marketing appeals mentions and other marketing aspects in product description page (PDP)

	Frequency n (%) ^a (N = 113)
<i>Marketing appeals</i>	
1 = Infant Behaviour & Health	64 (56.6)
Undesirable behaviours	32 (28.3)
Digestion	43 (38.1)
Specific disease, disorder, condition	25 (22.1)
Other	20
2 = Growth & Development	69 (61.1)
Brain development	29 (25.7)
Physical growth	52 (46.0)
Aspiration	16 (14.2)
Other	16
3 = Nurturing	61 (54.0)
Love from mother	27 (23.9)
Quality time	3 (2.7)
Protection	42 (37.2)
Other	6
4 = Endorsement	83 (73.5)
Celebrity	27 (23.9)
Community	46 (40.7)
Authority	35 (31.0)
Other	34
5 = Premiumization	106 (93.8)
Quality-assurance	89 (78.8)
Foreign-made	76 (67.3)
Nature	44 (38.9)
Trust	51 (45.1)
Other	84
6 = Science & Nutrition	111 (98.2)
Breast milk research	46 (40.7)
Added nutrient constituents	102 (90.3)
Research & Innovation	70 (61.9)
Other	4
7 = Economic	45 (39.8)
Membership	17 (15.0)
Promotional events	25 (22.1)
New customer benefits	12 (10.6)
Other	11
8 = Chinese Identity	54 (47.8)
Chinese babies	36 (31.9)

(Continues)

TABLE 2 (Continued)

	Frequency n (%) ^a (N = 113)
Nationalism	6 (5.3)
Chinese parents	15 (13.3)
Other	4
9 = Lifestyle	59 (52.2)
Popular trend	16 (14.2)
Personalisation	18 (15.9)
Convenience	44 (38.9)
Other	4
<i>Other marketing aspects</i>	
<i>Marketing regulation</i>	
General breastfeeding promotion	39 (34.5)
Who recommendation breastfeeding promotion	11 (9.7)
Use of infant image (<12 months)	31 (27.4)
Comparison to breast milk	38 (33.6)
<i>Images</i>	
Celebrity	19 (16.8)
Normal parents	23 (20.4)
Children	67 (59.3)
Animals	21 (18.6)
Other	74

^aTotal could be >100% due to multiple marketing aspects displayed in the same product.

3.2 | Detailed content analysis

3.2.1 | Marketing appeals

A qualitative analysis examined how companies were using the different marketing appeals to promote their products and how this could potentially mislead and influence mother's infant feeding perceptions and behaviours.

3.2.2 | Premiumization

Premiumization was a top appeal used among all samples of e-commerce websites. The main technique used for premiumization was "quality assurance," through emphasising the safe and closely monitored supply chain, manufacturing, quality screening and product transportation processes. For instance, cold chain logistics for product transportation and the British Retail Consortium (BRC) Food Safety certification were mentioned in many product descriptions. Interestingly, most product

descriptions also ensured quality by calling attention to the traceability of the supply chain through the QR code on the product package.

Provides safe, trusted nutrition for infants and young children in more than 40 countries and regions with globally unified quality. Wyeth-Illuma, Stage 1

Another prevalent premiumization technique was to highlight the foreign-made aspects of the product. Many product descriptions included images of foreign scientists and the world map to present their product as “foreign-made.” Specifically, for products that were manufactured and packaged abroad, this was often emphasised with claims, such as “imported with original packaging.” Even when only the ingredients of the formula were imported, many still marketed their product as “100% imported ingredients.” France, Ireland and the Netherlands were the most referenced countries, often paired with descriptors, like, “high quality,” “royal” and “natural.” Remarkably, even the latitude of the grasslands in China where milk was sourced was compared with grasslands in European countries and promoted as a positive characteristic.

Quality dairy farmland on Latitude of 38° North. “Original quality”—aggregated from the international supply of raw materials. Junlebao, Stage 1

3.2.3 | Science & Nutrition

MLP and PDP also used the appeal of *Science & Nutrition* to promote products, with “added nutrient constituents” as the most frequently used marketing technique. The commonly referenced nutrient constituents include but are not limited to docosahexaenoic acid (DHA), arachidonic acid (ARA), zinc, vitamin C, iron, calcium, choline, lutein, prebiotic GOS/FOS mixture, and OPO (Oleic and Palmitic Fatty Acid Structure) lipid. Most nutritional claims were associated with other appeals, specifically *infant behaviour & health issues* and/or *growth & development appeals*. For instance, one PDP made this list of claims next to its ingredient list:

LPN® whey protein—The precious active protein in breast milk, activates an infant's natural protection.

Lactose—Enhances the digestive system, helps the absorption of calcium.

Choline—Improves neural response sensitivity, aids recognition and memory.

DHA ARA—helps the development of an infant's brain and vision.

SN-2 PLUS + Natural lipid—Similar to breast milk's golden ratio of lipid, balanced and high affinity for good absorption. Biostime, Stage 1

Important to note, some PDPs emphasised and marketed their products based on “breast milk research” and made nutritional comparisons with breast milk. For instance, the PDP of Feihe Firmus' Stage 2 product cited that breast milk served as the inspiration of their milk formula research and that the product contains OPO-structured lipid, “serving as a continuation of breast milk nutrients.” Additionally, H&H Biostime announced their dedication to breast milk research of Chinese mothers:

Concentrated on the research of Chinese breast milk for 17 years, collected more than 6,500 breast milk samples, studied more than 1 million breast milk data, and released the “China Breast Milk Research White Paper.”

and cited clinical trial results that compared milk products with breast milk:

3 authority clinical trials proving that SN-2 Plus feeding effects (infant's height, weight, lactobacillus count, and stool color were similar to those of the breast milk. H&H Biostime, Stage 1

The scientific basis of products was emphasised in many other forms, such as citing academic literature, claiming partnerships with international laboratories and showcasing established patents for their innovative formula.

3.2.4 | Endorsement

Community endorsement was the most used subcategory within the *Endorsement* appeal, specifically characterised by showing the support for the product through mothers' testimonials. In the Mead Johnson product testimonial, one mother was quoted:

My baby has used this formula since the day of birth! Good digestion and no constipation, with great development and good health!—Mead Johnson mother

3.2.5 | Testimonials endorsed buying in bulk

Buying bulk from the flagship website is not only convenient but also trustworthy as the products are all authentic.—Mead Johnson mother. Mead Johnson, Enfagrow, Stage 1

Endorsements from online maternal and community platforms, such as Baidu, Babytree and PCbaby, were used in PDPs of both Mead Johnson and H&H Biostime.

The endorsements included highly visible individuals, such as Chinese celebrity mothers (Xie Na, Kun Ling and Zhang Ziyi), fathers (Tian Liang and Liu Ye) and an Olympian swimmer (Sun Yang).

3.2.6 | Growth & Development

Physical growth was the subcategory most frequently used in the appeal of *Growth & Development*. Healthy *Growth & Development* of bones, vision, teeth and immune systems was the main focuses. The subcategory of brain development was linked with added nutrients, like, DHA and ARA, stating to facilitate the development of neural pathways, vision, memory and emotional intelligence. Product descriptions of Mead Johnson's Enfagrow Stage 1 formula stated that:

In the golden 1000 days of brain development, it is very important to supplement DHA. Mead Johnson, Enfagrow, Stage 1

The above claim may suggest that DHA-enriched infant formula is essential for their child to achieve normal brain development in the critical first 1000 days of life.

3.2.7 | Infant Behaviour & Health Issues

Within the marketing appeal of *infant behaviour & health issues*, the subcategory of digestive health was largely targeted in the product descriptions. Many promoted the ability of their product to care for an infant's digestive system and allow their stomach to be more "in comfort." Better absorptions of nutrients, growth of probiotics and softer stools were also commonly cited benefits.

More than a quarter of the samples examined directly referenced "undesirable behaviours" of infants, inferring that their products could reduce these behaviours. Products were marketed with remarks of improving appetite, regulating emotions and sleep, and alleviating constipation. Normal infant behaviours, including regurgitation, crying and hunger, were presented as problems or abnormal conditions that could be alleviated by their products.

Help belly return to comfort. Gentlease "micro" protein formula:

defecation frequency—continuous improvement, crying time—33% reduction, anxiety—31% reduction, possetting frequency—36% reduction, excessive gas—26% reduction, stool shape—continued softness. Mean Johnson, EnfaGentlease, Stage 1

3.2.8 | Chinese identity

Many product descriptions were targeting the "Chinese identity" of consumers. In the product description of its Enfagrow Stage 2 formula, Mead Johnson marketed that they "accompanied the healthy growth of Chinese babies for 25 years" and that they are dedicated to the mission of "creating good nutrition that is more suitable for Chinese babies." Similarly, Yili, a Chinese-owned company, stated both on their MLPs and PDPs that they have conducted "17 years of nutrition research specifically for Chinese babies." Danone further expanded the "Chinese identity" notion to appeal to parents:

Nutrilon (Netherlands) together with millions of Chinese parents, embraces nature and assists the growth of Chinese babies. Danone, Nutrilon, Stage 1

Furthermore, culturally specific messages were also included, such as traditional Chinese medicine health concepts like "excessive heat" in the body and developing a "light taste preference" [Danone, Nutrilon, Stage 1].

3.2.9 | Other themes

Many of the MLPs and PDPs displayed links to external websites that aim to provide more information and attract consumers; these include member centres, infant feeding Q&A and "expert" consulting services. For instance, Yili, in one of its Stage 2 product descriptions, offered membership benefits of parenting education and one-on-one consulting service with a "medical professional."

A higher density of information describing Stages 2 and 3 products, comparing to those of Stage 1, was noted. There were also more promotional discounts and gifts for Stages 2 and 3 products, including new customer coupons and toys for children. It is important to note that most Stages 1–3 products within a brand share nearly identical packaging elements, including colour, visual themes and nutritional claims.

3.2.10 | Adherence to and potential deviations from code recommendations

The superiority of breastfeeding

Out of all of the companies sampled ($n = 10$), Nestle, Wyeth and Yili were the only companies that included breastfeeding promotion in all of their PDP samples. However, most of the breastfeeding comments were in small fonts located in the corner of the page and were brief, such as "we advocate for breastfeeding." Only Nestle and Wyeth included the WHO recommendation for EBF for at least 6 months in some but not in all of their PDPs. In most of Wyeth's PDPs, an image of an infant <12 months was placed right next to the WHO

recommendation of EBF. Beingmate and H&H (Biostime) included general support for breastfeeding in small fonts under the product name, which could be easily overlooked. Abbot only had breastfeeding support content in one of the nine PDPs sampled. Mead Johnson, Danone, Junlebao and Feihe (Firmus) did not include any information on their PDPs supporting breastfeeding or highlighting its benefits.

Breast milk comparison

Comparisons of infant formula to breast milk, suggesting an equivalence between the two, were made by companies in a variety of ways. Danone (Nutricia) stated in a Stage 1 product description that their scGOS:lcFOS prebiotics combination mimics the oligosaccharides structure and proportion of breast milk. Junlebao included in their product descriptions that they employed technologies that have an affinity to the human “breast.” Similarly, Feihe (Firmus) also made statements that they have *dedicated “56 years of research, striving to become more similar to the structure of breast milk.”* They indicated that the whey protein powder in their products is more similar to the structure of amino acids in breast milk, and the OPO-structured lipid provides lipids for infants that are close to those in breast milk.

Yili referenced clinical trials that compared groups of breastfed infants and those who were fed by their product.

Experiments prove that: the infants fed with Yili (Jin-LingGuan) milk formula were not significantly different from those who were breastfed in terms of their gut health and conditions of their stools. Yili, Stage 1

Likewise, H&H (Biostime) referred to as “clinical research” that suggested there to be no significant differences regarding infant feeding outcomes between the groups that used their product and those who were breastfed. They also used slogans like “unlocking mother’s love” that further idealises their product and presented milk formula as a continuation of mother’s love.

Use of attractive infant images

Images of an infant under the age of 1 year (defined in Supporting Information Appendix B) were found in the PDPs of at least half of the companies examined. Specifically, Mead Johnson included images of happy babies in multiple PDPs. Two images of Caucasian infants were inserted next to nutritional claims in the PDPs of Beingmate’s Stage 3 products. Biostime incorporated multiple pictures of happy Caucasian infants along with contents that relate to themes of development, nutrition, digestion and continuation of a mother’s love.

4 | DISCUSSION

This study carefully examined the marketing of BMS on Chinese e-commerce websites and characterised nine main marketing appeals. Efforts to market their brands and products as “premium” were displayed by most companies in their MLPs and PDPs, including

presenting their products as “foreign-made” and emphasising the “quality-assurance” measures in place. Previous studies have suggested that the premium brand image along with a premium price led to mothers viewing the product to be of “higher quality” (Save the Children, 2019). Notably, products manufactured in China were also described as sourced from the same latitude of European countries and/or used images of Caucasian infants and scientists. The popular use of “premiumization” appeal can be partially explained by the 2008 China infant formula contamination incident (Gossner et al., 2009), where melamine was found to be added to some infant formula milk and led to the development of kidney stones and renal failures among many infants. Ever since the scandal, there has been increasing market demand for imported milk formulas among Chinese consumers.

Nutritional and health claims, including reference to improving undesirable infant behaviours, were also used widely among the e-commerce webpages. Companies including Yili and Biostime cited clinical studies proclaiming that they found “no significant” difference between the health outcomes of infants using their product without providing evidence to back up this claim. Marketing strategies implying nutritional and health benefits equivalence between breast milk and BMS have been found to influence mothers’ self-efficacy, leading them to perceive their breast milk as inferior (Piwoz & Huffman, 2015). Misleading infant feeding information can instill beliefs in mothers that normal behaviours like crying and regurgitation are undesirable as they can undermine maternal breastfeeding confidence leading to the use of BMS products (Parry et al., 2013; Piwoz & Huffman, 2015).

Other persuasive techniques were extensively used, including endorsements from celebrities and other parents, economic incentives for new customers and members, culturally specific health claims, and the convenience of online shopping and free product returns. All Chinese-owned companies used endorsements from well-known Chinese celebrities with a large number of social media (Weibo) followers. Also, most of these celebrities had been featured on Chinese parental reality TV shows that were sponsored by BMS companies. For instance, Xie Na, the celebrity endorsing Yili, participated in the popular reality TV show “Viva La Romance,” which was sponsored by Yili. This proliferation of BMS companies’ presence on social media could shape psychosocial factors that have been found to have significant impacts on EBF behaviours (de Jager et al., 2014). Our findings are in line with previous research examining the online presence and marketing tactics of the BMS industry (Abrahams, 2012; Ching et al., 2021; Lozada-Tequeanes et al., 2020; Vinje et al., 2017).

Many e-commerce webpages had links to external platforms, such as maternal websites, “professional” consultation services, and membership centres that provided a breadth of additional information. Additionally, marketing content for Stages 1–3 formulas within the same brand was very similar in terms of content, colour and labels. Within most brands, Stages 2 and 3 products not only included the same messages as those of Stage 1 PDPs, but also had additional claims and economic incentives. According to the WHO, this practice,

known as “cross-promotion,” involves “packaging, branding, and labeling of a product closely resemble that of another” (WHO & UNICEF, 2019). Cross-promotion is a widely accepted brand extension marketing practice that drives consumers to create associations within a brand variant and product line (Park et al., 1991). Studies in Australia and Italy found that pregnant women and mothers perceived the advertisements for follow-on formula (Stage 2) and toddler milk (Stage 3) as promotions for infant formula (Stage 1) (Berry et al., 2012; Cattaneo et al., 2015), confirming the effectiveness and public health risks of BMS cross-promotion.

Product promotions/discounts, indicating equivalence between breast milk and BMS products, and the use of infant images all represent deviations from the Code. Hence, in agreement with previous recommendations (Robinson et al., 2019), our study shows that there is a great need in China not only for monitoring of online BMS marketing practices (including via e-commerce platforms) but also for strong re-enforcement of the Code and meaningful economic and/or legal penalties for well-documented violations.

While this study is one of the first content analyses to examine the marketing of BMS on Chinese e-commerce platforms, it is not without its limitations. The sample included the flagship websites (MLP and PDP) of only 10 companies on TMall. Hence, the results may not be generalisable to the marketing practices of other companies on different e-commerce platforms (such as JD and Pinduoduo). Although the samples were selected and captured systematically in 1 month, there may have been products added and removed since that time.

In conclusion, effective legislation including monitoring and enforcement to regulate the marketing practices of BMS companies, such as e-commerce platforms, is urgently needed to curtail the negative effect of commercial interests on the early feeding practices and lifelong health of children in China. Monitoring is especially needed for online platforms and social media; this might include holding key opinion leaders accountable for their endorsements and practices that ostensibly place profit over the welfare of infants. Furthermore, increased investments in evidence-based interventions are required in China to achieve the Global Nutrition Target of EBF rates of at least 50% by 2025. In addition to the reestablishment of Code legislation, interventions should include facility- and community-based breastfeeding support, maternity benefits and behaviour change communications campaigns (Philipp et al., 2001; Piwoz & Huffman, 2015; Perez-Escamil et al., 2012; Save the Children, 2019; Su et al., 2007). Further studies are needed to understand in detail how caregivers perceive the different methods of BMS marketing utilising e-commerce platforms and their impact on feeding decisions and behaviours. We strongly encourage researchers in this field to use the methodology developed for this study to systematically identify the online marketing tactics used by the BMS industry in their countries and counteract them. This is key because our findings strongly indicate that the WHO Code will not be successfully implemented in China and elsewhere unless online marketing of BMS products is well regulated.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

AUTHOR CONTRIBUTIONS

SH led the study design, data analyses and wrote the first draught of the manuscript. The study is part of her MPH thesis project at the Yale School of Public Health (YSPH). HC and YW contributed to the data collection, analysis and manuscript editing processes. NR involved in methodology development, provided review and edits of the manuscript, and was Shannon Han's preceptor at WHO during the summer of 2019. RP-E helped design the data analysis strategy and participated in results interpretation and write-up of the manuscript. He was S H's YSPH thesis advisor and provided substantive critical reviews of numerous drafts of the manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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