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Online news coverage of infant formula shortage in the United States: A content analysis

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ABSTRACT

This study aimed to describe the content of internet news specific to the 2022 infant formula shortage in the United States. First hundred English news articles on Google News were coded for content categories to reflect recommendations for affected families by the American Academy of Pediatrics and the Centers for Disease Control and Prevention. Chi-square test of independence ($\alpha = 0.05$) determined if content categories was statistically affected by whether the news article was professionally authored or an internet news article. Only 17% of the articles were professionally authored. Hardships to parents was the predominant theme (73% of news articles); 53% mentioned challenges for infants needing hypoallergenic or specialized formulas; 52% addressed food safety. Coverage of feeding guidelines, challenges for specialized formula requirements, introduction to solid foods, re-lactation, breastfeeding support, and food safety were not significantly impacted by whether the article was professionally authored or not ($p > .05$). Results point to the need for health professionals to increase their online presence as a vital source of accurate information during a public health crisis.

1. Introduction

The COVID-19 pandemic had a disparate impact on formula-feeding families in the United States, mostly due to formula shortages arising from supply chain issues; the shortage further intensified in early 2022 due to recall of, and eventual cessation in production of infant formula products produced by Abbott Nutrition, the predominant manufacturer of such products [1,2]. Apart from human milk, iron-fortified infant formula is the sole safe source of effective nutrition for non-breastfed infants until six months of age, and a critical source of nutrition for non- breastfed or partially breastfed infants till 12 months [3].

Infants require a precise ratio of macro- and micro-nutrients to sustain growth and development. Optimal nutrition with the right balance of various nutrients is vital to ensure the rapid rate of growth and development characteristic of this stage [4]. Modified cow's milk formula provides the calories and nutrient balance that mirrors breastmilk [5]. A parent or guardian unable to obtain infant formula, may resort to feeding the child unmodified cow's milk, goat's milk, or plant-based beverage that fall short of the precise nutritional requirements and balance for infants. Inadequate nutrient intake as triggered by this formula shortage can result in postnatal growth restriction, failure to thrive and metabolic disturbances that can persist into adult life [6]. Low-income infants could potentially be more affected by the formula crisis and thus be at increased health risks that could contribute to widening health disparities among low income families [7].

More than 90% of Americans use the internet [8], with an estimated 80% of internet users conducting online health-related searches [9]. With recognition of digital literacy as one of the "super social determinants of health" [10], accuracy and authenticity of any health-related information posted online is critical. While seekers of online health information are generally mistrustful of the information available over the internet, they may be oblivious to how they access health information from online sources [11]. A qualitative study on how consumers search for health-related information over the internet, concluded that seekers of online health information preferentially selected information presented on the first page of the results obtained after using appropriate keywords or short descriptions on search engines such as Google, even though they recognized governmental, professional and educational organizations as credible sources of online health information [12]. The U.S. Surgeon General's most recent advisory on building a healthy, digital information environment, recommends that professional organizations proactively utilize digital technology and media platforms for dissemination of accurate public health information [13]. To our knowledge, no studies have reported on the extent of news coverage focused on the formula shortage. The goal of this study, therefore,

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is to describe the content of internet news coverage attributed to infant formula shortage.

2. Materials and methods

The study analyzed the content of the first one hundred news articles posted on Google News, a news aggregator with an estimated 150 million visitors per month [14]. Google News curates articles from more than 20,000 publishers worldwide, grouping them by topic and relevance [15]. The methodology was adapted from a previous study that explored online news coverage of COVID-19 long haul symptoms, using a convenience sample of 100 news articles for the pilot study [16]. A cleared browser was used to search for news articles using the keywords "infant formula shortage" via the Google News function. The first hundred English news articles (both written news and video clips) identified in June 2022 were curated by their URLs and analyzed for this study. During the infant formula shortage, the American Academy of Pediatrics [3], and the Centers for Disease Control and Prevention [17] made recommendations for families struggling through the crisis. For this study, these recommendations were thematically grouped into seventeen categories. Each news article was viewed and dichotomously coded (1 = yes, 0 = no), for the presence or absence of each category. Broadly, these categories included: mention of hardships faced by parents, how to procure formulas, challenges faced by families with infants needing specialized or hypoallergenic formula, and aspects of infant feeding. Infant feeding aspects included feeding guidelines, practices or warning against homemade formula and dilution with water, introduction to solid foods, food safety, switching brands; or substituting infant formula with toddler formula, alternate goat or plant-based milk, or unflavored whole bovine milk. Other categories included mention of re-lactation, breastfeeding support, registered milk banks, pediatrician consultation and warning against breast milk donors. One researcher coded all the 100 news articles for these content categories and a second researcher re-coded 10% of the articles selected by a random number generator. Cohen's kappa was calculated to determine inter-rater reliability. Both reviewers agreed on 295 out of 300 data points, yielding a reliability score of $\kappa = 0.962$. Percentages of categorical variables were calculated and chi-square test of independence ($\alpha = 0.05$) performed to determine if the contents covered were statistically affected by whether the article was professionally authored (.gov, .org, .edu extensions) or an internet news article (.com extension). All calculations and analyses were conducted on Microsoft Excel. Since this study did not involve human subjects, as per policy, it was not subject to review by the Institutional Review Board at Lehman College and William Paterson University.

3. Results

Table 1 summarizes the distribution of internet and professional news articles across the 17 content categories. Majority the 100 news reports analyzed were internet news articles (83%, $N = 83$), and 17% ($N = 17$) were from professional sources. Hardships to parents due to formula shortage was the predominant theme, being found in 73% ($N = 73$) of all the news articles, followed by the challenges faced by families with infants needing hypoallergenic or specialized formulas (53%, $N = 53$). Food safety was addressed by 52% of the study sample (N = 53), of which a little more than a tenth was covered by professional articles ($N = 6$).

Suggestions on how to procure formulas were addressed in 46% of the sample (professional: 28.26%; $N = 13$; internet: 71.74%, $N = 33$); 28% of the articles suggested consulting with a pediatrician ($N = 28$) and only 17% addressed feeding guidelines for infants ($N = 17\%$). Warnings against homemade formula and dilution of formula were mentioned in 28% and 25% of the news articles respectively. Switching to pasteurized, unflavored whole cow milk for a short time, switching formula brands and replacing infant formula with toddler formula were addressed in 22% ($N = 22$), 40% ($N = 40$) and 11% ($N = 11$) of the articles respectively. Re-lactation (8%, $N = 8$) and breastfeeding support (13%, $N = 12$) was under-represented in the analyzed news articles. Suggestions to contact registered milk banks and warnings against breast milk donors were mentioned in 17% ($N = 17$) and 10% ($N = 10$) of the articles respectively. Only 7% ($N = 7$) of the articles mentioned introduction to solid foods, and 16% ($N = 16$) mentioned goat milk and plant-based substitutes. Chi-square test of independence indicated that all aspects of formula procurement except accessing stores with less foot traffic ($p = .14$), food banks ($p = .07$), and contacting registered milk banks ($p = .13$) had a significant impact on whether the news article was professionally sourced or internet news ($p < .05$). Inclusion of categories related to feeding guidelines, challenges for infants requiring hypoallergenic or specialized formula ($p = .29$), introduction to solid foods ($p = .06$), re-lactation ($p = .11$), breastfeeding support ($p = .53$), and food safety ($p = .13$) was not statistically impacted by the nature of the news article.

Of the 17 news articles from professional or government sources, more than three-quarters mentioned how to procure formula ($N = 13$), 59% mentioned parental hardships ($N = 10$), and 65% mentioned challenges

Table 1
Proportion of total news articles ($N = 100$) and professional news articles ($N = 17$) covering contents specific to formula shortage (N_p and N_i indicate number of professional and internet news articles addressing a content category respectively.

Content	Proportion of news articles covering content		*P*-value
	Total (N = 100)	Professional (N = 17)	
Hardships to parents	73% (73) $N_p = 10$; $N_i = 63$	58.8% (10)	0.15
How to procure formula:	46% (46) $N_p = 13$; $N_i = 33$	76.5% (13)	0.006
Online procurement	23% (23) $N_p = 10$; $N_i = 13$	58.8% (10)	<0.001
Access stores in areas of low population density.	17% (17) $N_p = 5$; $N_i = 12$	29.4% (5)	0.14
Sample from pediatrician	12% (12) $N_p = 5$; $N_i = 7$	29.4% (5)	0.02
WIC procurement	46% (46) $N_p = 14$; $N_i = 32$	82.4% (14)	0.001
Social media groups	26% (26) $N_p = 8$; $N_i = 18$	47.1% (8)	0.03
Food banks	11% (11) $N_p = 4$; $N_i = 7$	23.5% (4)	0.07
Warning to check reliability of online vendors	18% (18) $N_p = 8$; $N_i = 10$	47.1% (8)	<0.001
Feeding guidelines	17% (17) $N_p = 5$; $N_i = 12$	29.4% (5)	0.13
Pasteurized, unflavored whole cow milk for short time.	22% (22) $N_p = 8$; $N_i = 14$	47.1% (8)	0.006
Challenges for hypoallergenic / specialized formula	53% (53) $N_p = 11$; $N_i = 42$	64.7% (11)	0.29
Warning regarding dilution of formula with water	23% (23) $N_p = 9$; $N_i = 14$	52.9% (9)	0.001
Warning regarding homemade formula	28% (28) $N_p = 11$; $N_i = 17$	64.7% (11)	<0.001
Switching brands	40% (40) $N_p = 11$; $N_i = 29$	64.7% (11)	0.02
Substitute infant formula with toddler formula	11% (11) $N_p = 8$; $N_i = 3$	47.1% (8)	<0.001
Alternates (goat/plant-based milk)	16% (16) $N_p = 7$; $N_i = 9$	41.2% (7)	0.002
Introduction to solid foods	7% (7) $N_p = 3$; $N_i = 4$	17.7% (3)	0.06
Warning regarding breast milk donor	10% (10) $N_p = 3$; $N_i = 7$	17.7% (3)	0.25
Re-lactation	8% (8) $N_p = 3$; $N_i = 5$	17.7% (3)	0.11
Breastfeeding support	13% (13) $N_p = 3$; $N_i = 10$	17.7% (3)	0.53
Registered milk banks	17% (17) $N_p = 5$; $N_i = 12$	29.4% (5))	0.13
Consult pediatrician	28% (28) $N_p = 9$; $N_i = 19$	52.9% (9)	0.01
Food safety	52% (52) $N_p = 6$; $N_i = 46$	35.3% (6)	0.13

that the formula shortage presented for infants needing hypoallergenic or specialized formula ($N = 11$). Feeding guidelines for infants, warnings against homemade formula and dilution of formula were mentioned in 29% ($N = 5$), 65% (N = 11), 53% ($N = 9$) of the professional news articles respectively. More than half (N = 9) and 29% of the professional articles mentioned pediatrician consult (N = 9) and contacting registered milk banks ($N = 5$) respectively. Forty-seven percent of the professional articles mentioned feeding infants with pasteurized, unflavored whole cow milk for a short time or substituting infant formula with toddler formula ($N = 8$). Food safety and warning against breast milk donors were mentioned in 35% ($N = 6$) and 18% ($N = 3$) of the professional articles respectively. Only 17% of the professional news articles mentioned re-lactation and breastfeeding support.

4. Discussion

Infant growth is most rapid during the first year of life, with infants tripling their weight by one year of age [18]. A newborn infant's brain consumes 60% of the energy utilized by the body [19]; optimal infant brain development is reliant on adequate rates of cell metabolism and cell differentiation which in turn, is dependent on the bioavailability of key nutrients such as glucose, branched chain amino acids, oxygen and iron [20]. Absence of key nutrients during the neonatal period can deleteriously affect fundamental processes of early brain development and cognitive growth [19]. While the World Health Organization [21] and the American Academy of Pediatrics [5] recommend exclusive breastfeeding during the first 6 months of life, up to 70% of infants worldwide are not exclusively breastfed for the recommended period [22]. The recommended alternative to breast milk is iron-fortified infant formula, which is bovine milk that is commercially modified to meet neonatal nutritional needs [23]. The national formula shortage inadvertently led to infant food insecurity that can have long-term ramifications in population health, since infants have particular dietary needs unique to their rapid growth and development, and sub-optimal nutrition at this stage can have lifelong impacts on growth and development.

Almost three-quarters of the news articles mentioned hardships to parents due to the formula shortage. Of the 73 articles mentioning hardships to families, 86% were internet news ($N = 63$). Fifty-nine percent of the professional news articles ($N = 10$) mentioned the topic. Since formula is the sole source of nutrition for infants younger than 6 months, many families struggle to find safe ways to feed their infants. The hardships are exacerbated for families of lower socio-economic status, who don't have resources to travel to multiple stores or pay inflated prices and unfair practices [24,25], as well as for mothers who are not in a position to breastfeed due to illnesses such as cancer [26]. Chi-square test indicated that the topic was not significantly related to whether the article was internet news or professionally authored ($p = .15$).

Forty-six percent of the news articles mentioned how to procure formula. Recommendations from professional, federal and local governments for formula procurement include verified online vendors, social media groups, searching stores in areas of low population density, as well as contacting health care providers for samples, and Woman, Infants, and Children (WIC) assistance [27]. These topics were mentioned in 18% ($N = 18$), 26% ($N = 26$), 17% ($N = 17$), 12% ($N = 12$), and 46% ($N = 46$) of the news articles respectively. Other than the recommendation of contacting stores in remote regions, all the aforementioned topics significantly impacted whether the news article was internet- or professional-sourced ($p < .05$). About half of the infant formula in the United States is disbursed by the Special Supplemental Nutrition Program to socioeconomically disadvantaged families enrolled in Women, Infants, and Children (WIC) benefits, at no cost to the participants. Federal and state requirements for WIC procurement have been relaxed to facilitate vulnerable families to obtain the vital nutritional support for their infants [25]. More than 82% of the professional news articles in this study ($N = 14$) mentioned contacting WIC as a suggestion for formula procurement.

Term infants who are formula fed need a basic iron-fortified formula obtained from modified cow's milk and can be nutritionally interchangeable between brands. Since preterm infants need higher calories and proteins for “catch-up” growth, formulas specified for them have increased caloric density, protein and mineral content [28]. Specialized formulas are also needed by infants diagnosed with metabolic disorders such as galactosemia, phenylketonuria, as well as hypoallergenic formulas for infants with immunoglobulin-mediated allergies [29]. Food insecurity due to inadequate amounts of such specialized formula will cause failure to thrive that can result in long-term consequences for growth and development of these children. More than half of the news articles analyzed in this study addressed the hardships faced by families of infants needing hypoallergenic and specialized formulas. The presence of this topic did not significantly affect the type of news article ($p = .29$) but was mentioned in almost two-thirds of the professional news articles (64.7%, $N = 11$).

In order to alleviate the wide-ranging impact of the prolonged formula shortage, the American Academy of Breastfeeding Medicine recommends re-lactation as well as increased donation of excess breastmilk to accredited milk banks [30]. Only 8% of the news articles in this study mentioned re-lactation ($N = 8$). The recommendation was under-represented in professional news articles as well (18%, $N = 3$). The formula shortage crisis also brings to the forefront, the urgent need to address factors contributing to low rates of breastfeeding such as lack of nutrition education, inadequate family and social support, employment conditions that are non-supportive of breastfeeding such as absence of maternity leave and flexibility for breastfeeding or expressing breast milk [31]. Only 13% of the total news articles ($N = 13$), and 18% of the professional news articles ($N = 3$) in this study mentioned breastfeeding support. The United States Health and Human Services recommends parents to contact a local bank accredited through the Human Milk Banking Association of North America. However, though these banks offer a lifeline of support during the period of formula support, most of their milk is restricted to hospitalized infants [27]. This topic was addressed in 17% of the total news articles ($N = 17$) and 29% of the professional articles ($N = 5$), with no statistical effect on whether the article was internet news or professionally authored ($p = .13$). Procuring breast milk through breast milk donors poses safety risk as the milk has not been screened for contamination and infectious diseases and is thus not recommended [27]. Warning regarding breast milk donors was mentioned in a tenth of the total news articles ($N = 10$) and 18% of the professional news articles ($N = 3$); the presence of this topic did not statistically impact upon the type of news article ($p = .25$).

Feeding guidelines for infants were mentioned in 17% of the total news articles ($N = 17$), and 29% of the professional news articles ($N = 5$), with the category bearing no statistical impact on the source of news articles ($p > .05$). As per the American Academy of Pediatrics and the Centers for Disease Control, breastmilk or infant formula should be the sole source of nutrition until about six months of age, after which complementary foods can be introduced, depending on physiological readiness [32,33]. In our study, introduction to solid foods was mentioned in 7% of the total news articles and 18% of the professional news articles ($N = 3$). Since infants have highly unique nutrient needs with organs, especially kidneys that are not yet fully developed, homemade formulas and dilution of formulas are not recommended [34]. These may fall short of the unique balance of micronutrients and electrolytes that is essential for the first year of life, with the former practice also increasing risk of contamination [2,27]. In our study, 23% and 28% of the total news articles warned against dilution of formula ($N = 23$) and homemade formula respectively ($N = 28$), and both categories significantly affected the type of news article ($p = .001$ and $p < .001$ respectively). These categories were mentioned in 53% ($N = 9$) and 65% ($N = 11$) of the professional news articles.

Switching between formula brands was mentioned in 40% of the total articles ($N = 40$) and 65% of the professional news articles ($N = 11$), with the topic bearing statistical impact on whether the articles were professionally authored or not ($p = .02$). Within the same type of formula (example, cow milk based), barring gastrointestinal discomfort, most infants are able to gradually tolerate switching formula brands under a

pediatrician's supervision [27]. However, toddler formula lacks the nutritional balance that is essential for newborns and must therefore not be fed to newborns, but may be given for a short period of time to infants closer to twelve months old [3]. This topic was addressed in 11% of the total news ($N = 11$) and 47% of the professional news articles ($N = 8$). In general, infants younger than 12 months of age should not be fed unmodified bovine milk as it contributes to increased renal load, indigestibility, chronic enteric blood loss as well as decreased intake of iron, vitamin E and other micronutrients [35,36]. During the period of urgent formula shortage, the American Academy of Pediatrics revisited this guidance and suggested that in case of emergency, infants older than 6 months who were on regular formula may be given pasteurized, whole bovine cow's milk for up to a week while ensuring adequate iron intake [3]. More than a fifth of the total news articles ($N = 22$) and 47% of the professional articles ($N = 8$) in this study mentioned switching to pasteurized cow's milk for a short period of time. While pasteurized goat milk-based infant formula is being imported into the United States during the period of shortage, plant-based milk alternatives such as almond milk must be avoided; infants closer to 12 months of age may be given soy milk fortified with calcium and vitamin D for up to a week [3]. Within our study sample, 16% of the total sample ($N = 16$) and 41% of professional news articles ($N = 7$) mentioned these alternate milks.

Food safety was addressed in 52% of the news articles ($N = 52$), and 35% ($N = 6$) of the professional news articles; this content category did not significantly relate to the source of the news article ($p > .05$). Food-safety practices specific to powdered infant formula include practicing proper hygiene, sanitizing bottles and nipples, immediate refrigeration of prepared formula if not being used, using prepared formula within 24 h, discarding any remnant formula in a bottle after a feeding session, as well as using water from a safe source [37].

This study is limited by the cross-sectional design, which represents only a snapshot in time. Had the data been collected at a different point in time, the results could appear differently. This is especially true in the case of online news when data is changing on a constant basis. Further, the data in this study was gathered from only one aggregate news source. While Google News was chosen due to its popularity and wide reach and popularity, there are many others. The small sample size also limits the generalization of results. Nonetheless, this study fills a gap in the literature on an emergent and important public health issue. While the articles in this study noted the hardships related to the infant formula shortage, they also focused on the procurement of formula, food safety and challenges for infants with specific nutritional needs. Thus, pointing to the fact that online news can be an important source of information, particularly in times of crisis. Healthy People 2030 defines **personal health literacy** as "the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others," (USDHHS, 2022). Further, as a means to curb misinformation, the US Surgeon General recommends that health professionals and organizations be deliberate in finding opportunities to promote health literacy. For example, health organizations can recruit their members as subject matter experts for journalist and online news media to effectively communicated peer-reviewed research and expert opinions online. Our findings underscore the need for professional organizations to tap into these far-reaching online avenues to successfully and meaningfully impact targeted populations with practical recommendations during a public health crisis.

Declaration of Competing Interest

None of the authors have any conflicting interests.

References

[1] Abrams SA, Duggan CP. Infant and child formula shortages: now is the time to prevent recurrences. Am J Clin Nutr. 2022;nqac149. https://doi.org/10.1093/ajcn/nqac149. Advance online publication.

[2] Food and Drug Administration (FDA). Powdered infant formula recall: what to know. https://www.fda.gov/consumers/powdered-infant-formula-recall-what-know; 2022. Accessed June 28, 2022.

[3] Abrams SA. With the baby formula shortage, what should I do if I can't find any. https://www.healthychildren.org/English/tips-tools/ask-the-pediatrician/Pages/Are-there-shortages-of-infant-formula-due-to-COVID-19.aspx#:~:text=It%20can%20be%20tempting%20to,formula%20to%20help%20ease%20shortages; 2022.

[4] Martin CR, Ling PR, Blackburn GL. Review of infant feeding: key features of breast milk and infant formula. Nutrients. 2016;8(5):279.

[5] Meek JY, Noble L, Section on Breastfeeding. breastfeeding and the use of human milk. Pediatrics. 2022;150(1):e2022057988.

[6] Patel JK, Rouster AS. Infant nutrition requirements and options. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 https://www.ncbi.nlm.nih.gov/books/NBK560758/. Accessed June 28, 2022.

[7] Williams W, Artiga S. Key characteristics of infants and implications of the recent formula shortage. https://www.kff.org/medicaid/issue-brief/key-characteristics-of-infants-and-implications-of-the-recent-formula-shortage/; 2022. Accessed June 28, 2022.

[8] Pew Research Center. Internet/Broadband fact sheet. https://www.pewresearch.org/internet/fact-sheet/internet-broadband/; 2021. Accessed October 24, 2022.

[9] Ventola CL. Social media and health care professionals: benefits, risks, and best practices. P & T: Peer-Review J Formul Manag. 2014;39(7):491–520.

[10] Sieck CJ, Sheon A, Ancker JS, Castek J, Callahan B, Siefer A. Digital inclusion as a social determinant of health. NPJ Digit Med. 2021;4(1):52. https://doi.org/10.1038/s41746-021-00413-8.

[11] Chen Y, Li C, Liang J, Tsai C. Health information obtained from the internet and changes in medical decision making: questionnaire development and cross-sectional survey. J Med Internet Res. 2018;20(2):e47.

[12] Peterson G, Aslani P, Williams KA. How do consumers search for and appraise information on medicines on the Internet? A qualitative study using focus groups. J Med Internet Res. 2003;5(4):e33.

[13] Office of the Surgeon General. Confronting health misinformation: The U.S. surgeon general's advisory on building a healthy information environment. https://www.ncbi.nlm.nih.gov/books/NBK572169/; 2021.

[14] Ali A. Ranked: America's most searched and visited news sites by state. https://www.visualcapitalist.com/americas-most-searched-and-visited-news-sites-by-state/; 2021.

[15] Gravitec. How to get on Google News: Guide for 2021–2022. https://gravitec.net/blog/how-to-get-on-google-news-guide/; 2022.

[16] Basch CH, Park E, Kollia B, Quinones N. Online news coverage of COVID-19 long haul symptoms. J Community Health. 2022;47(2):306–10. https://doi.org/10.1007/s10900-021-01053-5.

[17] Centers for Disease Control and Prevention. Information for families during the infant formula shortage. https://www.cdc.gov/nutrition/infantandtoddlernutrition/formula-feeding/infant-formula-shortage.html#:~:text=Due%20to%20supply%20chain%20issues,for%20families%20across%20the%20country; 2022. Accessed June 28, 2022.

[18] Mayo Clinic. Healthy lifestyle, Infant and Toddler. https://www.mayoclinic.org/healthy-lifestyle/infant-and-toddler-health/expert-answers/infant-growth/faq-20058037#:~:text=Expect%20your%20baby%20to%20double,by%20about%20age%201%20year; 2020. Accessed June 28, 2022.

[19] Georgieff MK, Brunette KE, Tran PV. Early life nutrition and neural plasticity. Dev Psychopathol. 2015;27(2):411–23.

[20] Wullschleger S, Loewith R, Hall MN. TOR signaling in growth and metabolism. Cell. 2006;124(3):471–84.

[21] World Health Organization. Infant and young child feeding. https://www.who.int/news-room/fact-sheets/detail/infant-and-young-child-feeding; 2021. Accessed June 28, 2022.

[22] Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. Cochrane Database Syst Rev. 2012;8:CD003517.

[23] Lemaire M, Le Huërou-Luron I, Blat S. Effects of infant formula composition on long-term metabolic health. J Dev Orig Health Dis. 2018;9(6):573–89.

[24] American Academy of Pediatrics. American Academy of pediatrics urges White House, Congress to take comprehensive, urgent action to address infant formula shortage. https://www.aap.org/en/news-room/news-releases/aap/2022/american-academy-of-pediatrics-urges-white-house-congress-to-take-comprehensive-urgent-action-to-address-infant-formula-shortage/; 2022. Accessed June 28, 2022.

[25] The White House. Fact sheet: President Biden announces additional steps to address infant formula shortage. https://www.whitehouse.gov/briefing-room/statements-releases/2022/05/12/fact-sheet-president-biden-announces-additional-steps-to-address-infant-formula-shortage/; 2022. Accessed June 28, 2022.

[26] Living beyond Breast Cancer. The infant formula shortage and the breast cancer community; 2022. https://wwwlbbcorg/news-opinion/infant-formula-shortage-and-breast-cancer-community?gclid=EAIaIQobChMIq–O07u0-AIVOhXUAR1Xzgk0EAAYAiAAEgKBNPD_BwE Accessed June 28, 2022.

[27] Health and Human Services. Information for families during the formula shortage. https://www.hhs.gov/formula/index.html%20accessed%20june%2029; 2022. Accessed June 28, 2022.

[28] O'Connor NR. Infant formula. Am Fam Physician. 2009;79(7):565–70.

[29] Kruszka P, Regier D. Inborn errors of metabolism: from preconception to adulthood. Am Fam Physician. 2019;99(1):25–32.

[30] Academy of Breastfeeding Medicine. ABM statement on shortage of breastmilk substitutes. https://www.bfmed.org/statement-on-shortage-of-breastmilk-substitutes; 2022. Accessed June 28, 2022.

[31] Office of the Surgeon General (US). Centers for Disease Control and Prevention (US), Office on Women's Health (US). The Surgeon General's call to action to support breastfeeding. Rockville (MD): Office of the Surgeon General (US); 2011. 2011.

[32] Centers for Disease Control and Prevention. Foods and drinks for 6 to 24 month olds. https://www.cdc.gov/nutrition/infantandtoddlernutrition/foods-and-drinks/index.html; 2021. Accessed June 28, 2022.
[33] Healthy Children. starting solid foods. https://www.healthychildren.org/English/ages-stages/baby/feeding-nutrition/Pages/Starting-Solid-Foods.aspx; 2021. Accessed June 28, 2022.
[34] Yale Medicine. Baby formula shortage: 8 tips for parents. https://www.yalemedicine.org/news/baby-formula-shortage; 2022. Accessed June 28, 2022.
[35] American Academy of Pediatrics. Breastfeeding and the use of human milk. Pediatrics. 2012;129(3):e827–41.
[36] Academy of Nutrition and Dietetics. For infants, hold the milk. https://www.eatright.org/health/pregnancy/breast-feeding/for-infants-hold-the-milk; 2018. Accessed June 28, 2022.
[37] Food and Drug Administration. Infant formula: safety do's and don'ts. https://www.fda.gov/consumers/consumer-updates/infant-formula-safety-dos-and-donts; 2022. Accessed June 28, 2022.