



## Editorial

## Breastfeeding and the Obesity Pandemic

Rafael Pérez-Escamilla

Department of Social and Behavioral Sciences, Yale School of Public Health, New Haven, CT

There is a consistent association between maternal obesity and a lower likelihood of initiation of breastfeeding, as well as a shorter duration of total and exclusive breastfeeding [1,2]. This is a major cause of public health concern as women of reproductive age continue to be affected strongly and disproportionately by the obesity pandemic. Globally, it is estimated that by 2035, most of the population (51%, or over 4 billion people) will be living with either overweight or obesity [BMI (in kg/m<sup>2</sup>) ≥ 25], and 25% of people (nearly 2 billion) will be obese (BMI ≥ 30) [3]. Furthermore, by 2035, 23% of adult men (690 million) and 27% of adult women (842 million) will have obesity [3].

Four potential mechanisms have been hypothesized to explain the relationship between maternal obesity and suboptimal lactation, including an increased risk of insufficient breast milk production: 1) alterations related to obesity-related fat and glucose metabolic changes accompanied by chronic inflammation, 2) mechanical latch difficulties because of large breasts, 3) body image psycho-emotional stigma that may lead women not to intend to breastfeed or to produce an excessive amount of stress hormones that hinder the lactation process, and 4) delayed onset of lactation accompanied by the introduction of pre-lacteal feeds, a known risk factor for delayed initiation of breastfeeding and shorter durations of any and exclusive breastfeeding [2,4–7].

Although the mechanisms have not been fully elucidated, studies continue to shed light on the biological plausibility of the association between maternal obesity and suboptimal lactation. Findings from a robust study conducted by Keyes et al. [8] based on 3 cohort studies conducted in Spain, Greece, and the United States ( $n = 5120$ ) showed that maternal prepregnancy overweight and obesity were associated with shorter durations of any and exclusive breastfeeding, after adjusting for key socioeconomic and demographic confounders. Importantly, they found that this relationship was mediated by a higher dietary inflammation index, C-reactive protein (only for exclusive breastfeeding), and cesarean-section deliveries [8].

A carefully conducted case-control study recently showed that mothers who delivered term babies and had very low milk production

during the first 4 wk postpartum ( $n = 23$ ) (defined as never exceeding 300 mL/d during any test-weight measurement period, which corresponds to half of the minimum expected amount of breast milk needed by an exclusively breastfed infant) [9], had significantly higher obesity and inflammatory biomarkers, lower concentrations of long-chain fatty acids (LCFAs) in milk, and disrupted association between plasma and milk LCFAs compared with women with moderate ( $n = 20$ ) and/or adequate amounts of milk production ( $n = 18$ ). These findings suggest that inflammation disrupts normal mammary gland fatty acid uptake [9].

It is encouraging that a recent systematic review and meta-analysis found positive impacts of breastfeeding counseling interventions on breastfeeding initiation and duration among women who were overweight or obese [10]. Given the findings from the study by Keyes et al. [8], it is not surprising that, on the one hand, the meta-analysis findings emphasize the strong need for breastfeeding support since the birth of the child. On the other hand, the data clearly show that for interventions to be more impactful, they will need to consider potential metabolic alterations and stigma issues that may negatively affect the lactation process among women with overweight and obesity.

Innovative, evidence-based approaches need to be developed to provide effective breastfeeding counseling to women who are overweight or obese. Specifically, findings from Keyes et al. [8] suggest that these interventions need to consider improving dietary quality to improve the dietary inflammation index, foster more physical activity and stress management skills to reduce inflammation, and conduct cesarean-section deliveries only when it is absolutely justified and then offer additional support with the initiation of breastfeeding during the stay in the maternity facility. For these interventions to be more effective, it will also be important to identify how, when, and for whom insulin resistance affects successful breastfeeding [9].

Although evidence suggests that it is possible to effectively support breastfeeding women with well-designed counseling interventions [7], studies like that of Keyes et al. [8] also show that women with overweight or obesity have multiple additional risk factors for not being able to

DOI of original article: <https://doi.org/10.1016/j.ajcnut.2023.04.004>.

Abbreviations: LCFA, long-chain fatty acids.

See corresponding article on page 255

E-mail address: [rafael.perez-escamilla@yale.edu](mailto:rafael.perez-escamilla@yale.edu).

<https://doi.org/10.1016/j.ajcnut.2023.04.035>

Received 25 April 2023; Received in revised form 27 April 2023; Accepted 28 April 2023

Available online 18 May 2023

0002-9165/© 2023 American Society for Nutrition. Published by Elsevier Inc. All rights reserved.

breastfeed successfully. Future research is needed to understand the impact of maternal obesity on breast milk production and quality [7] and the biological and psycho-emotional pathways underlying them. This research agenda will require interdisciplinary team science. In high-income countries, rates of maternal overweight and obesity are higher among low-income women overrepresented by ethnic/racial groups that have been historically discriminated by and isolated from society, and it is in these groups that the obesity prevalence is nowadays increasing the fastest in low- and middle-income countries [11]. Hence, it is critical that there is substantial diversity in the populations included in studies of risk factors and interventions to improve breastfeeding outcomes in the context of the obesity pandemic. One example is the BESTOW trial designed to improve breastfeeding outcomes among Hispanic and African-American women in the United States who were overweight or obese and showed that we still lack the knowledge to provide optimal breastfeeding support for low-income women of color with overweight or obesity [12].

Failing to act in the area of maternal obesity and breastfeeding can have major negative economic consequences for the world. The economic cost of the global overweight and obesity burden is already estimated to increase from \$1.96 trillion in 2020 to over \$4 trillion in 2035. However, this estimate does not consider the enormous additional economic losses due to the impact of maternal overweight and obesity on undermining breastfeeding and corresponding benefits to child health and development, women's health, and national development [7,13]. Well-funded governmental agencies that set research agendas and fund research studies, such as the National Institutes of Health (NIH) of the United States, have consistently underfunded breastfeeding protection, promotion, and support for interdisciplinary team science research. The time has come for this to change [7].

## Acknowledgments

I thank Sofia Segura-Pérez for her thoughtful feedback on drafts for this editorial.

The sole author was responsible for all aspects of this manuscript.

## Conflicts of interest

The author reports no conflicts of interest.

## Funding

The author's research program is funded by the Patient-Centered Outcomes Research Institute (PCORI MMM-2021C2-23671), The

Centers for Disease Control and Prevention (CDC U48DP006380-02-00), The National Institutes of Health (NIDDK R21DK122312-01A1), The Connecticut Department of Public Health (CT DPH 2022-0104), The World Health Organization, The Family Larsson-Rosenquist Foundation, and Wholesome Wave.

## References

- [1] M. Achike, M. Akpınar-Elci, The role of maternal prepregnancy body mass index in breastfeeding outcomes: a systematic review, *Breastfeed. Med.* 16 (9) (2021) 678–686, <https://doi.org/10.1089/bfm.2020.0376>.
- [2] Y.S. Chang, A.A. Glaria, P. Davie, S. Beake, D. Bick, Breastfeeding experiences and support for women who are overweight or obese: a mixed-methods systematic review, *Matern. Child Nutr.* 16 (1) (2020), e12865, <https://doi.org/10.1111/mcn.12865>.
- [3] World Obesity Atlas 2023 [Internet], World Obesity Federation, 2023 [cited 23 April, 2023]. Available from: <https://data.worldobesity.org/publications/?cat=19> [cited 23 April, 2023]. Available from:.
- [4] K.M. Rasmussen, Association of maternal obesity before conception with poor lactation performance, *Annu. Rev. Nutr.* 27 (2007) 103–121.
- [5] L.H. Amir, S. Donath, A systematic review of maternal obesity and breastfeeding intention, initiation and duration, *BMC Pregnancy Childbirth* 7 (2007) 9, <https://doi.org/10.1186/1471-2393-7-9>.
- [6] L.A. Nommsen-Rivers, Does insulin explain the relation between maternal obesity and poor lactation outcomes? An overview of the literature, *Adv. Nutr.* 7 (2) (2016) 407–414, <https://doi.org/10.3945/an.115.011007>.
- [7] R. Pérez-Escamilla, C. Tomori, S. Hernández-Cordero, P. Baker, A.J.D. Barros, F. Bégin, et al., Breastfeeding: crucially important, but increasingly challenged in a market-driven world, *Lancet* 401 (2023) 10375, 472–485.
- [8] M. Keyes, C. Andrews, V. Midya, P. Carrasco, M. Guxens, A. Jimeno-Romero, et al., Mediators of the association between maternal body mass index and breastfeeding duration in 3 international cohorts, *Am. J. Clin. Nutr.* 118 (1) (2023) 255–263.
- [9] R.E. Walker, K.J. Harvatine, A.C. Ross, E.A. Wagner, S.W. Riddle, A.D. Gernand, et al., Fatty acid transfer from blood to milk is disrupted in mothers with low milk production, obesity, and inflammation, *J. Nutr.* 152 (12) (2023) 2716–2726.
- [10] Z.L. Reichental, V.M. O'Brien, S.L. O'Reilly, Interventions to support women with overweight or obesity or gestational diabetes mellitus to initiate and continue breastfeeding: systematic review and meta-analysis, *Obes. Rev.* 23 (3) (2022), e13371.
- [11] R. Perez-Escamilla, O. Bermudez, G.S. Buccini, S. Kumanyika, C.K. Lutter, P. Monsivais, C. Victora, Nutrition disparities and the global burden of malnutrition, *BMJ* 361 (2018) k2252.
- [12] D.J. Chapman, K. Morel, A. Bermúdez-Millán, S. Young, G. Damio, R. Pérez-Escamilla, Breastfeeding education and support trial for overweight and obese women: a randomized trial, *Pediatrics* 131 (1) (2013) e162–e170.
- [13] J.P. Smith, A. Iellamo, T.T. Nguyen, R. Mathisen, The volume and monetary value of human milk produced by the world's breastfeeding mothers: results from a new tool, *Front. Public Health.* 11 (2023) 1152659, <https://doi.org/10.3389/fpubh.2023.1152659>.