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Breastfeeding, industry marketing and migration in the era of globalization

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Table of contents

ABSTRACT	1
RESUMO	9
1. INTRODUCTION	17
1.1. Breastfeeding in the 21st century	19
1.1.1. Breastfeeding: a Global Health issue	19
1.1.2. Determinants of breastfeeding	22
1.1.3. Breastfeeding and migration	26
1.2. Breastfeeding, industry marketing and conflict of interests	29
1.2.1. Commercial determinants of breastfeeding.....	29
1.2.1.1. Pregnant women and mothers of young infants	30
1.2.1.2. Institutional stakeholders and conflict of interests	33
1.2.2. The International Code of Marketing of Breast-milk Substitutes.....	36
1.2.3. The Baby-Friendly Hospital Initiative.....	41
1.2.4. Infant formula industry marketing and migration.....	42
2. OBJECTIVES	46
3. METHODS	50
3.1. Study design.....	52
3.2. Quantitative study.....	54
3.2.1. Participants.....	54
3.2.2. Data collection.....	54
3.2.3. Data analysis.....	57
3.3. Qualitative study.....	58
3.3.1. Participants.....	58
3.3.2. Data collection.....	59
3.3.3. Data analysis.....	60
3.4. Ethical considerations.....	60
4. RESULTS	63
4.1. Paper I.....	65
4.2. Paper II.....	79
4.3. Paper III	91
5. DISCUSSION	135
REFERENCES	149

LIST OF TABLES

Table 1: Types of Marketing Strategies.....	30
Table 2: Overview of Code provisions.....	38

LIST OF FIGURES

Figure 1: Exclusive Breastfeeding Rates by Country and UNICEF Region.....	21
Figure 2: Conceptual Model of Determinants Shaping Breastfeeding Practices and Behaviors.....	24
Figure 3: Migrants Living in Portugal in 2019 (%) Stratified by Nationality and Sex.....	27
Figure 4: Legal status of the Code (2020).....	39
Figure 5: Ten Steps to Successful breastfeeding.....	42

Abstract

Background

The benefits of breastfeeding are well-established and they extend to infants, mothers, society and the environment. The World Health Organization recommends exclusive breastfeeding for the first six months of life. Yet, only 44% of infants below six months of age are exclusively breastfed worldwide.

Infant feeding practices are shaped by individual, socioeconomic, cultural and structural factors. Within structural factors, the rapid expansion of the breastmilk substitutes industry induced by globalization has become a matter of concern. A large body of evidence shows that market factors are detrimental for optimal breastfeeding practices. Thus, as far back as in 1981, the World Health Assembly approved a set of recommendations aiming to regulate breastmilk substitutes' industry marketing – the International Code of Marketing of Breast-milk Substitutes (hereafter referred to as the Code). However, the set of provisions stipulated by the Code have been implemented with a considerable degree of variability across countries. For example, Brazil has implemented a high number of provisions set by the Code and is internationally acknowledged for the effectiveness of multilevel strategies promoting breastfeeding. In Portugal only a few provisions of the Code were adopted in the national law. Compliance with the Code is one of the assumptions of the Baby-Friendly Hospital Initiative, a global health policy aiming to provide optimal healthcare to mothers and their infants, which is present in both countries.

Migration status is also a determinant of health and has been associated with higher breastfeeding rates, suggesting that cultural beliefs may be a protective factor towards breastfeeding. However, only a few studies have assessed the effect of market factors on infant

feeding practices among migrant women. Understanding the influence of market factors on infant feeding intentions and behaviors in this population is fundamental to promote optimal nutrition in early life.

Objectives

This study aims to compare infant feeding practices, and their association with market factors, among native and migrant women living in different sociocultural contexts. The following specific objectives were addressed:

1. To determine if any association between maternal country of birth and first day in-hospital exclusive breastfeeding exists in Portugal and if any association is affected by giving birth in a Baby-Friendly Hospital (**Paper I**);
2. To assess the effect of market factors on breastfeeding discontinuation (any and exclusive), comparing migrant and native women in Portugal (**Paper II**);
3. To understand whether women's perspectives on breastfeeding intention and practice are influenced by breastmilk substitutes marketing upon migration to a country with fewer Code provisions, by comparing the views of native women living in Brazil and immigrant Brazilian women living in Portugal (**Paper III**).

Methods

A multi-method approach was used entailing a cross-sectional and a longitudinal quantitative study and a multi-sited qualitative study.

Objectives 1 and 2 were achieved through a quantitative study, grounded on baMBINO– *Migrant and Perinatal Health: Barriers, Incentives and Outcomes*, a national longitudinal study aiming to assess perinatal health and health care among migrant and native Portuguese women who gave birth in Portugal.

Between April 2017 and March 2019, women aged at least 18 years old and admitted for delivery in 32 public maternity hospitals in mainland Portugal were invited to participate in baMBINO. Having a stillbirth after delivery was a criteria of exclusion, except for women with multiple pregnancy and at least one live birth. For each recruited migrant woman, a native woman was invited to participate in the same hospital. Data were gathered at two different time points: 1) during the first 24 hours after birth; and, 2) at any time after the first month postpartum, but mostly around three postpartum months. Besides information on mother and newborn characteristics, data on infant feeding practices were obtained at these two time points. At baseline, data were collected by staff on duty at each hospital. Later, from one month onwards, computer-assisted telephone interviewees were performed by trained interviewers.

Infant feeding practices were compared between migrant and native Portuguese women, and the influence of market factors was assessed. Given that information on industry marketing exposure was not collected within the project baMBINO for the first day after delivery, giving birth in a Baby-Friendly Hospital was used as a proxy for a more (Baby-Friendly) or less (non-Baby-Friendly) protective environment against the influence of market factors.

Data were analyzed using IBM SPSS Statistics (Versions 24 and 26) and different statistical approaches, according to the study design of each paper: cross-sectional (Paper I) and longitudinal (Paper II). The sample size consisted of 5,340 participants at baseline and 2,401 during the first follow-up.

To achieve objective 3, a multi-sited qualitative case study was conducted in Brazil and in Portugal inspired by the differences in the implementation of the Code in these two countries and the hypothesis that those differences may influence the degree to which women are exposed to breastmilk substitutes' industry marketing.

Native and immigrant Brazilian women aged at least 18 years old, who had infants between 0 and 12 months and without contraindications to breastfeed, were eligible. Purposive heterogeneity sampling was employed in order to guarantee maximum variation of perspectives based on women's socioeconomic status and infants' age. In Portugal, migrant Brazilians were pooled from a sub-sample of baMBINO participants and invited to participate. In Brazil, native women were recruited at two private clinics (one gynecologic clinic and one pediatric clinic) in Osasco, in the State of São Paulo. The author of this thesis was responsible for the recruitment and data collection in each research site.

Qualitative semi-structured interviews were conducted until no new themes emerged. They were digitally recorded and transcribed verbatim. Fifteen immigrant Brazilian and sixteen native Brazilian women were interviewed respectively between June 2018 and January 2019 and between May and June 2019.

Content analysis was performed with the assistance of the NVivo software (QSR International).

Results

During the first hospital day, exclusive breastfeeding rates were high among both migrant (89.2%) and native women (87.4%). A positive association was found between migrant participants and in-hospital exclusive breastfeeding during the first 24h after birth (OR = 1.19, 95% CI [1.00, 1.41]). In non-Baby-Friendly Hospitals, women from Eastern European countries were more likely to exclusively breastfeed than native Portuguese women (aOR = 2.46, 95% CI [1.27, 4.78]). In Baby-Friendly Hospitals, no differences were found between migrant and native Portuguese women (**Paper I**).

Migrant women were less likely to stop exclusive (aHR= 0.81, 95% CI = 0.72–0.91) and any (aHR= 0.54, 95% CI = 0.44–0.66) breastfeeding than native women. Market factors influenced exclusive and any breastfeeding duration. Women receiving free formula samples by a health professional were more likely to stop exclusively breastfeeding (aOR = 1.37, 95% CI [1.13–1.66]). Exposure to formula discounts was associated with both exclusive (aHR= 1.22, 95% CI = 1.09–1.38) and any (aHR= 1.21, 95% CI = 1.00–1.46) breastfeeding discontinuation. No interactions were found between migration status and market factors (**Paper II**).

Brazilian immigrant women did not change their intentions to breastfeed after moving to Portugal, despite having reported higher exposure to market factors when compared to Brazilian natives. Brazilian immigrant women were more aware of the potential harmful impact of breastmilk substitutes' industry marketing on optimal breastfeeding practices, often referring to breastfeeding promotion messages that were conveyed both by family members and institutional stakeholders in Brazil. Their cultural beliefs regarding infant feeding appear to play an important protective role against the effects of exposure to market factors in the host country, which was perceived to be a less favorable environment to breastfeeding (**Paper III**).

Conclusion

The findings presented within this thesis provided new evidence about the influence of market factors among migrant women. In non-Baby Friendly hospitals, exclusive breastfeeding rates were higher among women from Eastern European countries, while in Baby-Friendly hospitals no differences were found between migrant and native women. These results suggest that the implementation of the Baby-Friendly Hospital Initiative may have contributed to attenuate inequalities in exclusive breastfeeding rates between migrant and native women during the first in-hospital day. The short-term and long-term effects of this global health policy

have been widely demonstrated. What this thesis adds is its potential in reducing differences among natives and migrants. Further research is needed on the sociocultural and structural factors shaping infant feeding practices among women from Eastern European countries, who were especially keen to breastfeed their babies.

As showed by the longitudinal study, migrant women showed a lower risk of exclusive and any breastfeeding discontinuation and a lower exposure to breastmilk substitutes' industry marketing when compared to natives. However, the provision of free formula samples by a health professional and formula discounts had a negative impact on exclusive and any breastfeeding, regardless of migration status and maternal country of birth. Thus the distribution of free formula samples by health professionals should be avoided and discounts of all types of formulas should be banned, following the Code recommendations. In addition, it would be important to extend protection from market factors also to migrant women, since, if exposed to them, they may experience the same consequences of native women.

The qualitative study revealed that cultural factors may play an important role in mediating the relationship between exposure to breastmilk substitutes' industry marketing and breastfeeding intention and practice. Both immigrant Brazilians and native Brazilians were eager to exclusive breastfeed their infants and highly valued the emotional bond between the child and the mother established through the act of breastfeeding. These cultural beliefs were strengthened by breastfeeding promotion strategies in their country of origin, which may have a long-lasting protective effect against market factors in countries where fewer provisions of the Code have been implemented.

In conclusion, this thesis helps to fill the gap about the influence of breastmilk substitutes' industry marketing on infant feeding practices among migrant women. The main policy implications of this study are that strategies promoting breastfeeding appear to

contribute to increase and sustain women's breastfeeding intention and practice and to protect them against breastmilk substitutes' industry marketing and, for those reasons, should remain the focus of support by both the countries where the Code is vigorously implemented and those where it is not. Stronger protection against market factors is needed, however, in countries with few Code provisions among both native and migrant women to ensure optimal breastfeeding practices for the whole population.

Resumo

Introdução

Os benefícios do aleitamento materno estão bem estabelecidos e estendem-se a bebês, a mães, à sociedade e ao meio ambiente. A Organização Mundial da Saúde recomenda o aleitamento materno exclusivo nos primeiros seis meses de vida. No entanto, apenas 44% dos bebês com menos de seis meses de idade são amamentados exclusivamente em todo o mundo.

As práticas de alimentação infantil são influenciadas por fatores individuais, socioeconómicos, culturais e estruturais. Dentro dos fatores estruturais, a rápida expansão da indústria de substitutos do leite materno induzida pela globalização tornou-se um motivo de preocupação. Um número elevado de estudos mostrou que os fatores de mercado são prejudiciais para as práticas ideais de aleitamento. Assim, já em 1981, a Assembleia Mundial da Saúde aprovou o Código Internacional de Marketing de Substitutos do Leite Materno (doravante denominado Código). No entanto, o conjunto de disposições estipuladas pelo Código foi implementado com um grau considerável de variabilidade entre os demais países. Por exemplo, o Brasil implementou quase todas as disposições estabelecidas pelo Código e é reconhecido internacionalmente pela eficácia das estratégias multiníveis de promoção do aleitamento materno. Em Portugal, apenas algumas disposições do Código constituem parte integrante da legislação nacional. O cumprimento do Código é uma das premissas da Iniciativa Hospital “Amigo dos Bebês”, uma política de saúde global que tem por objetivo proporcionar cuidados de saúde ideais às mães e seus bebês e que existe em ambos os países.

A condição de imigrante é também um determinante da saúde e tem sido associada a taxas de aleitamento mais elevadas, o que sugere que as crenças culturais podem ser um fator protetor do aleitamento materno. No entanto, a evidência sobre o efeito dos fatores de mercado nas práticas de alimentação infantil entre mulheres imigrantes é escassa. Compreender a

influência de fatores de mercado nas intenções e comportamentos de alimentação infantil nessa população, é fundamental para promover uma nutrição ideal no início da vida.

Objetivos

Este estudo tem como objetivo comparar as práticas de alimentação infantil, e a sua associação com fatores de mercado, entre mulheres nativas e imigrantes que vivem em diferentes contextos socioculturais. Definiram-se os seguintes objetivos específicos:

1. Determinar se existe alguma associação entre o país de nascimento da mãe e o aleitamento materno exclusivo no primeiro dia, em Portugal, e se essa associação é influenciada pela ocorrência do parto num Hospital “Amigo dos Bebés “(**Artigo I**);
2. Avaliar o efeito dos fatores de mercado na descontinuação do aleitamento (exclusivo e não exclusivo), comparando mulheres imigrantes e nativas em Portugal (**Artigo II**);
3. Compreender se as perspectivas das mulheres sobre a intenção e prática de amamentar são influenciadas pelo marketing de substitutos do leite materno após imigração para um país no qual foram estabelecidas menos disposições do Código, comparando as perspectivas de mulheres nativas residentes no Brasil com as perspectivas de mulheres imigrantes brasileiras residentes em Portugal (**Artigo III**).

Métodos

Foi utilizada uma abordagem multimétodo, que envolveu um estudo quantitativo transversal e um estudo longitudinal, assim como um estudo qualitativo multissituado.

Os objetivos 1 e 2 foram alcançados através de um estudo quantitativo baseado no *baMBINO – Saúde Perinatal em migrantes: Barreiras, Incentivos e Resultados*, um estudo

nacional longitudinal que teve por objetivo avaliar a saúde perinatal e os cuidados de saúde prestados a mulheres portuguesas e imigrantes que deram à luz em Portugal.

Entre abril de 2017 e março de 2019, foram convidadas a participar mulheres com 18 anos ou mais de idade e internadas aquando o parto em 32 maternidades públicas de Portugal Continental. Ter um natimorto após o parto foi critério de exclusão, exceto para mulheres com gravidez múltipla e com pelo menos um filho nascido vivo. Para cada mulher imigrante recrutada, uma nativa foi convidada a participar do mesmo hospital. Os dados foram recolhidos em dois momentos diferentes: 1) durante as primeiras 24 horas após o nascimento; e, 2) em qualquer momento após o primeiro mês pós-parto, mas principalmente por volta dos três meses pós-parto. Nesses dois momentos, além das informações sobre as características da mãe e do recém-nascido, foram obtidos dados relativos a práticas de alimentação infantil. No início do estudo, os dados foram recolhidos por profissionais de saúde em cada hospital. Posteriormente, a partir de um mês, entrevistadores treinados realizaram entrevistas telefónicas assistidas por computador.

As práticas de alimentação infantil foram comparadas entre mulheres imigrantes e portuguesas, e foi avaliada a influência de fatores de mercado. Como as informações sobre a exposição ao marketing da indústria durante o primeiro dia após o nascimento não foram recolhidos no âmbito do projeto baMBINO, ter um parto num Hospital “Amigo dos Bebés” foi usado como *proxy* para um ambiente mais (“Amigo dos Bebés”) ou menos (não “Amigo dos Bebés”) protetor contra a influência dos fatores de mercado.

A análise dos dados foi desenvolvida com recurso ao programa do IBM SPSS (versões 24 e 26) e foram usadas diferentes abordagens estatísticas, de acordo com o desenho de estudo de cada artigo: transversal (Artigo I) e longitudinal (Artigo II). O tamanho da amostra consistiu em 5,340 participantes no início do estudo e 2,401 durante o primeiro *follow-up*.

Para atingir o objetivo 3, foi realizado um estudo de caso qualitativo multissituado no Brasil e em Portugal, cuja seleção foi inspirada pelas diferenças na implementação do Código nestes dois países e a hipótese de que essas diferenças tenderiam a influenciar o grau de exposição das mulheres ao marketing dos substitutos de leite materno

Foram elegíveis mulheres brasileiras, nativas e imigrantes, com 18 ou mais anos, com bebés entre 0 e 12 meses e sem contraindicações para amamentar. Foi utilizada a técnica de amostragem intencional de variação máxima a fim de permitir o máximo de diversidade de perspectivas, com base na condição socioeconómica das mulheres e na idade dos bebés. Em Portugal, as mulheres imigrantes brasileiras foram selecionadas a partir de uma subamostra de participantes no estudo baMBINO e, subsequentemente, convidadas a participar. No Brasil, as mulheres nativas foram recrutadas em duas clínicas privadas (uma clínica ginecológica e uma clínica pediátrica) em Osasco, no Estado de São Paulo. A autora desta tese foi responsável pelo recrutamento e recolha de dados em cada local da pesquisa.

Foram conduzidas entrevistas qualitativas semiestruturadas até que não surgissem novos temas. As entrevistas foram gravadas em formato áudio e posteriormente transcritas na íntegra. No total, foram entrevistadas quinze mulheres imigrantes brasileiras e 16 mulheres nativas brasileiras em Portugal e no Brasil entre junho de 2018 e janeiro de 2019 e entre maio e junho de 2019, respetivamente.

A análise de conteúdo foi realizada com o apoio do software NVivo (QSR International).

Resultados

Durante o primeiro dia no hospital, as taxas de aleitamento materno exclusivo foram altas tanto entre as mulheres imigrantes (89.2%) quanto entre as mulheres nativas (87.4%). Foi

encontrada uma associação positiva entre as participantes imigrantes e o aleitamento materno exclusivo durante as primeiras 24 horas após o nascimento (OR = 1.19, IC 95% [1.00, 1.41]). Em hospitais sem a acreditação “Amigo dos Bebés”, as mulheres dos países da Europa de Leste apresentaram uma probabilidade maior de amamentar exclusivamente do que as mulheres portuguesas nativas (aOR = 2.46, IC 95% [1.27, 4.78]). Nos hospitais “Amigo dos Bebés”, não foram encontradas diferenças entre mulheres imigrantes e portuguesas nativas (**Artigo I**).

As mulheres imigrantes mostraram-se menos propensas a interromper o aleitamento exclusivo (aHR = 0.81, IC 95% = 0.72–0.91) e não exclusivo (aHR = 0.54, IC 95% = 0.44–0.66) do que as mulheres nativas. Os fatores de mercado influenciaram a duração do aleitamento materno exclusivo e não exclusivo. As mulheres que receberam amostras grátis de fórmulas infantis por parte de um profissional de saúde mostraram mais propensão para abandonar o aleitamento exclusivo (aOR = 1.37, IC de 95% [1.13-1.66]). A exposição a descontos em fórmulas infantis foi associada com a interrupção do aleitamento exclusivo (aHR = 1.22, 95% CI = 1.09-1.38) e não exclusivo (aHR = 1.21, 95% CI = 1.00-1.46). Não foram encontradas interações entre o estatuto de imigrante e os fatores de mercado (**Artigo II**).

A intenção de amamentar das mulheres imigrantes brasileiras não mudou após imigrarem para Portugal, apesar destas participantes terem relatado uma maior exposição aos fatores de mercado quando comparadas com as nativas brasileiras. As mulheres imigrantes brasileiras mostraram-se mais cientes do potencial impacto prejudicial do marketing da indústria de substitutos do leite materno sobre as práticas ideais de aleitamento materno, referindo-se muitas vezes às mensagens de promoção da amamentação veiculadas por membros da família e *stakeholders* institucionais no Brasil. As suas crenças culturais em relação à alimentação infantil parecem desempenhar um papel protetor importante contra os

efeitos da exposição a fatores de mercado no país de acolhimento, que foi percebido como um ambiente menos favorável ao aleitamento materno (**Artigo III**).

Conclusão

Os resultados apresentados nesta tese fornecem novas evidências sobre a influência dos fatores de mercado nas mulheres imigrantes. Em hospitais sem a acreditação “Amigo dos Bebés”, as taxas de aleitamento materno exclusivo foram maiores entre mulheres de países do Leste Europeu, enquanto em hospitais “Amigo dos Bebés”, não foram encontradas diferenças entre mulheres imigrantes e nativas. Esses resultados sugerem que a implementação da Iniciativa “Hospital Amigo dos Bebés” pode ter contribuído para atenuar as desigualdades nas taxas de aleitamento materno exclusivo entre mulheres imigrantes e nativas durante o primeiro dia de internamento.

Os efeitos de curto e longo prazo dessa política de saúde global foram amplamente demonstrados. O que esta tese acrescenta é o seu potencial em reduzir as diferenças entre mulheres nativas e imigrantes. É necessário investigar mais sobre os fatores socioculturais e estruturais que influenciam as práticas de alimentação infantil entre mulheres de países do Leste Europeu dada a sua elevada preferência pelo aleitamento materno.

Numa fase posterior, as mulheres imigrantes mostraram um risco menor do abandono do aleitamento exclusivo e não exclusivo e uma menor exposição ao marketing da indústria de substitutos do leite materno. No entanto, o fornecimento de amostras grátis de fórmulas infantis por parte de um profissional de saúde e os descontos tiveram um impacto negativo sobre o aleitamento materno exclusivo e não exclusivo, independentemente do estatuto de imigração e do país de nascimento da mãe. Assim, deve-se evitar a distribuição de amostras de fórmulas gratuitas, especialmente por profissionais de saúde, e proibir os descontos em todos os tipos de fórmulas, seguindo as recomendações do Código. Além disso, as mulheres imigrantes devem

ser protegidas também dos fatores de mercado, uma vez que, quando expostas, podem sofrer as mesmas consequências das mulheres nativas.

O estudo qualitativo revelou que os fatores culturais podem mediar a relação entre a exposição ao marketing da indústria de substitutos do leite materno e as intenções e práticas de aleitamento. Tanto as mulheres brasileiras imigrantes quanto as mulheres brasileiras nativas mostraram uma clara intenção de amamentar exclusivamente os seus filhos e valorizam muito o vínculo afetivo entre a criança e a mãe estabelecido por meio da amamentação. Essas crenças culturais foram fortalecidas por estratégias de promoção da amamentação no seu país de origem, o que pode ter um efeito protetor de longa duração contra a influência dos fatores de mercado observados em países onde foram implementadas menos disposições do Código.

Em conclusão, esta tese contribui para aumentar o conhecimento sobre a influência do marketing da indústria nas práticas de alimentação infantil nas mulheres imigrantes. As principais implicações políticas deste estudo prendem-se com a importância das estratégias de promoção do aleitamento materno que parecem contribuir para aumentar e manter a intenção e prática de amamentar das mulheres, assim como para protegê-las contra o marketing da indústria de substitutos do leite materno. Por estas razões, as estratégias de promoção do aleitamento devem permanecer alvo de investimento tanto nos países onde o Código é implementado de forma mais vigorosa como nos países onde não é. No entanto, um controle e proteção mais fortes contra os fatores de mercado é ainda mais necessário em países com poucas disposições do Código visando quer mulheres nativas quer mulheres migrantes de modo a garantir práticas ideais de aleitamento em toda a população.

1. Introduction

1.1. Breastfeeding in the 21st century

1.1.1. Breastfeeding: A Global Public Health issue

The first 1,000 days of life, which include the period from conception until a child's second birthday, has been considered a window of opportunity for child health, growth and development (Cunha et al., 2015; Thurow et al., 2016). Evidence shows that optimal nutrition in early childhood may have far lasting consequences in later life, reducing the risk of malnutrition, overweight and obesity and contributing to human capital. Breastmilk is considered the best source of nutrition for infants (Bhutta et al., 2008; Black et al., 2013; Victora, et al., 2008). The World Health Organization ([WHO], n.d. a) recommends early initiation of breastfeeding (i.e. within the first hour after birth), exclusive breastfeeding for the first six months of life and then introduction of adequate complementary foods while continuing to breastfeed until 2 years of age and beyond.

Breastfeeding is also considered a child right. In this regards, article 24 of the Convention on the Rights of the Child (1989) encourages all the States Parties to take measures:

to ensure that all segments of society, in particular parents and children, are informed, have access to education and are supported in the use of basic knowledge of child health and nutrition, the advantages of breastfeeding, hygiene and environmental sanitation and the prevention of accidents (United Nations General Assembly, 1989, Art.24).

It has been estimated that 823,000 annual lives could be saved among children young than 5 years by scaling-up breastfeeding globally (Victora et al., 2016). Breastfeeding benefits have been identified across distinct country groups. According to Victora et al. (2016), breastfeeding has been associated with lower infant mortality, not only in low- and middle-income countries, but also in high-income countries, by reducing the risk of sudden infant deaths and necrotizing enterocolitis. It also protects children against diarrhea and respiratory infections and reduces

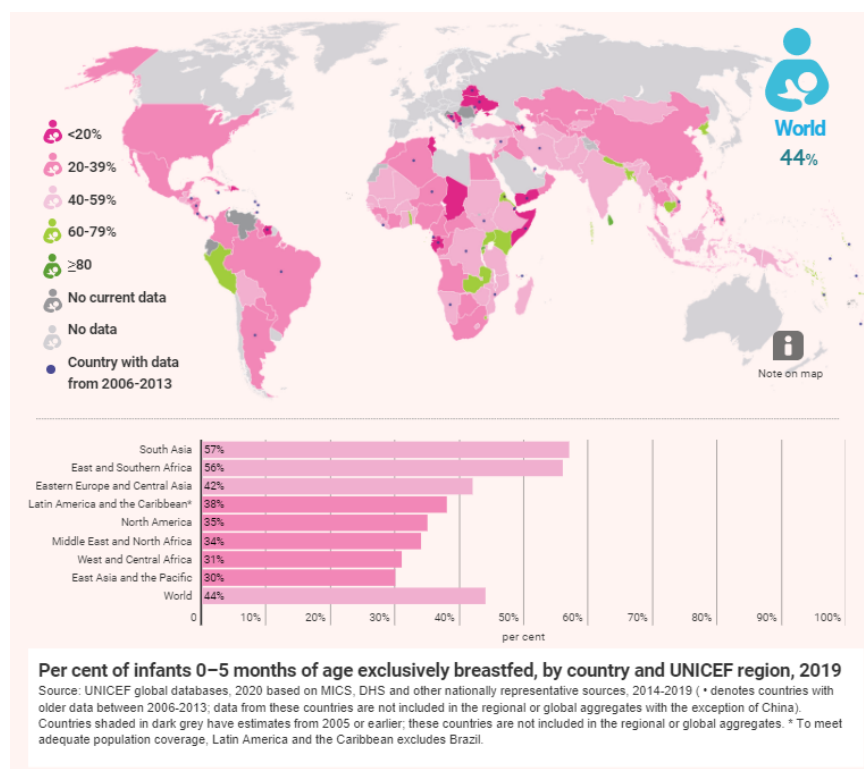
the risk of otitis media up to 2 years of age. Additionally, in low-middle income countries, it was associated with lower risk of malocclusions. Evidence also points to a possible association of longer breastfeeding duration with reduced risk of overweight or obesity and diabetes in later life (Victora et al., 2016). Children breastfed for 12 months or more may have improved performance in intelligence tests, higher educational attainment and income in adulthood, than those ones breastfed for less than 1 month (Victora et al., 2015). Breastfeeding thus contributes to improved human capital (Victora et al., 2015, 2016).

Aside from its positive effects on children and society, breastfeeding also impacts positively on maternal health. Longer breastfeeding duration has been associated with improved birth spacing, reduced risk of breast cancer, and possibly ovarian cancer and type 2 diabetes (Victora et al., 2015). Furthermore, being naturally available, breastmilk contributes to environmental sustainability and food security (Rollins et al., 2016). It also contributes to avoiding the environmental and economic costs associated with breastmilk substitutes (Cadwell et al., 2020; Rollins et al., 2016).

Despite the far-reaching benefits of breastfeeding for mothers, children, the environment and the whole society, global breastfeeding rates still fall short of those set by international recommendations, as shown in Figure 1 (United Nations Children's Fund [UNICEF], 2021). Globally, only 44% of infants aged 0-5 months are exclusively breastfed, which means that three in five infants in this age window are not receiving an optimal nutrition (UNICEF, 2021). In addition, research has shown that inequities exist between and within countries. Breastfeeding duration is longer in low-income and lower-middle-income countries than in high-income countries (Victora et al., 2016). Within lower-middle-income countries, an inverse correlation has been found between per capita gross domestic product and both exclusive breastfeeding at 6 months and continued breastfeeding at the age of 12–15 months

(Neves et al., 2020). Conversely, a positive correlation with breastmilk substitutes intake was observed, which is higher as household income increases (Neves et al., 2020). Moreover, while in lower-middle-income countries breastfeeding duration is higher among mothers with low socioeconomic status, in high-income countries the opposite is true (Victora et al., 2016). In lower-middle income countries, these inequalities may be due to higher purchasing power of breastmilk substitutes among the richest quintile (Neves et al., 2020), while in high-income countries higher levels of education may be responsible for more informed infant feeding decisions (Al-Sahab, 2010). Thus breastfeeding can contribute to closing the gap between lower-middle-income countries and high-income countries, which will otherwise tend to widen (Victora et al., 2016). Hence investing in breastfeeding is crucial not only to promote maternal and child health, but also for equity and society well-being.

Figure 1. *Exclusive Breastfeeding Rates by Country and UNICEF Region.*



Source: UNICEF, 2021.

Breastfeeding protection, support and promotion are in line with the Sustainable Development Goals (SDGs), also called Global Goals. The SDGs were adopted by the United Nations (n.d.) in 2015. They aim for a more sustainable and equal world and are meant to be achieved by 2030. Breastfeeding is relevant to achieving SDG1 - *no poverty* and SDG2 - *zero hunger* given that breastmilk tends to be naturally available (World Alliance for Breastfeeding Action [WABA], n.d.). It also contributes to SDG3 - *good health and well-being*, by promoting maternal and child health, reducing the risk of infection and non-communicable diseases, and under-five year mortality rates (WABA, n.d.). By improving cognitive ability, educational attainment and income later in life, it can facilitate the achievement of SDG4 - *quality education*, SDG8 - *decent work and economic growth*, and consequently strengthen SDG1 - *no poverty* and enable SDG10 - *reduce inequalities* (WABA, n.d.). Finally, it helps to achieve SDG4 - *gender equality*, especially in settings where there is limited access to reproductive health services, by enabling women to birth control (WABA, n.d.). However, worldwide breastfeeding rates are still low. Not investing in breastfeeding has been considered a missing opportunity to improve global health and the economy (The Lancet, 2017). Protecting, promoting and supporting breastfeeding is therefore a Global Public Health priority.

1.1.2. Determinants of breastfeeding

Despite the large body of evidence showing the benefits of breastfeeding for individuals, communities and the environment, exclusive breastfeeding rates in the first six months of life are much lower than recommended. This highlights the so called “weaning paradox”, which points to the fact that, although the benefits of exclusive breastfeeding have been scientifically proven, early introduction of formula, foods or drinks other than breastmilk is common in many parts of the world (Almeida, 2004). To disentangle the factors sustaining this paradox and understand the determinants of breastfeeding, a comprehensive and

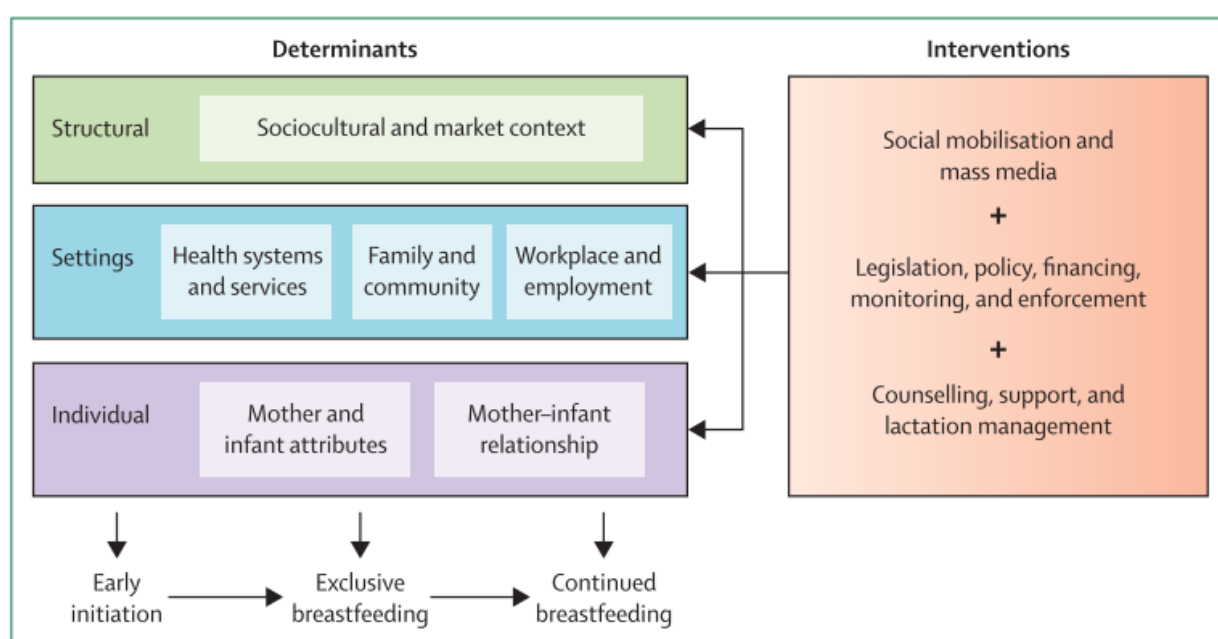
multidisciplinary approach is needed, considering not only the biological factors, but also taking into account the structural factors that shape infant feeding norms (Almeida, 2004; Rollins et al., 2016). In other words, breastfeeding is influenced by both biological and social dimensions. It is important thus to rethink breastfeeding in a more integrative way and to frame it as a nature-culture hybrid (Almeida, 2004).

In a paper published within the *Lancet* Breastfeeding Series, Rollins et al. (2016) suggested a conceptual model explaining the proximal and distal determinants that shape breastfeeding practices and behaviors (see Figure 2). The distal determinants of breastfeeding entail structural factors, namely social norms, cultural beliefs and market factors. These factors operate in a unidirectional way in shaping infant feeding decisions. Furthermore, although the whole community is exposed to them, they target pregnant women and mothers of young children in a more direct and personalized fashion than men and other community members. Structural factors exercise their influence over three main settings: 1) health system and services providing pre-, post- and perinatal healthcare; 2) family and the community (i.e. female relatives' experiences, father' beliefs and preferences, etc.); and, 3) the workplace and employment.

The proximal determinants of breastfeeding include: 1) maternal characteristics, such as confidence (Avery et al., 2009) and self-efficacy (Lau et al., 2018), previous breastfeeding experience (Colombo et al., 2018; Huang et al., 2019b), age (Colombo et al., 2018) and education (Colombo et al., 2018; Fernández-Cañadas Morillo, et al., 2017; Zakarija-Grković et al., 2016), parity (Fernández-Cañadas Morillo et al., 2017; Zakarija-Grković et al., 2016), mode of delivery (Chen, 2018 et al.; Hobbs et al., 2016), smoking (Liu et al., 2016), obesity (Huang et al., 2019a; Lyons et al., 2019), diabetes (Carmody, 2019 et al.; Haile et al., 2016), depression (Butler, 2021 et al.; Dadi et al., 2020) and migration status (Dennis et al., 2019); and, 2) infant characteristics, such as gestational age (McDonald et al., 2012) and prematurity (Bonnet et al.,

2019; Rodrigues et al., 2018). It is worth mentioning that breastfeeding implies constant interactions between the baby and the mother (Peñacoba et al., 2019). Mother's perceptions and interpretation of baby clues are, in turn, influenced by the distal determinants of breastfeeding (Rollins et al., 2016). Thus, ensuring an environment enabling breastfeeding is crucial for optimal nutrition.

Figure 2. *Conceptual Model of Determinants Shaping Breastfeeding Practices and Behaviors.*



Source: Rollins et al., 2016, p.492.

The contexts where infant and young children feeding practices are shaped, also called “first-food environments”, have suffered a transformation caused by globalization and subsequent structural changes (Baker, Santos, et al., 2021), which have caused breastfeeding to decline and an increasing breastmilk substitutes consumption over time (Baker, Russ, et al., 2021; Baker, Santos, et al., 2021). The nature of this transition is multifactorial and entails economic, demographic and socio-cultural drivers (Baker, Santos, et al., 2021). Across countries, economic growth leads to an increase in purchasing power which translates into formula milk becoming more affordable and accessible. Within countries, economic growth is

associated with shorter breastfeeding duration and higher breastmilk substitutes consumption among those in the richest quintile (Baker, Santos, et al., 2021; Neves et al., 2020). Regarding demographic factors, urbanization contributes to increased accessibility of breastmilk substitutes and exposure to formula industry marketing. This, combined with changes in lifestyle and family structure (i.e. from extended to nuclear families) drives formula feeding up (Baker, Santos, et al., 2021). Socio-cultural drivers include changes in gender roles and motherhood values such as increased women participation in the workforce and shared responsibility of infant feeding with other family members, which can lead to a reduction of breastfeeding. Furthermore, the hypersexualization of the breast and the stigmatization of breastfeeding in public, may lead to the de-normalizing breastfeeding (Baker, Santos, et al., 2021; Hannan et al., 2005; Scott & Mostyn, 2003). Social norms and beliefs about breastfeeding may also be shaped by industry marketing strategies that portray formula as a valid breastmilk substitute, thus normalizing it (Piwoz & Huffman, 2015). Additionally, healthcare settings providing maternal and child care might be instrumentalised by the formula industry as privileged channels to exercise influence over infant feeding behaviors' and practices. This can occur through the distribution of free formula samples to women but also through marketing strategies that target health professionals (e.g. industry-sponsored educational events on infant feeding). Because health professionals are a trustful source of information about infant feeding those strategies can be especially effective in changing infant feeding practices (Baker, Santos, et al., 2021; Harris & Pomeranz, 2020). The medicalization of pregnancy, birthing and post-natal care also turned some hospital practices more common, namely cesarean sections and unnecessary in-hospital formula supplementation, which discourage breastfeeding (Baker, Santos, et al., 2021). Increased women participation in the workforce, without adequate paid maternal leave, workplace entitlements and social and family support is also a risk factor for suboptimal breastfeeding practices (Baker, Santos, et al., 2021,

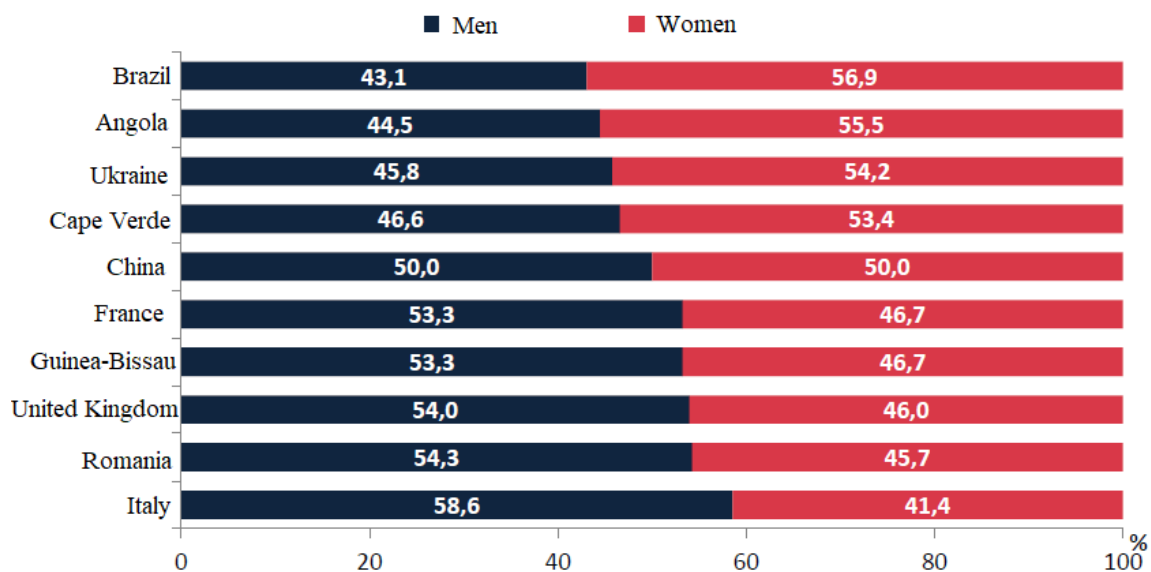
Rollins et al., 2016). Hence, breastfeeding is influenced by a wide range of factors that go beyond the sole responsibility of women. Ensuring first-food environments that are favorable to breastfeeding is crucial to enabling mothers to consider this as a viable option.

1.1.3. Breastfeeding and migration

Migration status is considered a determinant of health (Andersen et al., 2016; Castañeda et al., 2015; El-Khoury et al., 2018; Eslier et al., 2020; Lesueur et al., 2018) and it has been also associated to breastfeeding (Dennis et al., 2019). Widening inequalities and advances in transportation and communication technology related to globalization have led to an increase in the trend of international migration over the last decades (International Organization for Migration [IOM], 2019). In 2019, approximately 272 million of people were living in a country other than their country of origin, over three times more people when compared to 1970 (IOM, 2019). About 74% of these migrants were of working age (20–64 years) and 48 % were female (IOM, 2019). Between 2000 and 2019, Europe was the region with the second largest growth in international migration, after Asia (IOM, 2019).

In Portugal, migration declined as a result of a financial crisis between 2011 and 2016, which had a very negative impact on the labor market and beyond (Legido-Quigley et al, 2016). Since then, the percentage of migrants with a resident permit increased rapidly, from 3,9% in 2016 to 5,7% in 2019, corresponding to about 600,000 people (Oliveira, 2020). Between 2012 and 2018, a feminization of migration occurred. A higher percentage of women was observed among the four largest migrant groups in Portugal, which include Brazilian, Angolan, Ukrainian and Cape Verdean migrants. As shown in Figure 3, women from Brazil amounted to 56,9% of the whole Brazilian population in Portugal (Oliveira, 2020, p.68). In 2018, migrant women contributed to 11% of all births in Portugal. This is a high percentage considering that only 4,7 % of the whole population are migrants (Oliveira, 2020).

Figure 3. *Migrants Living in Portugal in 2019 (%) Stratified by Nationality and Sex.*



Adapted from Oliveira, 2020, p. 68.

Being a mother in a new country may be challenging. Migrants tend to experience more barriers to access to maternal care than natives (Starrs et al., 2018; De Freitas et al., 2020). Furthermore, lack of social support, unfamiliarity with the healthcare system, language barriers, higher risk of postpartum depression and financial insecurity can hinder optimal breastfeeding practices (Frenoy et al., 2021; Hamwi et al., 2021; Joseph et al., 2018). However, robust evidence exists of an “healthy migrant effect” regarding breastfeeding as migrant mothers tend to adopt healthier behaviors when compared to their native counterparts (Nolan & Layte, 2015; Urquia et al., 2012). A recent systematic review, including women from 14 high-income countries, showed that initiation and duration of any breastfeeding were significantly higher among migrant women, although the same was not found for exclusive breastfeeding (Dennis et al., 2019). Initiation of exclusive breastfeeding was borderline significant, and higher, in migrant than in non-migrant women (Dennis et al., 2019). A study conducted in Portugal showed that median breastfeeding duration of any and exclusive breastfeeding was higher among migrant women when compared to natives (Kana et al., 2018).

However, US-based research found an inverse association between acculturation and breastfeeding rates, with longer length of stay in the host country showing a detrimental effect on breastfeeding (Bigman et al., 2018). Acculturation was defined as “those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original culture patterns of either or both groups” (Redfield et al., 1936, p. 149), which in the case of the study mentioned resulted in lower breastfeeding rates.

Migrant mothers living in high-income host countries may experience contradictions and conflicts around breastfeeding (Busck-Rasmussen et al., 2014; Schmied et al., 2012). Social and cultural norms about breastfeeding in their country of origin may contrast with a perceived formula feeding norm and with the advice provided by female relatives living in the host country (Schmied et al., 2012). Formula use may be more convenient than breastmilk for migrant mothers, as they may benefit from less social support and experience breastfeeding problems for which they may not be able to identify prompt assistance with (Schmied et al., 2012). Increased formula availability and affordability, comparatively to their country of origin, may be detrimental for optimal breastfeeding practices (Schmied et al., 2012). Moreover, mixed messages about breastfeeding by health professionals may cause confusion among migrant mothers (Schmied et al., 2012). Thus, understanding the socioeconomic and structural factors that influence migrants’ breastfeeding behaviors in the host country is fundamental to protect, promote and support breastfeeding among this migrant population.

1.2. Breastfeeding, industry marketing and conflict of interests

1.2.1. Commercial determinants of breastfeeding

One of the effects of globalization is the worldwide expansion of the transnational corporations' market, which led to the so-called industrial epidemics (Stuckler et al., 2012). The aggressive marketing of unhealthy commodities, such as alcohol and ultra-processed food and drinks, has raised concern about the negative impact of commercial determinants of health on non-communicable diseases, and on public health more generally (Kickbusch et al., 2016; Moodie et al., 2013). The industry of breastmilk substitutes is not exempt from this phenomenon, which has been responsible for infant and young child feeding transition to higher formula diets (Baker, Santos, et al., 2021). While the harmful impact of big corporations (e.g. Big Food, Sugar-Sweetened Beverages, Tobacco and Alcohol industries) on the global burden of non-communicable diseases is well-known (Moodie et al., 2013), the negative impact of breastmilk substitutes on health may be counter intuitive, since infant formula is medically indicated in a few specific medical conditions (WHO, 2009a). Furthermore, the industry marketing strategies have contributed to normalize the use of infant formula, by influencing social norms and turning the use of breastmilk substitutes into a valid alternative to breastmilk and a matter of lifestyle choice (Piwoz & Huffman, 2015). In addition, the messages conveyed by industry advertising may disempower women, by increasing expectations of failure related to breastfeeding (Parry et al., 2013; Piwoz & Huffman, 2015). Mothers may doubt that their milk is sufficient and nutritionally adequate to meet the infant needs (Parry et al., 2013). Moreover, advertising may portray infant formula as a solution for infant behaviors that are not considered medical conditions (e.g. fussiness, spitting up, etc.) (Parry et al., 2013).

The marketing strategies used by breastmilk substitutes companies are intended for different stakeholders: 1) lay stakeholders, i.e. the general public and, specifically, pregnant

women and mothers of young infants (Hastings et al, 2020; Rollins et al., 2016); and, 2) institutional stakeholders, including policy-makers, researchers, health professionals and health workers (Piwoz & Huffman, 2015). Those strategies integrate the multiple efforts and large investments made by the industry to compete with a product which is cost-free for parents and the environment, naturally available, and which has a wide range of benefits (Hastings et al, 2020; Victora et al., 2016). They will be described in more detail below.

1.2.1.1. Pregnant women and mothers of young infants

The promotion of breastmilk substitutes among pregnant women and mothers of young infants is carried out in multiple settings and employs various strategies. Such marketing strategies have been classified according to the setting where they occur, as follows: 1) promotion through healthcare workers and health services; and, 2) direct-to-consumer marketing (Government Accountability Office [GAO], 2006).

Table 1. *Types of Marketing Strategies*

Types of marketing strategies
Through the medical community (examples): • Formula ads and free samples given to pregnant women in doctors’ offices • Free or reduced-price formula given to hospitals for use in the hospital • Free formula samples in hospital discharge packs • “Dear Health Care Provider” letters explaining the benefits of particular formulas • Training for health care professionals about various infant formula products • Promotional items (e.g., pens, baby name cards, calendars) Directly to the consumer (examples): • Mass media advertising: television, radio, and print ads • Coupons and free formula sent to the homes of pregnant women and new mothers • Web sites promoting infant formula products • Prominent displays of infant formula products on grocery store shelves to directly appeal to shoppers

Adapted from GAO, 2006.

Research on the commercial determinants of breastfeeding has focused mainly on the in-hospital provision of industry-sponsored discharge packs, containing free formula samples, coupons or both, and it is mostly US-based, where this practice is widespread (Huang et al., 2013; Sadacharan et al., 2014). Several studies have shown a negative association between the provision of free formula samples in the form of discharge packs and breastfeeding exclusivity at different time points (Snell et al., 1992; Rosenberg et al., 2008; Sadacharan et al., 2014), with one of those studies showing no association with breastfeeding duration (Rosenberg et al., 2008). Conversely, among more vulnerable groups, namely primiparous, less educated and becoming ill postpartum women, the receipt of formula samples may significantly decrease breastfeeding duration (Bergevin et al., 1983). In addition, a study with participants from a low-income minority cultural group showed that industry-sponsored discharge packs are associated with decreased exclusive breastfeeding rates at 3 weeks after delivery (Snell et al., 1992).

Some researchers went further and observed that removing industry-sponsored packs containing formula samples from the hospital increases breastfeeding rates at 10 weeks postpartum (Feldman-Winter et al., 2012). However, the distribution of free formula samples, along with other industry-sponsored material, may occur also in other healthcare settings besides the birthing hospital, such as obstetric and pediatric clinics (Feldman-Winter et al., 2012; Howard et al., 2000). Based on findings from a randomized clinical trial, the provision of free formula samples within obstetric clinics may determine the discontinuation of breastfeeding before discharge and any and exclusive breastfeeding before two weeks postpartum (Howard et al., 2000). Women with uncertain or limited (12 weeks or less) breastfeeding goals represent a more vulnerable population, with a higher risk of breastfeeding discontinuation (Howard et al., 2000).

Free formula samples and industry-sponsored coupons can be marketed directly to pregnant women and new mothers by mail (GAO, 2006). The receipt of free formula samples by mail, either in the prenatal or postnatal period (until 1 month postpartum) has been associated with decreased rates of exclusive breastfeeding by 6 months postpartum, but no significant association was found through 5 months of infant age (Waite & Christakis, 2016). The authors of the study argued that, along this period, the perception of formula endorsement by health professionals and hospitals, associated to the receipt of discharge packs containing formula samples, combined with mothers perceived insufficient breastmilk supply, may be more effective in decreasing the duration of exclusive breastfeeding (Waite & Christakis, 2016). Formula feeding mothers that received a discharge pack containing formula samples are more likely to choose the hospital formula at 1 month postpartum when compared to those ones that did not receive it (Huang et al., 2013). In addition, mothers using an infant formula recommended by a health professional during the first infant month of age, are less likely to switch it, in later infancy, for non-health-related reasons (Huang et al., 2013). Thus formula industry marketing through health professionals, is not only detrimental for breastfeeding practices, it also works as a powerful strategy to create fidelity to a product that is usually more expensive than others in the market (Huang et al., 2013).

Aside from free formula samples, manufacturers try to grow their sales through a range of other types of direct-to-consumer advertising: ads on magazines, websites, television or radio, company helplines, direct mail, baby clubs, and online chats, promotions at retailers (including online stores) such as special displays or price discounts, thus increasing formula visibility, availability and affordability (Baker, Santos, et al., 2021; Harris & Pomeranz, 2020). A study conducted in United States revealed that the frequency of hand feeding (e.g. infant formula, cereal/solid food, or hand feeding equipment) advertisements in parenting magazines is predictive of decreased breastfeeding rates in the next year (Foss et al., 2006). Moreover,

evidence shows that, even when the number of breastfeeding ads in magazines is higher compared to formula ads, breastfeeding may be portrayed as a difficult practice, thus discouraging it (Frerichs et al., 2006). Another study assessed the impact of exposure to different types of formula media marketing within the antenatal period on breastfeeding outcomes and showed that exposure to formula information from print sources decreases intended duration of exclusive breastfeeding, while recalled formula information from websites is negatively associated with intended and actual breastfeeding (Zhang et al., 2013). The use of social media, baby clubs and company helplines have raised growing concern about the potential negative influence on breastfeeding rates (Hastings et al., 2020; Pereira-Kotze et al., 2020). Other forms of marketing, such as discounts and special displays, are also widespread and a reason of concern (Silva et al., 2020), but their impact on breastfeeding behaviors has not been investigated yet. Assessing whether and how these marketing strategies influence infant feeding norms and practices is fundamental to develop effective policies, programs and campaigns to promote breastfeeding in early life.

1.2.1.2. Institutional stakeholders and conflict of interests

Institutional stakeholders, including policy-makers, researchers, health professionals and health workers responsible for infant and young child nutrition, are also a target of formula industry marketing strategies (Baker, Santos, et al., 2021; Grummer-Strawn et al., 2019; Harris & Pomeranz 2020; Hastings et al., 2020; Sobel et al., 2001; Wright & Waterston, 2006). Health professionals, such as pediatricians, nurses, midwives, dietitians and lactation consultants are considered a reliable source of information by parents. Thus, marketing strategies targeting health professionals have the potential to influence, women's infant feeding decisions, albeit in an indirect way (Baker, Santos, et al., 2021; Piwoz & Huffman, 2015). A large proportion of companies' salesforce is dedicated to engaging health professionals in industry marketing,

which is highly profitable (Baker, Santos, et al., 2021). For example, in 2010 Mead Johnson allocated about 71% of its sales workforce to the healthcare sector (Baker, Santos, et al., 2021). Formula feeding advice by a health professional and free formula sample provision at hospital discharge tend to be interpreted by women as a medical endorsement of formula, thus increasing the chances of them using it (Snell et al., 1992; Sobel et al., 2011). Additionally, in-hospital formula supplementation is predictive of later suboptimal breastfeeding practices (Whipps et al., 2021). Hence, ensuring a healthcare environment where both health professionals and mothers are free from the pressure exerted through formula industry marketing strategies is crucial for an optimal nutrition.

Aside from free formula samples, health professionals might be offered also other industry-sponsored products, such as lanyards, mugs and pens (Baker, Santos, et al., 2021). Studies on pharmaceutical industry marketing have showed that small gifts with the company brand name on them may also sublimely influence physician prescriptive behavior (Lo et al., 2009; Wazana et al., 2020). Other marketing strategies include sponsorship at various levels: provision of low-cost or free formula supplies for use in healthcare settings and the sponsoring of clinical equipment or services, key opinion leaders, professional medical associations, scientific meetings attendance and continuation of medical education (Baker, Santos, et al., 2021; Tanrikulu et al., 2020; Wright & Waterston, 2006). Donations to public healthcare institutions is part of a business model that is often called “corporate social responsibility” and which consists of actions benefiting the community and society while boosting the company brand (Granheim et al., 2017). A study analyzing 114 pediatric associations in several countries revealed that 60% of them received industry sponsorship, namely for educational events, and that only a few of them had a regulatory policy concerning corporate sponsorship, as shown also in previous research on the pharmaceutical industry (Fabbri et al., 2016; Grummer-Strawn et al., 2019). Linking the name of the brand with health professionals and professional medical

associations is a way to increase products' credibility (Wright & Waterston, 2006). Other marketing strategies include the creation of new research institutes or sponsorship of fellowships and research grants with the final purpose of producing industry-favorable evidence, and lobbying activities to influence policy making (Baker, Santos, et al., 2021; Grummer-Strawn et al., 2019; Harris & Pomeranz 2020; Hastings et al., 2020; Wright & Waterston, 2006).

Institutional stakeholders working in the field of infant and young child nutrition should hold as a primary interest the protection, promotion and support of breastfeeding, thus accepting financial incentives or gifts by formula industry raises a conflict of interest. According to the definition given by Thompson (1993), and adopted by the Institute of Medicine (US) Committee on Conflict of Interest in Medical Research, Education and Practice (Lo et al., 2009), "a conflict of interest is a set of conditions in which professional judgment concerning a primary interest tends to be unduly influenced by a secondary interest (Thompson, 1993, p. 573)". According to this definition, industry sponsorship sets the conditions for a conflict of interests, where a set of primary interests, namely maternal and child health promotion, integrity of professional judgment, quality of medical education and validity of research, may be influenced by financial incentives. The conflict of interests is eminent when the secondary interest prevails over the primary interest. Accepting funding, donations and gifts from the industry creates a sense of obligation and loyalty to companies that may lead to recipients being unconsciously unwilling to speak, or think, ill of them and their products (Wright & Waterston, 2006). Yet, even when institutional stakeholders are not influenced by industry marketing, they are indirectly lending credibility to breastmilk substitutes companies by associating their name to them (Wright & Waterston, 2006).

While Thompson' definition of conflict of interests helps to clarify the interplay between contrasting interests, the legal definition given by Rodwin (2017) emphasizes the

importance of institutional stakeholders' duties and obligations: "a conflict of interest exists where an individual has an obligation to serve a party or perform a role and the individual has either: 1) incentives or 2) conflicting loyalties, which encourage the individual to act in ways that breach his or her obligations. (Rodwin, 2017, p. 10)". As such, conflict of interests may arise, not just because of financial incentives, but also between contrasting roles. In this regard, Law Professor Peters warns: "the conflict we are dealing with is an intrapersonal [intra-institutional] conflict arising within a human or an institution which is entrusted with such [fiduciary] decision making. It is not a clash between different actors" (Rodwin, 2017, p. 4). Policies aiming to address conflicts of interests may help to prevent possible harm and to maintain public trust in health professionals, professional medical associations, researchers and policy makers, thus contributing to promoting optimal infants and young children nutrition.

1.2.2. The International Code of Marketing of Breast-milk Substitutes

In low-middle income countries, formula consumption has been associated to the so-called "commerciogenic" malnutrition (Jelliffe, 1972). In the late 1970's, the inappropriate preparation of formula resulting from over-dilution or dilution with unclean water, led to an increase of child malnutrition, intestinal infections caused by water-borne pathogens and higher infant mortality rates, particularly among infants whose families had a low socioeconomic status and therefore experienced difficulty in affording formula in the doses that were necessary to feed them (Brady, 2012; Anttila-Hughes et al., 2018). It has been estimated that 66,000 infants died in 1981 due to improperly prepared infant formula feedings in low-middle income countries (Anttila-Hughes et al., 2018). Widespread inadequate formula consumption, and the consequent rise in infant mortality in these settings, has been attributed to the aggressive and unethical marketing of Nestlé – the first formula company expanding its market in these settings (Anttila-Hughes et al., 2018). Some of its marketing strategies, which include the

provision of low-cost or free supply of infant formula to health care clinics and the use of corporate mothercraft nurses (sales representatives in nurse uniforms recommending formula to new mothers), were denounced in a famous report called the “The Baby Killer” (Muller, 1975). This, along with research on infant mortality in low-middle income countries, raised a public debate and activism against the unethical formula industry marketing, resulting in the international boycott of Nestlé in 1977 and in public hearings with main responsible stakeholders on this issue in 1978 (Anttila-Hughes et al., 2018).

Recognizing the negative impact of improper and unethical formula industry marketing on optimal infant feeding, the WHO (1981) approved the International Code of Marketing of Breast-milk Substitutes (hereafter referred to as the Code) in 1981. The Code is a set of recommendations banning the marketing of breastmilk substitutes, but not their availability (WHO, 1981). The products considered under the scope of the Code are: *breastmilk substitutes*, including infant formula; *other milk products, foods and beverages*, including bottle-fed complementary foods, when marketed or otherwise represented to be suitable, with or without modification, for use as a partial or total replacement of breastmilk; and, *feeding bottles and teats* (WHO, 1981). The WHO (2017) Guidance on Ending the Inappropriate Promotion of Foods for Infants and Young Children, further clarifies that *follow-on milks* (for infants aged 6–12 months) and *toddler milks* (for children aged 12 months and older), are also covered by the Code, since they replace the consumption of breastmilk partially or totally.

The Code consists of 11 articles with provisions concerning: 1) information and education on infant feeding; 2) promotion of breastmilk substitutes and related products to the general public, mothers, health workers and in healthcare settings; 3) labelling and quality of breastmilk substitutes and related products; and, 4) implementation and monitoring of the Code

(WHO, 1981). They are presented in more details in Table 1 (Harris & Pomeranz, 2020, p. 869).

Table 2. *Overview of Code provisions.*

<i>Article 4 regulates information and educational materials about infant feeding:</i> • All materials should include information on the benefits and superiority of breastfeeding, the risk of artificial feeding, the negative effect on breastfeeding of partial bottle feeding, the difficulty of reversing the decision to not breastfeed, and health hazards of improper use of infant formula. • Industry-prepared educational materials should not be provided to the general public. <i>Article 5 prohibits all promotion to the general public:</i> • All advertising in any form; • Providing product samples, both directly and indirectly; • Promotions at retailers, including post-of-sale displays, coupons, premiums, and short-term price discounts (ie, sales); and • Any contact between manufacturers or distributors and pregnant women or mothers of infants, including company help-lines, direct mail, baby clubs, and online chats. <i>Article 6 prohibits all promotion through the healthcare system:</i> • Providing free or low-cost samples; • Donations of branded equipment or materials; and • Demonstrations of infant formula feeding by marketing representatives from manufacturers/distributors. <i>Article 7 prohibits health workers from endorsement by association:</i> • Financial or material inducements to promote products; • Fellowships, research grants, or professional development from manufacturers/distributors; and • Provision of product samples to pregnant women, mothers, or families. <i>Article 9 sets requirements for labeling and quality:</i> • No nutrition or health claims; • No images or text that idealize infant formula feeding; and • Must clearly state that breastfeeding is superior, use only with the advice of a health worker, and instructions and warnings about proper preparation. <i>Articles 10 and 11 cover implementation and monitoring:</i> • Governments are responsible for monitoring. • Manufacturers and distributors are responsible for adherence, even in countries where governments have not fully implemented the Code.

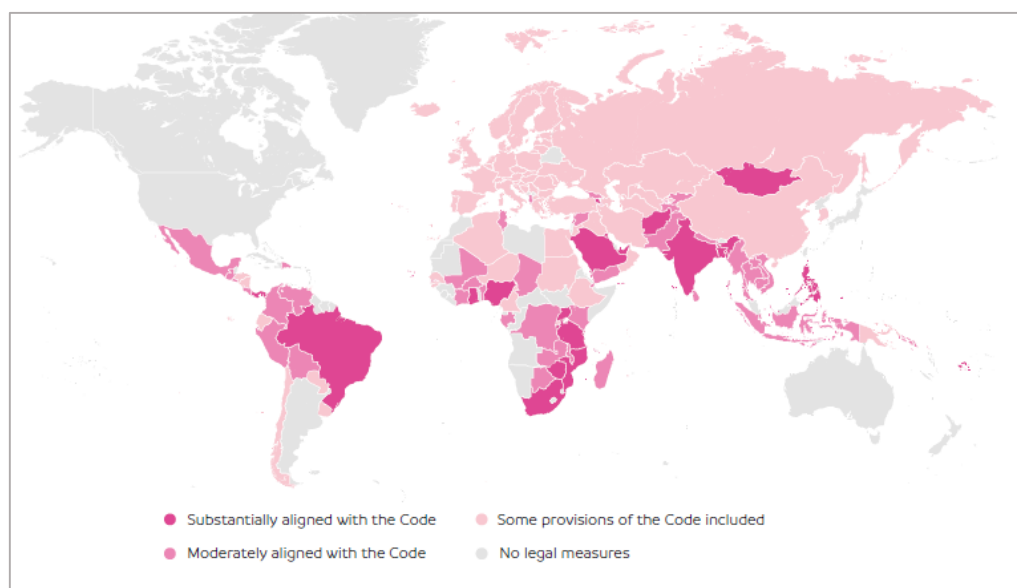
Source: Harris & Pomeranz, 2020, p.869.

Since 1981, a range of subsequent resolutions have been adopted to update the Code (WHO, n.d. b), including resolution WHA69.9 (WHO, 2016). Resolution WHA69.9 explicitly states that health workers, health systems, health professional associations and nongovernmental organizations should likewise avoid conflicts of interests. This document

mentions several conditions that represent a conflict of interest, including the provision of free products, such as free formula samples, to parents and caregivers, whose negative effects have been extensively described above (WHO, 2016). The Code and subsequent resolutions are not legally binding for member states. However, they are considered a pillar to ensure an environment enabling optimal infant nutrition. Thus, they should be implemented by each member state into national legislation, regulations or other suitable measures (WHO, 1981).

A total of 136 countries adhered to the enacting of the Code's legal measures (WHO, 2020). However, according to the last report on the legal status of the Code (WHO, 2020) only 25 out of those 136 countries had substantially implemented the Code's provisions into their legislation (see Figure 4 (WHO, 2020, p.13).

Figure 4. *Legal status of the Code (2020).*



Source: WHO, 2020, p. 13.

Brazil is one of the countries that implemented the Code more substantively and it is known internationally for the additional implementation of multiple public health policies to protect, promote and support breastfeeding (Rollins et al., 2016). In Brazil, the Code was first adopted in 1988, and subsequently revised in 1992 and 2001/2002. It became law in 2006,

through the Law No. 11.265, which enhances the “Brazilian Norm for Commercialization of Food for Nursing and Children of First Infancy, Rubber Nipples, Pacifiers, and Nursing Bottles” (NBCAL) (Monteiro, 2006). According to Law No. 11.265. (2006), the promotion of the following products by any communication means is prohibited: infant formulas and follow-on milks; nourishing formulas presented and/or indicated for high-risk newborns; rubber nipples, nursing bottles and pacifiers.

In Portugal, only a few provisions of the Code were implemented. They were adopted into national law in 2008 and revised in 2017 through the Decree-Law No. 62/2017 in 2017. The law regulates labelling of both infant formulas and follow-on milks, but only prohibits the commercial promotion of infant formulas. However, a monitoring system is still lacking. Thus, there are no data available on its application.

1.2.3. The Baby-Friendly Hospital Initiative

The Code includes also recommendations for health workers and health services, namely the prohibition of any type of promotion of breastmilk substitutes, bottles, or nipples in health services, donations of free or low cost supplies of breastmilk substitutes, free samples or gifts to health workers (WHO, 1981). These recommendations integrate another global public health policy, the Baby-Friendly Hospital Initiative (BFHI) (WHO, 2009b), but compliance with the Code has become officially a requirement for Baby-Friendly Hospitals only after the Implementation Guidance was released in 2018 (WHO, 2018).

The BFHI was first launched in 1991 by the WHO and UNICEF to ensure the provision of optimal maternal and child care in maternity wards based on the Ten Steps to Successful Breastfeeding (hereafter designated the Ten Steps) (WHO & UNICEF, 1989). These were a set of policies and procedures to support breastfeeding in health services providing care to mothers and their infants. The importance of the implementation of the Ten Steps was then reinforced by the Innocenti Declaration on the protection, promotion and support of breastfeeding in 1990 and the Global Strategy for Infant and Young Child Feeding in 2002 (WHO, & UNICEF, 1990, 2003).

In 2018, the Ten Steps were revised and classified in two thematic areas (see Figure 5 (WHO, 2018, p.8): 1) critical management procedures to ensure constant and ethical care (first two steps) and, 2) key clinical practices (remaining eight steps) (WHO, 2018). The Code compliance is included in Step 1, as an important prerequisite to ensure that families and health professionals are free from any commercial influence. Considering that between 2005 and 2019 the total milk formula retail sales volume increased by 121.5% and that this growth occurred also in countries with a strong implementation of the Code (Baker, Santos, et al., 2021), monitoring its compliance is fundamental to protect breastfeeding and to achieve the WHO's

(2014) global goal of increasing exclusive breastfeeding rate in the first 6 months to up to at least 50% by 2025.

Figure 5. *Ten Steps to Successful Breastfeeding.*

Box 1. Ten Steps to Successful Breastfeeding (revised 2018)

Critical management procedures

1. a. Comply fully with the *International Code of Marketing of Breast-milk Substitutes* and relevant World Health Assembly resolutions.
b. Have a written infant feeding policy that is routinely communicated to staff and parents.
c. Establish ongoing monitoring and data-management systems.
2. Ensure that staff have sufficient knowledge, competence and skills to support breastfeeding.

Key clinical practices

3. Discuss the importance and management of breastfeeding with pregnant women and their families.
4. Facilitate immediate and uninterrupted skin-to-skin contact and support mothers to initiate breastfeeding as soon as possible after birth.
5. Support mothers to initiate and maintain breastfeeding and manage common difficulties.
6. Do not provide breastfed newborns any food or fluids other than breast milk, unless medically indicated.
7. Enable mothers and their infants to remain together and to practise rooming-in 24 hours a day.
8. Support mothers to recognize and respond to their infants' cues for feeding.
9. Counsel mothers on the use and risks of feeding bottles, teats and pacifiers.
10. Coordinate discharge so that parents and their infants have timely access to ongoing support and care.

Source: WHO, 2018, p.8.

1.2.4 Infant formula industry marketing and migration

The effect of commercial determinants on migrants and ethnic minority groups is an area that has been poorly studied. Most of the evidence comes from qualitative studies exploring breastfeeding beliefs and behaviors among migrant mothers (Choudhry et al., 2012; Gallegos et al., 2015; Hunter-Adams et al., 2016; Maharaj et al., 2013; Rossiter et al., 2000; Vaughn et al., 2010) and few quantitative studies exist (Romero-Gwynn, 1989; Snell et al., 1992). Romero-Gwynn (1989) observed a sharp decline in breastfeeding rates among low educated Indochinese mothers to infants born in the United States after migration. The only associated factor to formula feeding were the formula samples distributed at hospital discharge. It is worth noting that, when asked about the reasons to breastfeed their other children in the country of origin, the main reasons given by mothers were the expensive cost and the lack of

availability of infant formula and not the health and nutritional benefits associated to breastfeeding. The author of the study argues that the increased availability and accessibility of infant formula may be responsible for the decline of breastfeeding in the host country. Similar conclusions were reached also by more recent studies conducted among Vietnamese migrant mothers in Australia and Latino mothers in Cincinnati Area (Rossiter et al., 2000; Vaughn et al. 2010), where increased affordability and availability of infant formula were reported as reasons for formula feeding. This was partially attributable to Governmental programs addressing underserved mothers, which paradoxically distribute breastmilk substitutes, while promoting breastfeeding (Kaufman et al., 2010). Based on migrant women's narrative, the prohibitive cost of infant formula in the country of origin is a major factor influencing infant feeding choices, besides cultural factors encouraging breastfeeding. (Rossiter et al., 2000; Vaughn et al., 2010). In addition, for migrant women coming from countries where infant formula is not affordable, formula feeding represents a status symbol. It has, therefore, a positive connotation in the migratory trajectory, meaning a successful fit in a society where formula is perceived as the feeding norm (Gallegos et al., 2015; Hunter-Adams et al., 2016).

Evidence shows that the awareness of living in a formula-feeding culture influences migrant women's feeding decisions, depending on the level of acculturation. In fact, highly acculturated and bicultural mothers (i.e. maintaining their culture of origin while adhering to the dominant culture) are keener to opt for formula feeding their child as a means to fit into social norms of the host country as opposed to low acculturated women (Choudhry et al., 2012). In this regard, the marketing of formula manufacturers may influence the perceived infant feeding norm, by normalizing the use of formula and portraying it as a matter of lifestyle (Piwoz & Huffman, 2015). On the other side, less acculturated migrants, which tend to keep their cultural beliefs in favor of breastfeeding (Choudhry et al., 2012), may sometimes

experience confusion and contrasting advice from health professionals in the host country. Recently arrived migrants rely more on health professionals when it comes to best infant feeding practices (Maharaj et al., 2013). Thus, in-hospital formula supplementation may raise doubts about the adequacy of their breastmilk supply. Such confusing messages may lead to early formula supplementation, in detriment of traditional believes supporting breastfeeding (Maharaj et al., 2013). As pointed out by Kaufman et al. (2009), the process between breastfeeding intentions and practices is not straightforward and may suffer the influence of the interplay of several factors and contexts.

Aside from the factors that are already known to influence breastfeeding in native women, migrant women may encounter additional barriers when seeking to fit breastfeeding in their routine (Kaufman et al., 2009). Moving to a new country may cause stressful challenges to new mothers, including by the need to return to work and stressors associated with tasks that get more complex and time consuming in a new country such as childrearing without social support (Hunter-Adams, 2016). The exposure to market factors may be harmful in this population, which may find themselves in a position of greater vulnerability when compared to natives. Thus knowing how sociocultural factors influence infant feeding practices of migrant women in countries that implement only a few provisions of the Code is fundamental to protect breastfeeding among minority groups.

2. Objectives

The unethical and inappropriate marketing of breastmilk substitutes is detrimental for optimal breastfeeding practices (Harris & Pomeranz, 2020). However, most existing studies focus on its effects on native women and the influence of market factors among migrant women is still poorly investigated. While a favourable sociocultural context may work to protect breastfeeding, less is known about women's perspectives about infant feeding practices and the influence of market factors in host countries with limited legal provisions of the Code. Thus, this thesis aims to compare infant feeding practices, and their association with breastmilk substitutes industry marketing, among native and migrant women living in different sociocultural contexts. A multi-method study was conducted with three specific objectives:

1. To determine if any association between maternal country of birth and first day in-hospital exclusive breastfeeding exists in Portugal and if any association is affected by giving birth in a Baby-Friendly Hospital (**Paper I**);
2. To assess the effect of market factors on breastfeeding discontinuation (any and exclusive), comparing migrant and native women in Portugal (**Paper II**);
3. To understand whether women's perspectives on breastfeeding intention and practice are influenced by breastmilk substitutes marketing upon migration to a country with fewer Code provisions, by comparing the views of native women living in Brazil and immigrant Brazilian women living in Portugal (**Paper III**).

3. Methods

3.1. Study design

This research draws on a multi-method approach entailing both a quantitative and a qualitative study. Objectives 1 and 2 were achieved through a quantitative study grounded on baMBINO – *Migrant and Perinatal Health: Barriers, Incentives and Outcomes*¹, a nationwide project aimed at assessing the perinatal health and healthcare experiences of migrant and native Portuguese women giving birth in Portugal. In order to assess the trajectory of breastfeeding practices during early life, data on infant feeding practices were collected at two different time points: 1) during the first 24 hours after birth; and, 2) at any time after the first month postpartum, but mostly around three postpartum months. Infant feeding practices of native Portuguese and migrant women were then compared at these two different moments and the influence of breastmilk substitutes industry marketing was assessed. Since data on market factors during the first 24 hours postpartum were not collected within the baMBINO project, giving birth in a Baby-Friendly Hospital was used as a proxy for an environment more (Baby-Friendly) or less (non-Baby-Friendly) protective against the influence of breastmilk substitutes industry marketing.

To respond to objective 3, a qualitative multi-site case study was carried out in Portugal and Brazil. The selection of these two countries was justified by differences in breastmilk substitutes marketing legislation and the opportunity they provide to assess the possible impact of acculturation on infant feeding practices. Brazil is considered a good example of the positive impact of multiple and synergic strategies on breastfeeding (Rollins et al., 2016) and it has substantially implemented the International Code of Breast-milk Substitutes through its legislation (WHO, 2020). Conversely, Portugal has implemented only a few provisions of the Code in the national law (WHO, 2020). Although the 3-month exclusive breastfeeding rate

¹ This project was based at Institute of Public Health of University of Porto and was funded by FEDER funds through the Operational Programme for Competitiveness and Internationalization, and by national funds of FCT – Fundação para a Ciência e Tecnologia (POCI-01-0145-FEDER- 016874; PTDC/DTPSAP/6384/2014).

increased from 41.3% in 1982/84 to 62.4% in 2012/14 (Kislalya et al. 2020), in 2014, the United Nations Committee on the Right of the Child (2014) expressed concern about the aggressive marketing of breastmilk substitutes and the decline of exclusive breastfeeding rates in Portugal among children between four and six months in 2014. To understand women's perspectives on the influence of market factors in these two different sociocultural contexts, semi-structured in-depth interviews were conducted among native women in Brazil and immigrant Brazilian women living in Portugal.

3.2. Quantitative study

3.2.1. Participants

Participants were recruited at admission for delivery in public maternity hospitals of mainland Portugal. In 2017, public maternity hospitals were responsible for 85.1% (n = 68,591) of all reported deliveries in the country (Instituto Nacional de Estatística, 2017). Out of 39 maternity hospitals, 32 accepted to participate and were enrolled in project baMBINO. Among these, 11 were Baby-Friendly Hospitals.

Eligibility criteria entailed women being aged at least 18 years old at the time of delivery. After delivery, the only exclusion criterion was having a stillbirth, with the exception of women with multiple pregnancy and at least a livebirth. All migrant women admitted for delivery between April 2017 and March 2019 were recruited by a member of staff at each of the 32 public maternity hospitals taking part in the study. Migrant women were defined as being born abroad but living in Portugal, in line with the definition of the International Organization for Migration (2019). It should be noted that, in Portugal, all childbearing migrant women have access to maternal healthcare free of charge, regardless of their country of origin, nationality, or legal status (Directorate-General for Health, 2009; Order No. 25360, 2001). Native Portuguese women were matched by a factor of 1:1 with migrant women in each maternity facility taking part in the project.

3.2.2. Data collection

Eligible participants were first approached by healthcare professionals working at each maternity hospital enrolled in the project. Women were handed in an information sheet clarifying the study's aims and methods, which was available in 15 different languages, after which they were invited to participate in the study. Those who accepted to participate were asked to sign a written informed consent form. Data were collected at two different time points:

1) at recruitment; and, 2) during a first follow-up, occurring any time after the first month postpartum, but mostly around three postpartum months. Overall, 5,687 women were invited to participate in the baMBINO study, with a dropout rate of 4.5% during recruitment and 44.7 % during the first follow-up. The latter was due to several reasons, but mainly due to difficulties in reaching participants through a telephone contact (38.5 %). A small percentage of the participants refused to participate or did not complete the follow-up interview (around 6 %). The final sample consisted of 5,431 participants at baseline and 3,006 at first follow-up.

Data collected at recruitment

After recruitment, data were collected by members of the staff at each maternity hospital using a structured questionnaire available in Portuguese. Two types of information were gathered: 1) sociodemographic information; and, 2) clinical records. Sociodemographic data entailed information about women's country and date of birth, education, marital status, ethnicity, and intention to stay in Portugal for the following three months. Clinical records included information about: (a) pregnancy and prenatal care (parity, assisted reproductive technology use, multiple pregnancy, prenatal care utilization, prenatal screening tests, tobacco use and complications during pregnancy); (b) delivery (date of child birth, mode of delivery, gestational age, fetal presentation, onset of labor, episiotomy and vaginal tear); and, (c) newborn's characteristics (birth order in case of twins, birthweight, Apgar score, congenital malformations, hospitalization and infant feeding during the first 24 hours after birth). Clinical information about the prenatal period was collected using pregnancy "notes", while data concerning the delivery and the newborn was obtained through medical records.

Infant feeding was classified as in-hospital exclusive breastfeeding when the baby was fed only with breastmilk and as "other" when the baby received mixed feeding, formula feeding or parenteral nutrition. Migrant participants were clustered into 7 groups following the most

common migrant classification system in Portugal: Portuguese-speaking African countries (PSAC), Brazil, Eastern European countries, other European countries, Asian countries, and other countries. Brazilians are the largest migrant community in Portugal (Oliveira, 2020). PSAC includes migrants from Angola, Cape Verde, Guinea-Bissau, Mozambique and São Tomé and Príncipe, who share historical and cultural ties with Portugal, given their colonial past. Migrants from Eastern European countries are also largely represented in Portugal (Oliveira, 2020). The category “other countries” groups migrants from a miscellaneous of countries, which was not possible to classify otherwise, due to their small sample size.

Data collected during the first follow-up

A first follow-up was conducted from one month postpartum onwards. Women were interviewed through computer-assisted telephonic interviews by trained interviewers of the baMBINO team. The instrument consisted of a 112-item questionnaire, the Migrant Friendly Maternity Care Questionnaire (MFMCQ), which was developed by the Reproductive Outcomes and Migration (ROAM) – an international research collaboration network on reproductive health disparities between migrants and natives (Gagnon et al., 2014). Participants were asked about their health and healthcare experiences during pregnancy, delivery, and postpartum period. The MFMCQ interviews lasted 45 minutes on average. Aside from the MFMCQ, additional questions were asked to a sub-sample of 2,401 women in order to investigate infant feeding practices in the first months postpartum and exposure to market factors (Appendix 1). Interviews were conducted in participants’ preferred language. When necessary, the interpreter service of the High Commission for Migration (ACM) was used.

Questions on infant feeding practices were based on both mothers’ 24-hours recall and recall since birth. According to the answers given by the mothers, infant feeding patterns were categorized as follows: any breastfeeding (yes or no) and exclusive breastfeeding (yes or no).

Any breastfeeding was defined as giving the baby breastmilk (including milk expressed or breastmilk from a donor), while also feeding the baby with one of the following: infant formula, water, liquids, or foods other than breastmilk. On the contrary, exclusive breastfeeding implies that the baby was fed only with breastmilk (including milk expressed or breast milk from a donor), following the WHO (2008) definition. Questions about market factors focused on the two main modalities used by the industry to reach mothers: 1) through a health professional; and, 2) directly to consumer. First mothers were asked if they or one of their family members received industry-sponsored items from a health professional, including: free formula samples; bottles, teats or pacifiers; and industry-sponsored gifts and/or brochures. Then, they were questioned about exposure to special displays, discounts and advertising of formulas, and where it occurred. Due to the diverse background of the study participants, the expression “artificial milk” was used to indicate formulas, independently from the recommended age, as this is the most commonly used term in Portugal. Moreover, since the MFMCQ covers the pre- and postnatal period, including delivery, exposure to market factors is intended to have occurred within this time window.

3.2.3. Data analysis

Quantitative data were analyzed using the IBM SPSS Statistics (Versions 24 and 26). Categorical variables were described as counts and proportions. Then they were compared through the Chi-Square Test to test for statistical differences between groups.

Different analytical approaches were used due to the differences in the study design of the two papers included in the quantitative study: cross-sectional (Paper I) and longitudinal (Paper II) study design. They are described in detail in the respective methods’ section of each paper. Briefly, in Paper I, multiple imputation was first performed to deal with missing data. After observing a statistical association between country of birth and first day in-hospital

exclusive breastfeeding, a multivariate logistic regression was fitted, stratifying by hospital accreditation to the Baby-Friendly Hospital Initiative. In Paper II, a different approach was used given the choice for conducting a longitudinal study. A Cox regression analysis was fitted to investigate the effect of market factors on any and exclusive breastfeeding duration, after adjusting for potential confounders. The level of significance was set at $p < 0.05$.

3.3. Qualitative study

3.3.1. Participants

A multi-site qualitative case study drawing on semi-structured interviews was conducted in Brazil and Portugal. Native and immigrant Brazilian women aged 18 or above and who were mothers to an infant between 0-12 months were eligible to participate in the study. Purposive heterogeneity sampling was employed in both Brazil and Portugal to guarantee maximum variation of perspectives based on the following criteria: women's socioeconomic status (i.e. maternal education and household income) and infants' age, which was kept below or equal to 12 months to attenuate the effects of recall bias. Women who had contraindications to breastfeed were not eligible for the study.

In Portugal, participants were recruited through the baMBINO project. A sub-sample of the Brazilian immigrant mothers who were living in the Porto Metropolitan Area, Porto District and Braga District was selected using non-probabilistic purposive sampling. Mothers who accepted to be recontacted after taking part in the baMBINO's survey were invited to participate in the qualitative study by the author of this thesis through telephone. In Brazil, participants were recruited at two private clinics (an obstetric/gynecologic clinic and a pediatric clinic) in Osasco, a municipality in the Metropolitan Region of São Paulo. São Paulo was chosen as the preferential site for interviews with native Brazilian women because majority of Brazilian immigrants who took part in the study in Portugal were born in the state of São Paulo.

The participants were purposefully selected to guarantee variation in perspectives. They were informed about the study by medical staff at the obstetric and gynecologic clinic after their postnatal consultations and invited to participate in the study by the author of the thesis. At the pediatric clinic, trained administrative staff informed participants about the study who were subsequently invited to take part in the study by the author of the thesis.

3.3.2. Data collection

Semi-structured in-depth interviews were conducted in-person by the author until reaching thematic saturation, i.e. data collection was discontinued when no additional categories and themes emerged from data analysis. A Study Information Sheet containing information about the research objectives and methods was provided to all potential participants who were given the opportunity to clarify any doubts. Those who accepted to take part in the interview were given a written informed consent, which was signed by all participants.

Semi-structured interviews were conducted using the topic guide in Appendix 2. They were intended to explore 1) infant feeding beliefs, intentions and practices and 2) women's perspectives about the influence of breastmilk substitutes marketing on breastfeeding practices. A total of fifteen Brazilian immigrant women were interviewed in Portugal between June 2018 and January 2019 in the dates, time and location that were most convenient to them (e.g. place of work, home, coffee shop). Sixteen Brazilian native women were interviewed in Brazil between May and June 2019 at the clinics following their consultations. After obtaining participants' verbal consent, interviews were digitally recorded and transcribed verbatim and reviewed for accuracy by the author, who is fluent in Portuguese. Interviews lasted between 30 and 60 minutes. Sociodemographic data (maternal date of birth and education, marital status,

family household income) and information about parity and infant date of birth were also collected.

3.3.3. Data analysis

The data were analyzed by the author using content analysis. A pre-defined coding framework was defined, following the topic domains of the interview guide. Additional themes and sub-themes were included in the framework as the analysis progressed. NVivo software (QSR International) was used to assign codes to relevant expressions and sentences, to identify new themes and sub-themes, and to examine patterns and differences in mothers' perspectives taking into account their migration status and socioeconomic characteristics, in a reflexive and iterative manner.

3.4. Ethical considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki (World Medical Association, 2001). The quantitative arm of the study drew on data collected under the scope of project baMBINO, which obtained Ethical approval from the Ethics Committee of the Institute of Public Health of the University of Porto (Proc. No. CE14013/14th March 2014), the Institutional Review Board of each maternal unit enrolled in the project, and the Portuguese Data Protection Authority. The qualitative arm of the study received ethical approval from the Ethics Committee of the Institute of Public Health of the University of Porto (Proc.No. CE18085/10th May 2018) and from the Committee for Ethics in Research of the University of São Paulo (Proc.No. 3.241.864/3rd April 2019).

Written informed consent was signed by all women who participated in the study in Portugal and in Brazil. A Study Information Sheet (SIS) explaining all the details of the study was handed in to every participant. In the case of data collected in under project baMBINO,

the SIS was also available in languages other than Portuguese. Any arising doubts or questions were clarified and women were informed about the possibility of withdrawing from the study at any moment. In the case of the qualitative study, verbal consent to digitally record the interviews was requested before its start. No money compensation was given for the participation in the study and the costs associated with displacement for conducting the qualitative interviews were sustained by the author.

All the procedures regarding data collection, storage, analysis and dissemination ensured data protection and confidentiality. An ID number was used to identify participants in all documents and any electronic database. Quantitative data, interviews recordings and transcriptions were stored in a secure place and were accessible only by the research team and authorized personnel. Interviews recordings and transcriptions will be destroyed upon completion of the study, following the legally established deadlines.

4. Results

4.1. PAPER I

Maternal Country of Birth and Exclusive Breastfeeding

During the First In-Hospital Day in Portugal:

The Influence of the Baby-Friendly Hospital Initiative

Lisi, C., de Freitas, C., & Barros, H.

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Abstract

Background: Early breastfeeding practices are important determinants of later breastfeeding behaviors and can be influenced by multiple factors. Despite the *Baby-Friendly Hospital Initiative* reported positive influence on breastfeeding initiation, its influence on the association between maternal country of birth and first day in-hospital breastfeeding has not been examined.

Research aims: To determine (1) if association between maternal country of birth and first day in-hospital exclusive breastfeeding exists in Portugal and (2) if any association is affected by giving birth in a Baby-Friendly Hospital.

Methods: Data were drawn from baMBINO—a longitudinal, 2017–2019 nationwide study designed to assess the perinatal health and healthcare experiences of migrant and native Portuguese women. Data from participants ($N = 5,340$) were collected during their hospital stay from 32 maternity units. Missing data were handled through multiple imputation. After stratifying by *Baby-Friendly Hospital Initiative* accreditation, a multivariate logistic regression was performed.

Results: First day in-hospital exclusive breastfeeding rates were high among both migrant and native participants (89.2% vs. 87.4%). Migrants were more likely to exclusively breastfeed when compared to natives ($OR = 1.19$, 95% $CI [1.00, 1.41]$). In non-Baby-Friendly Hospitals, a positive association was found between participants from Eastern European countries ($aOR = 2.46$, 95% $CI [1.27, 4.78]$) and first day in-hospital exclusive breastfeeding. In accredited hospitals, maternal country of birth did not influence exclusive breastfeeding during the first 24 hr.

Conclusions: The Baby-Friendly Hospital Initiative attenuates differences between migrant and native participants, promoting optimal breastfeeding practices among natives.

Keywords

Baby-Friendly Hospital Initiative, breastfeeding, cultural norms, exclusive breastfeeding

Resumo

Introdução: As práticas precoces de aleitamento são importantes determinantes dos comportamentos de aleitamento posteriores e podem ser influenciadas por vários fatores. Apesar dos efeitos positivos da Iniciativa Hospitais Amigos dos Bebés no início do aleitamento, a sua influência na associação entre país de nascimento da mãe e aleitamento exclusivo no primeiro dia após o parto não foi ainda examinada.

Objetivo de Pesquisa: Avaliar a associação entre país de nascimento da mãe e aleitamento materno exclusivo no primeiro dia, em Portugal, e se essa associação é afetada pelo parto num Hospital Amigo dos Bebés.

Métodos: Os dados foram extraídos do baMBINO – um estudo nacional longitudinal, que avalia a saúde perinatal de mulheres imigrantes e portuguesas nativas. Foram recolhidos dados de 5,340 participantes em 32 maternidades, durante o internamento. Após estratificação segundo acreditação na Iniciativa Hospitais Amigos dos Bebés, realizou-se uma regressão logística multivariada.

Resultados: As taxas de aleitamento materno exclusivo no primeiro dia após o parto foram elevadas tanto entre mães imigrantes quanto nativas (89.2% vs. 87.4%). As imigrantes mostraram mais propensão para amamentar exclusivamente quando comparadas às nativas ($OR = 1.19$, 95% $IC [1.00, 1.41]$). Em hospitais não acreditados, observou-se uma associação positiva entre mães de países do Leste Europeu ($aOR = 2.46$, 95% $IC [1.27, 4.78]$) e aleitamento materno exclusivo no primeiro dia. Em hospitais acreditados, o país de nascimento da mãe não influenciou o aleitamento materno exclusivo nas primeiras 24h.

Conclusões: A Iniciativa Hospital Amigos dos Bebés atenua diferenças entre mães imigrantes e nativas, promovendo práticas ideais de aleitamento entre nativas.

Back translated by Dr. Elisabete Alves, PhD

Background

Breastfeeding benefits children, participants, society, and the environment. Its lifelong positive outcomes on children's health, nutrition, and development, as well as on women's health, carry the potential to increase socioeconomic equity while fostering environmental sustainability (Rollins et al., 2016; Victora et al., 2016). Consequently, several efforts have been undertaken globally to protect, promote, and support breastfeeding. The *Baby-Friendly Hospital Initiative* (BFHI) is one of the most far-reaching efforts (World Health Organization, 2018), with implementation in more than 152 countries since its launch in 1991 (WHO, n.d.). Grounded in the *International Code of Marketing of Breast-milk Substitutes* (IC; WHO, 1981), the *Ten Steps to Successful Breastfeeding* statement (WHO & United Nations Children's Fund [UNICEF], 1989) and the *Innocenti Declaration* (WHO & UNICEF, 1991), the BFHI aims to set into practice the WHO's recommendations for early breastfeeding initiation (i.e., within the first hour after birth), exclusive breastfeeding during 6 months and continued breastfeeding until 2 years and beyond (WHO, 2003).

Human milk is the biological norm for feeding infants. Additionally, breastfeeding improves neurodevelopment and increases protection against infectious diseases (Sankar et al., 2015; Victora et al., 2016). These outcomes increase with breastfeeding duration, higher in children who are breastfed for longer periods than those who are breastfed for a shorter duration, or not breastfed (Victora et al., 2016). Optimal infant feeding in the early stages of a newborn's life is fundamental since it predicts later infant feeding behaviors (Vehling et al., 2018). While in-hospital exclusive breastfeeding after birth has been associated with longer breastfeeding duration (Vehling et al., 2018), formula supplementation during the postnatal hospital stay increases the risk of early breastfeeding cessation by reducing maternal self-confidence and sense of self-efficacy (Hinich, 2016; Vehling et al., 2018).

Early breastfeeding practices can be influenced by a range of factors acting at individual, setting, and structural

Key Messages

- The influence of the *Baby-Friendly Hospital Initiative* on the association between maternal country of birth and first day in-hospital exclusive breastfeeding has not been investigated in previous literature.
- In Portugal, mothers from Eastern Europe giving birth in a non-Baby-Friendly Hospital were more likely to exclusively breastfeed when compared with native Portuguese mothers.
- However, for deliveries occurring in a Baby-Friendly Hospital there was no significant relationship between the maternal country of birth on first day in-hospital and exclusive breastfeeding.
- The Baby-Friendly Hospital Initiative attenuated the differences between natives and migrants reducing the likelihood of suboptimal breastfeeding among natives.

levels (Rollins et al., 2016). At an individual level, mother and newborn characteristics are useful for predicting exclusive breastfeeding at discharge (McDonald et al., 2012). The type of antenatal care provider and the level of care of the hospital may also impact breastfeeding initiation (McDonald et al., 2012). Structural factors entail the socio-cultural and market contexts, which can be influenced by legislation, policy, media, and mobilization efforts to change attitudes and practices (Rollins et al., 2016). The BFHI plays a relevant role at this level, by increasing breastfeeding initiation and duration (Kramer et al., 2001; Pérez-Escamilla et al., 2016). Additionally, breastfeeding attitudes and practices may be shaped by culture. Maternal country of birth is viewed as an indicator of cultural values and beliefs and there is a growing literature investigating its influence on breastfeeding (Aguilar-Ortega et al., 2019; Dennis et al., 2019; Farchi et al., 2016; Henderson et al., 2018; Kana et al., 2018; Nolan & Layte, 2015). Implementation of the BFHI in Portugal started in 1991. There are currently 14 accredited Baby-Friendly Hospitals (BFHs) in the country (UNICEF Portugal, 2018). Thirteen are located in mainland Portugal, representing 33% of the 39 public maternity units in this part of the country.

Despite the BFHI's positive outcomes related to breastfeeding initiation (Pérez-Escamilla et al., 2016), its influence

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on the association between maternal country of birth and first day in-hospital breastfeeding has not been examined. Drawing on a nationwide study carried out in Portugal, we sought to determine (1) if association between maternal country of birth and first day in-hospital exclusive breastfeeding exists in Portugal, and (2) if any association is affected by giving birth in a Baby-Friendly Hospital.

Methods

Design

This was a comparative, cross-sectional study using prospectively collected data and retrospectively collected medical record data. Our study was part of the *Migrant and Perinatal Health: Barriers, Incentives and Outcomes* study (baM-BINO)—a nationwide project designed to assess the perinatal health and healthcare experiences of migrant and native Portuguese women giving birth in Portugal. Ethical approval was obtained from the Ethic Committee of the Institute of Public Health of the University of Porto (Proc. No. CE14013/14th March 2014), the Institutional Review Board of each maternal unit enrolled in the project, and the Portuguese Data Protection Authority.

Setting

In Portugal, maternal healthcare is delivered free of charge to all childbearing women, regardless of their country of origin, nationality, or legal status. In 2017, 85.1% ($n = 68,591$) of all deliveries reported in mainland Portugal occurred in public maternity units (Instituto Nacional de Estatística, 2017). All the 39 public hospitals in mainland Portugal that have a maternity unit were invited to participate in the study. Thirty-two (82%) accepted, and 11 (34%) of the participating hospitals were accredited BFHs. In 2018, these 32 maternity units accounted for 84% of the total live births in Portugal (Serviços Partilhados do Ministério da Saúde, 2018). No significant differences were found between the hospitals enrolled in the study and those that did not participate.

Sample

All migrant women admitted for delivery in the maternity units enrolled in the project between April 2017 and March 2019 were invited to take part in the study. Migrants were defined as being born abroad, according to the definition of the International Organization for Migration (2019). For each migrant woman who consented to participate, a native woman was also invited. The only inclusion criterion was to be at least 18 years old. After delivery, women were excluded from the total sample if they had a stillbirth. In the case of a multiple pregnancy, women with a stillbirth were included if they had at least one live birth.

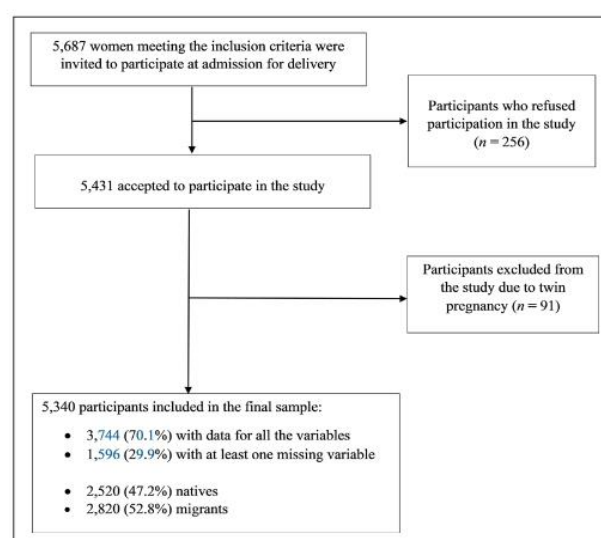


Figure 1. Flow Chart Showing the Selection of Participants for the Study ($N = 5,340$).

A total of 5,687 women were invited to take part in the study, of whom 256 refused to participate. After excluding 91 participants with twin pregnancies, 5,340 participants were included in the final sample (Figure 1); 2,820 migrant participants and 2,520 native Portuguese participants. The discrepancy between the number of foreign-born and native participants was due to difficulties in implementing the recruitment strategy in hospitals with a high percentage of migrants, where the number of babies born to foreign-born participants was not able to be matched by the number of babies born to natives.

Measurement

Outcome Measures. Type of feeding was investigated according to whether the newborn was given human milk, infant formula, mixed feeding (i.e., both human milk and infant formula) or parenteral nutrition during the first 24 hr after birth. Our main outcome was first day in-hospital exclusive breastfeeding, defined as receiving only human milk during the first 24 hr after delivery (WHO, 2008) and categorized as “yes” (exclusively breastfed) or “no” (other). The questionnaire is available as Supplemental File S1.

Exposure Measures. Maternal country of birth was our exposure of interest. This variable is stable and objective as it does not depend on current legislation on citizenship in the host country (Rechel et al., 2012). For this reason, it is considered a better indicator of migration status than citizenship, allowing for comparisons between studies done in different countries (Rechel et al., 2012).

In our study, migrant participants were grouped by origin into seven categories: Portuguese-speaking African countries (PSAC), Brazil, Eastern European countries, other European countries, Asian countries, and other countries. PSAC (i.e., Angola, Cape Verde, Guinea-Bissau, Mozambique, and São Tomé and Príncipe) and Brazil have historical and cultural ties with Portugal and were the largest migrant groups in the country. Migrants from Eastern European countries (e.g., Russia, Ukraine, Romania, Macedonia) also represented an important share of the migrant population in Portugal. Grouping countries into Eastern European, other European, and Asian is based on the United Nations Statistics Division classification for countries (2011). The category “Other countries” included participants whose origins did not fit into the previous categories and whose group size was small.

Covariates. The following covariates were included in the analysis: Maternal age (categorized as 18–24, 25–34 and ≥ 35 years old); education, defined as the highest level achieved (none or primary, secondary, and tertiary education); parity (multiparous vs. primiparous); gestational age ($<$ vs. ≥ 37 weeks); first antenatal visits (≤ 12 weeks vs. > 12 weeks); mode of delivery (vaginal/instrumental vs. cesarean section); smoking during pregnancy (yes or no); diabetes during pregnancy (yes or no); Apgar score after 5 min (< 7 vs. ≥ 7); congenital malformations (yes or no). Congenital malformations were defined according to the guidelines of the European Network for Surveillance of Congenital Anomalies (2019). Newborns with major malformations (except limb and genital malformations) and with aberrant frenula (a minor anomaly) were categorized as a “yes” since breastfeeding might be challenging in these cases. The variable BFH referred to whether participants gave birth in a BFH or in a non-BFH. Maternity units were classified according to the most recent list of BFHI facilities in Portugal (UNICEF Portugal, 2018).

Data Collection

The study was conducted between April 2017 and March 2019. Healthcare providers working at each maternity unit enrolled in the project explained the study to eligible women admitted for delivery and invited them to participate. An information sheet clarifying the study’s aims and methods was available in 15 different languages and distributed to potential participants. After accepting, women were asked to sign a written informed consent form. Each participant was identified through an ID number in all documents and any electronic databases. To ensure participants’ anonymity and privacy, data were stored securely and only accessible to the research team and authorized staff.

Baseline data were collected by focal points through a questionnaire available in Portuguese. Participants were asked about country and date of birth, education, marital status, ethnicity, and intention to stay in Portugal for the

upcoming 3 months. Clinical records were also gathered, including information about (1) pregnancy and antenatal care; (2) delivery; and (3) the newborn’s characteristics. Prenatal information was obtained through pregnancy “notes,” while data about delivery and the postpartum period were retrieved from medical records. For the purposes of this study, we used baseline information collected at recruitment during the larger baMBINO study. Clinical record data were also collected.

Data Analysis

Descriptive statistical analyses were carried out comparing participants’ sociodemographic and obstetric characteristics and 1st day in-hospital infant feeding by maternal country of birth. Chi-Square tests were used to test for differences between groups (Study Aim 1).

Crude odds ratios (ORs) and corresponding 95% confidence intervals (95% CI) were estimated to assess the association of maternal country of birth with 1st day in-hospital infant feeding (Study Aim 2). A multivariate logistic regression model was fitted in order to assess the association of maternal country of birth with 1st day in-hospital exclusive breastfeeding, adjusting for potential confounders and stratifying by BFHI accreditation. All the relevant covariates that were significant in the tests of univariate logistic regressions were included in the multivariate model. When we observed collinearity between two variables (e.g., between newborn birth weight and gestational age, and complications during pregnancy and gestational age), only one variable was included in the final model. Native Portuguese participants were the reference group. Missing data were handled by means of multiple imputation. All analyses were performed using IBM SPSS Statistics 24.0.

Results

A comparison of the maternal sociodemographic and obstetric characteristics along with the infant feeding during the 1st day in hospital between migrant and native Portuguese women is displayed in Table 1. Migrants were less likely to have no or primary education and to smoke during pregnancy. They were more frequently multiparous and tended to initiate antenatal care visits after the first trimester more often. They also had a higher prevalence of diabetes during pregnancy. First day in-hospital exclusive breastfeeding rates were high among both migrant and native participants.

Our examination of maternal country of birth (Table 2) shows that most migrant participants were from PSAC (50.6%), followed by Brazil (17.8%), Eastern European countries (10.2%), other European countries (9.2%), Asian countries (5.4%), and by a range of countries other than those mentioned above (6.8%). The proportion of older participants (≥ 35 years) was higher among participants from other countries, Brazil, and other European

Table 1. Comparison of the Participants' Characteristics and Their 1st Day In-Hospital Infant Feeding With Their Migration Status (N = 5,340).

Characteristic	Native (n = 2,520) n (%)	Migrant (n = 2,820) n (%)	χ^2	p
Maternal age (years)				
18–24	446 (17.8)	487 (17.3)	1.96	.376
25–34	1,361 (54.3)	1,576 (56.1)		
≥ 35	701 (28.0)	745 (26.5)		
Maternal education				
Primary/none	788 (34.3)	783 (31.7)	13.68	.001
Secondary	775 (33.8)	960 (38.9)		
Tertiary	733 (31.9)	724 (29.3)		
Parity				
Multiparous	1,217 (50.4)	1,508 (56.7)	20.61	< .001
Primiparous	1,200 (49.6)	1,151 (43.3)		
Gestational age (weeks)				
≥ 37	2,297 (92.8)	2,555 (92.7)	0.02	.892
< 37	1,79 (7.2)	202 (7.3)		
Mode of delivery				
Vaginal/instrumental	1,790 (71.0)	1,939 (68.8)	3.26	.071
Cesarean section	730 (29.0)	881 (31.2)		
Smoking during pregnancy				
No	2,007 (81.4)	2,561 (93.4)	173.02	< .001
Yes	458 (18.6)	181 (6.6)		
First antenatal visit				
≤ 12 weeks	2,022 (84.9)	1,827 (71.5)	129.67	< .001
Diabetes during pregnancy				
No	2,282 (92.7)	2,479 (90.1)	10.63	.001
Yes	180 (7.3)	271 (9.9)		
Apgar score after 5 minutes				
≥ 7	2,437 (99.3)	2,700 (99.0)	1.46	.227
< 7	16 (0.7)	26 (1.0)		
Congenital malformations				
No	2,418 (99.4)	2,673 (99.5)	0.07	.791
Yes	14 (0.6)	14 (0.5)		
Gave birth in a BFH				
No	732 (29.0)	806 (28.6)	0.14	.707
Yes	1,788 (71.0)	2,014 (71.4)		
First day in-hospital infant feeding				
Exclusive breastfeeding	2,087 (87.4)	2,357 (89.2)	3.72	.054
Other	300 (12.6)	286 (10.8)		

Note. BFH = Baby-Friendly Hospital. Formula feeding, mixed feeding, and parenteral nutrition have been collapsed into the category "other." Missing values: maternal age = 24; maternal education = 577; parity = 264; gestational age = 107; smoking during pregnancy = 133; first antenatal visit = 403; diabetes during pregnancy = 128; Apgar score after 5 min = 161; congenital malformations = 221; 1st day in-hospital infant feeding = 310.

countries, and the lowest among participants from Asian countries. While over one third of participants from other European countries and Asian countries had completed tertiary education, 38.3% of the participants from PSAC had no or primary education. Except for women from other European countries, all migrant participants were more

likely than Portuguese natives to be multiparous and to initiate antenatal care visits after the first trimester. Although no differences were found between natives' and migrants' likelihood to deliver in a BFH, disaggregated data showed that PSAC-born participants were more likely to give birth in a BFH.

Table 2. A Comparison of the Participants' Characteristics and Their Infant Feeding During the 1st Day in Hospital with the Maternal Country of Birth (N = 5,340).

Characteristic	Portugal (n = 2,520) n (%)	PSAC ^a (n = 1,427) n (%)	Brazil (n = 501) n (%)	Eastern European countries ^b (n = 287) n (%)	Other European countries ^c (n = 260) n (%)	Asian countries ^d (n = 153) n (%)	Other countries ^e (n = 192) n (%)	χ^2	p
Maternal age (years)									
18–24	446 (17.8)	270 (19.0)	84 (16.8)	60 (20.9)	27 (10.4)	24 (15.9)	22 (11.5)	61.99	<.001
25–34	1,361 (54.3)	811 (57.2)	246 (49.2)	166 (57.8)	145 (56.0)	105 (69.5)	103 (53.6)		
≥ 35	701 (28.0)	338 (23.8)	170 (34.0)	61 (21.3)	87 (33.6)	22 (14.6)	67 (34.9)		
Maternal education									
Primary /none	788 (34.3)	494 (38.3)	106 (24.4)	75 (32.6)	41 (18.6)	33 (25.4)	34 (20.7)	149.74	<.001
Secondary	775 (33.8)	473 (36.7)	233 (53.7)	80 (34.8)	79 (35.9)	44 (33.8)	51 (31.1)		
Tertiary education	733 (31.9)	322 (25.0)	95 (21.9)	75 (32.6)	100 (45.5)	53 (40.8)	79 (48.2)		
Parity									
Multiparous	1,217 (50.4)	786 (59.5)	276 (57.9)	146 (52.7)	123 (48.4)	79 (53.4)	98 (53.6)	35.32	<.001
Primiparous	1,200 (49.6)	534 (40.5)	201 (42.1)	131 (47.3)	131 (51.6)	69 (46.6)	85 (46.4)		
Gestational age (weeks)									
≥ 37	2,297 (92.8)	1,290 (92.6)	453 (92.6)	259 (92.2)	236 (92.2)	142 (94.7)	175 (93.1)	1.15	.979
< 37	179 (7.2)	103 (7.4)	36 (7.4)	22 (7.8)	20 (7.8)	8 (5.3)	13 (6.9)		
Mode of delivery									
Vaginal/instrumental	1,790 (71.0)	943 (66.1)	332 (66.3)	225 (78.4)	190 (73.1)	120 (78.4)	129 (67.2)	31.57	<.001
Cesarean section	730 (29.0)	484 (33.9)	169 (33.7)	62 (21.6)	70 (26.9)	33 (21.6)	63 (32.8)		
Smoking during pregnancy									
No	2,007 (81.4)	1,336 (96.3)	453 (93.4)	228 (82.3)	216 (85.4)	150 (100.0)	178 (94.2)	236.47	<.001
Yes	458 (18.6)	52 (3.7)	32 (6.6)	49 (17.7)	37 (14.6)	0 (0.0)	11 (5.8)		
First antenatal visit									
≤ 12 weeks	2,022 (84.9)	825 (64.6)	347 (76.9)	202 (77.1)	220 (87.6)	92 (65.7)	141 (80.6)	226.77	<.001
> 12 weeks	359 (15.1)	452 (35.4)	104 (23.1)	60 (22.9)	31 (12.4)	48 (34.3)	34 (19.4)		
Diabetes during pregnancy									
No	2,282 (92.7)	1,264 (90.9)	432 (88.9)	256 (92.8)	236 (91.5)	120 (80.5)	171 (90.0)	32.89	<.001
Yes	180 (7.3)	127 (9.1)	54 (11.1)	20 (7.2)	22 (8.5)	29 (19.5)	19 (10.0)		
Apgar score after 5 minutes									
≥ 7	2,437 (99.3)	1,358 (98.8)	480 (99.6)	278 (98.9)	251 (99.2)	150 (99.3)	183 (99.5)	4.82	.504
< 7	16 (0.7)	17 (1.2)	2 (0.4)	3 (1.1)	2 (0.8)	1 (0.7)	1 (0.5)		
Congenital malformations									
No	2,418 (99.4)	1,350 (99.4)	479 (99.8)	266 (99.3)	252 (98.8)	149 (100.0)	177 (100.0)	3.68	.633
Yes	14 (0.6)	8 (0.6)	1 (0.2)	2 (0.7)	3 (1.2)	0 (0.0)	0 (0.0)		
Giving birth in a BFH									
No	732 (29.0)	160 (11.2)	209 (41.7)	142 (49.5)	146 (56.2)	55 (35.9)	94 (49.0)	452.66	<.001

(Continued)

Table 2. Continued

Characteristic	Portugal (n = 2,520) n (%)	PSAC ^a (n = 1,427) n (%)	Brazil (n = 501) n (%)	Eastern European countries ^b (n = 287) n (%)	Other European countries ^c (n = 260) n (%)	Asian countries ^d (n = 153) n (%)	Other countries ^e (n = 192) n (%)	χ^2	p
Yes	1,788 (71.0)	1,267 (88.8)	292 (58.3)	145 (50.5)	114 (43.8)	98 (64.1)	98 (51.0)		
First day in-hospital infant feeding									
Exclusive BF	2,087 (87.4)	1,189 (90.6)	423 (89.6)	242 (89.0)	214 (84.3)	128 (87.1)	161 (86.6)	14.35	.026
Other	300 (12.6)	123 (9.4)	49 (10.4)	30 (11.0)	40 (15.7)	19 (12.9)	25 (13.4)		

Note. BF = breastfeeding; BFH = Baby-Friendly Hospital. PSAC = Portuguese-speaking African countries. Formula feeding, mixed feeding, and parenteral nutrition have been collapsed into the category "other." Missing values: maternal age = 24; maternal education = 577; parity = 264; gestational age = 107; smoking during pregnancy = 133; first antenatal visit = 403; diabetes during pregnancy = 128; Apgar score after 5 min = 161; congenital malformations = 221; 1st day in-hospital infant feeding = 310.

^aIncludes Angola, Cape Verde, Guinea-Bissau, Mozambique, and São Tomé e Príncipe. ^bThe most represented countries include Ukraine, Romania, Moldova, Russian Federation, and Bulgaria. ^cThe most represented countries include France, Spain, Germany, and the United Kingdom. ^dThe most represented countries include China, Nepal, India, and Pakistan. ^eIncludes women whose origins did not fit into the previous categories and whose group size was small.

Exclusive breastfeeding during the first hospital day was more common among migrants from PSAC, Brazil, and Eastern European countries (Table 2). Participants from other European Countries had the lowest 1st day exclusive breastfeeding rate, which was still high.

The proportion of missing values in the study sample across all variables ranged from 0.4% (maternal age) to 10.8% (maternal education; Supplemental Table S1), 26.9% of participants had at least one missing value. To account for potential bias, we performed a multiple imputation. First, we estimated the ORs and relative 95% CI for the association between maternal country of birth and 1st day in-hospital infant feeding using the imputed sample (Tables 3 and 4). We found that migrant groups as a whole, and PSAC-born participants in particular, were more likely to exclusively breastfeed during the 1st day after birth when compared to natives. Then, we stratified by giving birth in a BFH and adjusted for other potential confounders (Tables 3 and 4), and we observed that, when the birth occurred in a non-BFH, migrants were more likely to exclusively breastfeed during the 1st day of hospital stay compared with natives (aOR = 1.35, 95% CI [1.01, 1.81]). This association was stronger among Eastern European participants (aOR = 2.46, 95% CI [1.27, 4.78]). No differences in exclusive breastfeeding during the first hospital day were observed between native and foreign-born participants who gave birth in a BFH.

Discussion

The proportion of native and foreign-born participants who initiated breastfeeding during the first 24 hr after birth was high. This was in contrast to the proportions of exclusive breastfeeding initiation in the first few days observed in a study undertaken in England, which ranged from 65.5% to 73.6% among migrants (long- and short-term migrants respectively) as opposed to 59.5% of natives (Henderson et al., 2018).

The high rates of first day in-hospital exclusive breastfeeding observed may be explained by a supportive sociopolitical environment that has led several hospitals to obtain accreditation as BFH and a favorable sociocultural context where breastfeeding is generally encouraged and not frowned upon when done in public, unlike what has been reported for other high income countries (Hauck et al., 2020).

Additionally, we have reported that exclusive breastfeeding rates during the first day of hospital stay were higher among migrants than natives. Comparisons with other researchers who carried out studies across European settings is challenged due to the use of multiple, and sometimes unspecific, outcome definitions. Breastfeeding "during hospital stay" or "at discharge" is likewise referred to as breastfeeding "initiation," and the term also was used to indicate breastfeeding at any point after birth. Nevertheless, our findings were consistent with researchers who reported higher

Table 3. Exclusive Breastfeeding During the 1st Day in Hospital Grouped by Migration Status Then Stratified by Giving Birth in a Baby-Friendly Hospital (*N* = 5,340).

Migration Status	Total <i>N</i>	Not BFH		BFH	
	OR (95% CI)	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Native	Reference	Reference	Reference	Reference	Reference
Migrant	1.19 [1.00, 1.41]	1.37 [1.04, 1.81]	1.35 [1.01, 1.81]	1.08 [0.87, 1.35]	1.07 [0.83, 1.39]

Note. BFH = Baby-Friendly Hospital; aOR = adjusted odds ratio for maternal age and education, parity, gestational age, mode of delivery, smoking during pregnancy, first antenatal visit, diabetes during pregnancy, Apgar score after 5 min, and congenital malformations.

rates of exclusive and prevalent breastfeeding initiation (i.e., giving the newborn one or more meals of glucose solution) among foreign-born participants (Henderson et al., 2018; Zuppa et al., 2010). Another two research teams reported the opposite, with migrant participants presenting lower rates of exclusive breastfeeding initiation than the native-born (Aguilar-Ortega et al., 2019; Farchi et al., 2016). Researchers who assessed the influence of maternal country of birth on any breastfeeding initiation also had mixed results. Two reported that foreign-born participants were more likely to initiate breastfeeding (Nolan & Layte, 2015; Tavoulari et al., 2015), and one group of researchers reported no differences between native- and foreign-born participants' rates for any and exclusive breastfeeding initiation (Kana et al., 2018).

The percentage of participants exclusively breastfeeding during the 1st day of postnatal hospital stay was higher among participants from PSAC, Brazil, and Eastern European countries. Similar results were found in Italy by Zuppa et al. (2010) where participants from Africa, Eastern Europe, and Latin America had higher exclusive and prevalent breastfeeding rates than natives. It is worth noting that the majority of PSAC participants in our sample gave birth in BFHs, which may have influenced their breastfeeding outcomes. This is explained by the participants within this group

residing in the Lisbon and Vale do Tejo Region, where the recruitment of participants occurred mostly in BFHs.

Additionally, in our study, participants from Asian countries initiated exclusive breastfeeding at a rate similar to those of Portuguese natives. This finding is at odds with other researchers who have pointed to lower rates of exclusive breastfeeding among infants born to Asian participants when compared to natives in Spain and Italy (Aguilar-Ortega et al., 2019; Farchi et al., 2016). The favorable sociocultural context observed in Portugal may be proving helpful in overcome barriers to breastfeeding described by Chinese women in other host countries, which include embarrassment related to breastfeeding and perceived convenience of bottle feeding (Zhou et al., 2010).

A key finding of our study is that the influence of maternal country of birth on exclusive breastfeeding during the first hospital day disappeared when delivery occurred in a BFH. While participants from Eastern Europe were more likely than Portuguese natives to exclusively breastfeed their infants when they were born in non-BFHs, that association was not found in BFHs. To our knowledge, this is the first study investigating whether giving birth in a BFH affects the association between maternal country of birth and 1st day in-hospital exclusive breastfeeding. Recently, researchers

Table 4. Exclusive Breastfeeding During the 1st Day in Hospital Grouped by Maternal Country of Birth then Stratified by Giving Birth in a Baby-Friendly Hospital (*N* = 5,340).

	Total <i>N</i>	Giving birth in a BFH			
		No		Yes	
Maternal country of birth	OR (95% CI)	OR (95% CI)	aOR (95% CI)	OR (95% CI)	aOR (95% CI)
Portugal	Reference	Reference	Reference	Reference	Reference
PSAC	1.39 [1.11, 1.72]	1.32 [0.81, 2.17]	1.23 [0.74, 2.06]	1.20 [0.93, 1.55]	1.24 [0.92, 1.67]
Brazil	1.28 [0.94, 1.75]	1.61 [1.02, 2.54]	1.52 [0.94, 2.46]	1.21 [0.78, 1.87]	1.24 [0.76, 2.01]
Eastern European countries	1.14 [0.76, 1.71]	2.17 [1.17, 4.02]	2.46 [1.27, 4.78]	0.77 [0.46, 1.28]	0.64 [0.37, 1.11]
Other European countries	0.76 [0.53, 1.09]	1.18 [0.72, 1.91]	1.22 [0.73, 2.04]	0.60 [0.35, 1.02]	0.66 [0.36, 1.23]
Asian countries	0.88 [0.54, 1.45]	0.80 [0.40, 1.59]	0.54 [0.26, 1.09]	1.07 [0.52, 2.17]	0.96 [0.45, 2.06]
Other countries	0.94 [0.61, 1.46]	1.13 [0.63, 2.04]	1.22 [0.66, 2.24]	1.00 [0.51, 1.95]	0.89 [0.42, 1.87]

Note. BFH = Baby-Friendly Hospital; PSAC = Portuguese-speaking African countries; OR = odds ratio; CI = confidence interval; aOR = adjusted odds ratio for maternal age and education, parity, gestational age, mode of delivery, smoking during pregnancy, first antenatal visit, diabetes during pregnancy, Apgar score after 5 min, and congenital malformations.

compared exclusive breastfeeding at discharge among women delivering at BFHs and non-BFHs in Belgium, finding that the BFHI increased exclusive breastfeeding practices among native participants (Robert et al., 2019). The authors of this study argued that BFHI implementation could act as a booster promoting breastfeeding practices by participants whose beliefs were already favorable to exclusive breastfeeding and who perhaps needed additional support to engage in optimal breastfeeding practices (Robert et al., 2019). A similar explanation may underpin our results. BFHs seem to provide a more supportive environment for native participants, who would otherwise tend to have lower rates of 1st day in-hospital exclusive breastfeeding, thus attenuating the disparity with specific migrant groups.

Eastern European participants' greater likelihood to exclusively breastfeed in non-BFHs may be explained by sociocultural factors. Eastern European women living in Portugal have described breastfeeding while in hospital as a habitual practice (Coutinho et al., 2014). They were keen to be involved in maternal care, actively seeking information (Almeida et al., 2014), which might have supported their adoption of optimal infant feeding practices. Future research into the role of structural factors on breastfeeding beliefs, attitudes, and practices, comparing native and migrants' perspectives, is needed to fully understand the differences found in early breastfeeding behavior.

Limitations

Information about previous breastfeeding experience for multiparous women, breastfeeding intention, reason for formula supplementation, which are predictors of breastfeeding initiation, was not collected. Also, we did not assess the influences of length of stay in the host country on the main outcome. Length of stay is a proxy for acculturation. Finally, all the maternity units enrolled in the study were public. The percentage of cesarean sections, which was negatively associated with the onset of lactation and breastfeeding, is almost double in private hospitals. This may limit the generalizability of our findings to those settings.

Conclusions

In Portugal, exclusive breastfeeding rates during the first hospital day were high among both migrants and natives. Migrants were more likely to exclusively breastfeed than natives during the first 24 hr after birth. However, this was only observed in non-BFHs. In BFHs, maternal country of birth does not influence 1st day exclusive breastfeeding. The BFHI thus attenuates differences between migrant and native participants, perhaps promoting exclusive breastfeeding among natives. Our findings strengthen the evidence base supporting the implementation of the BFHI as a key effort in the promotion of exclusive breastfeeding initiation.

Authors' Note

Ethical approval was obtained from the Ethic Committee of the Institute of Public Health of the University of Porto (Proc. No. CE14013/ 14th March 2014), the Institutional Review Board of each maternal unit enrolled in the project and the Portuguese Data Protection Authority.

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Declaration of Conflicting Interests

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Supplemental Material

Supplemental material for this article is available online.

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4.2. PAPER II

The Impact of Formula Industry Marketing on Breastfeeding Rates in Native and Migrant Mothers

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The Impact of Formula Industry Marketing on Breastfeeding Rates in Native and Migrant Mothers

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Abstract

Introduction: Lifelong benefits of breastfeeding are far-reaching. However, optimal breastfeeding practices may be negatively affected by the marketing of different forms of breast milk substitutes. In addition, whether market factors have a different impact on migrants' breastfeeding practices when compared to natives has been poorly investigated.

Objectives: Our study's aims are (1) to assess the effect of market factors on breastfeeding discontinuation (any and exclusive), (2) comparing migrant and native women.

Methods: A longitudinal study was conducted within baMBINO, a nationwide project on perinatal health among migrant women in Portugal. Our final sample included 1,251 migrants and 1,150 natives recruited between April 2017 and March 2019 in 32 public maternities. Cox regression analysis was performed, adjusting for important confounders, and interactions were tested.

Results: Market factors were associated with any and exclusive breastfeeding discontinuation. Participants receiving free formula samples from a health professional were more likely to stop exclusive breastfeeding (adjusted hazard ratios [aHR]=1.37, 95% confidence intervals [95% CI]=1.13–1.66, $p=0.002$). Reporting exposure to formula discounts was associated with discontinuation of exclusive (aHR=1.22, 95% CI=1.09–1.38, $p=0.001$) and any breastfeeding (aHR=1.21, 95% CI=1.00–1.46, $p=0.046$). No interactions were found between being migrant and exposure to market factors.

Conclusions: Market factors influence discontinuation of any and exclusive breastfeeding. The impact of marketing does not differ between native and migrant women.

Keywords: breastfeeding discontinuation, market factors, International Code of Marketing of Breast-milk Substitutes, migrants, cultural factors

Introduction

BREASTFEEDING PRACTICES AND behaviors are shaped by historical, socioeconomic, market, cultural, and individual factors that operate at multiple levels.¹ Where market factors are concerned, the commercial interests of the industry of infant formula and related products compete with public health policies aiming at breastfeeding protection, promotion, and support.^{1–6} In 1981, the World Health Assembly approved the International Code of Marketing of Breast-milk Substitutes (hereafter referred to as the International Code) to regulate the commercial practices of manufacturers of baby food and related products, which include promotion of infant formula, follow-on and growing-up

milks, bottle-fed complementary foods, feeding bottles and teats, and any food or beverage marketed or represented as suitable to be fed to infants aged younger than 6 months.⁷ Subsequent resolutions were endorsed⁸ due to the negative influence of industry marketing on breastfeeding initiation, exclusivity, and duration trends observed among native women across several countries.^{4–6,9,10} How industry marketing impacts breastfeeding practices by migrant women and minority ethnic groups has been less studied.^{11,12}

Evidence shows that migrant mothers are more likely to initiate and maintain any breastfeeding^{13,14} when compared to natives, although acculturation may have a detrimental effect on optimal breastfeeding practices.¹³ More acculturated mothers may perceive formula feeding as the norm in

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western countries and use it as a way to fit in the host country.¹⁵ Such perceptions appear to be influenced by the marketing strategies used by formula manufacturers.⁶ However, little is known about the influence of market factors on the duration of breastfeeding among migrant mothers. In Portugal, the International Code provisions adopted in 2008, and revised in 2017 (Decree-Law No. 62/2017), cover infant and follow-on formula with respect to labeling, but only cover infant formula with regard to promotion, including free samples and formula discounts.¹⁶ Our study aims to assess the effect of market factors on discontinuation of any or exclusive breastfeeding in Portugal taking into consideration multiple maternal characteristics, namely the fact that they were Portuguese native or migrants.

Materials and Methods

Study design

We carried out a longitudinal study, under the scope of baMBINO (Migrant and Perinatal Health: Barriers, Incentives and Outcomes), a national project investigating perinatal health care experience and maternal and child health disparities among migrant and native Portuguese women. The study was approved by the Ethics Committees of the Institute of Public Health of the University of Porto (Proc. No. CE14013/14th March 2014) and of every participating hospital, and the Portuguese Data Protection Authority.

Setting

The recruitment occurred in public maternity hospitals of mainland Portugal, that were responsible for 85.1% of all deliveries reported in 2017.¹⁷ Out of the 39 public hospitals with obstetric care, 32 accepted to participate in the project. In Portugal, migrants have free access to reproductive, maternal, and child health care, irrespective of their legal status.^{18,19} Participants were recruited between April 2017 and March 2019 at admission for delivery.

Sample

Details about sampling methods have been described elsewhere.²⁰ Women aged 18 years or older were eligible to participate in the baMBINO study. For each migrant participant having birth, a native woman with a subsequent delivery in the same maternity unit was invited to participate. Having a stillbirth was an exclusion criterion, with the exception of mothers to twin births with one live birth.

For the purpose of this study, and as described in Figure 1, we excluded mothers (1) who never breastfed; (2) with contraindications to initiate or maintain breastfeeding; (3) with missing data on the outcome and/or exposure variables; and (4) with outliers in duration/cessation of exclusive breastfeeding (>195 days). The final sample included 2,401 participants (1,251 migrants and 1,150 natives).

Data collection

A longitudinal study was conducted from April 2017 until March 2019. Data were collected at two different time points: (1) at recruitment and (2) any time after the first month postpartum, but mostly around three postpartum months.

In each maternity unit, health professionals enrolled in the project explained the study to the women and invited them to participate. Women were given an information sheet, available in 15 different languages, containing the details of the project. After obtaining written informed consent from women willing to participate, information about socio-demographic (maternal country and date of birth, education, and marital status), obstetric and newborn characteristics, and infant feeding practices was collected.

From one month postpartum onward, computer-assisted telephonic interviews were conducted by trained researchers. A 112-item questionnaire—the Migrant Friendly Maternal Care Questionnaire (MFMCQ), was administered in participants' preferred language to investigate maternity care experience during pregnancy, delivery, and postpartum period.²¹ The project also counted on the interpreter service of the High Commission for Migration, on an as-needed basis. In addition, a set of questions on exposure to marketing of formula and related products were asked.

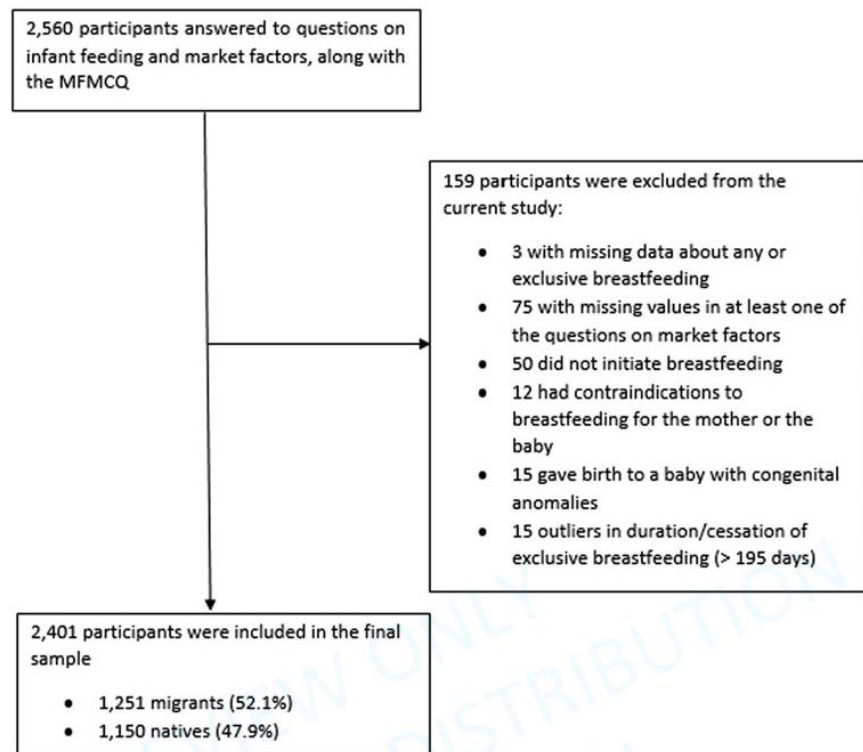
Outcome measures. Any breastfeeding was defined as being fed with breast milk (including milk expressed or breast milk from a donor), regardless of receiving infant formula, water, liquids, or foods other than breast milk. Our definition of exclusive breastfeeding was feeding the baby with breast milk (including milk expressed or breast milk from a donor), without any food or liquid other than breast milk, not even water, in line with the WHO definition.²²

At follow-up interview, participants were asked, "How did you feed your child in the last 24 hours?" If they were not exclusively breastfeeding, the information about the baby's age when he/she was first fed with infant formula, any liquid or food other than breast milk was also collected. The baby's age at the time of the interview was used as a time point for discontinuation of any breastfeeding. The baby's age was also used as the time of exclusive breastfeeding discontinuation, if the time of first introduction of liquids or foods besides breast milk was not available.

Exposure variables. Our main exposure was market factors, that is the marketing of formulas and other related products carried out by the industry. Information about exposure to different types of formula marketing, within and outside the health system, were collected after completing the MFMCQ. Since the MFMCQ covers pregnancy, delivery, and postnatal period, the exposure to market factors is intended to have occurred during this time lapse. Considering the diverse cultural and socioeconomic background of our study participants, we did not make any distinction among infant formula (for infants younger than 6 months of age), follow-on milks (for infants aged 6–12 months), and toddler milks (for children aged 12 months and older). Thus, we referred to formulas using the general term "artificial baby milk," which is the term most commonly used in Portugal.

First, mothers were asked if they, or a member of their family, had ever received from a health professional (1) a free formula sample; (2) bottles, teats, or pacifiers; (3) industry-sponsored gifts; and/or, (4) industry-sponsored brochures. In case of a positive answer, they were asked where and from whom they received those items. Then, participants were asked if, and where, they had ever seen special displays, discounts, or advertising of formula.

FIG. 1. Flowchart showing the selection of the study participants ($N=2,401$). MFMCQ, Migrant Friendly Maternal Care Questionnaire.



Covariates. The other variables included in the analysis were maternal education, defined as the highest level of educational achievement (none or primary, secondary, and tertiary education); migrant or native status, with a migrant being defined as any foreign-born woman who moved to Portugal, following the International Organization for Migration²³ maternal country of birth, according to which participants were divided into natives and mothers born in Portuguese-speaking African countries (PSAC), in Brazil and in other countries; parity (multiparous versus primiparous); gestational age (<37 weeks versus ≥ 37 weeks); mode of delivery (vaginal/instrumental versus cesarean section); smoking during pregnancy (yes or no); and giving birth in a Baby-Friendly Hospital (yes or no).

Statistical analysis. Categorical data were described as proportions and compared using chi-square test. Cox regression analysis was fitted to investigate the effect of market factors on any and exclusive breastfeeding cessation. The level of significance was set at $p < 0.05$. Only those market factors and covariates that showed a significant association with breastfeeding duration, in univariate analysis, were included in the respective final models for any and exclusive breastfeeding discontinuation. Migration status and maternal country of birth were used in model 1 and 2, respectively, as a proxy for cultural factors. Interactions between market factors and migration were also tested. Effect estimates are expressed as crude (hazard ratio [HR]) and adjusted hazard ratios (aHR) and 95% confidence intervals (95% CI) using a Cox regression. Data were analyzed using the IBM SPSS Statistics 26.0.

Results

Table 1 shows the characteristics of study participants by exposure to market factors that were significantly associated with our outcomes. Overall, women exposed to marketing were more likely to be native. In addition, participants exposed to industry-sponsored brochures were less likely to give birth in a Baby-Friendly hospital, while those who had seen formula discounts were more highly educated than their counterparts. As to our main outcomes, significant lower rates of exclusive and any breastfeeding were found among women exposed to market factors as opposed to those who were not. Looking into the different types of exposure to industry marketing, commercial practices carried out through a health professional, namely the receipt of free formula samples, bottles, teats or pacifiers, and industry-sponsored brochures were less frequent than other forms of marketing (e.g., special displays, discounts, and ads of formula) (Table 2). When women were asked from whom and where they, or a family member, received a free formula, respectively, 74.3% and 86.9% of them gave an answer. Most reported that the health professionals were nurses (74.3% of answers), followed by doctors (20.6%) and pharmacists (4.4%). Nurses were also the most mentioned by participants when questioned about the receipt of the other items. The receipt of free samples occurred mainly in health centers (51.6% of answers), public hospitals (34.0%), and private services (8.8%), along with pharmacies (5%). In some cases, women specified also other contexts (6.3%) where it occurred, which were mainly antenatal classes. Pharmacies, drug stores, and supermarkets were the main setting of

TABLE 1. COMPARISON BETWEEN EXPOSED AND NOT EXPOSED TO MARKET FACTORS

Characteristics	Free formula sample			Industry-sponsored brochure			Formula discounts		
	Not exposed (n = 2,218) n (%)	Exposed (n = 183) n (%)	p	Not exposed (n = 2,181) n (%)	Exposed (n = 220) n (%)	p	Not exposed (n = 1,523) n (%)	Exposed (n = 878) n (%)	p
Maternal education									
Primary/none	561 (27.2)	45 (27.1)	0.554	563 (27.8)	43 (21.1)	0.089	410 (29.1)	196 (24.0)	0.028
Secondary	792 (38.4)	70 (42.2)		772 (38.1)	90 (44.1)		526 (37.3)	336 (41.1)	
Tertiary	710 (34.4)	51 (30.7)		690 (34.1)	71 (34.8)		475 (33.7)	286 (35.0)	
Migration status									
Native	1,045 (47.1)	105 (57.4)	0.008	1,035 (47.5)	115 (52.3)	0.173	629 (41.3)	521 (59.3)	<0.001
Migrant	1,173 (52.9)	78 (42.6)		1,146 (52.5)	105 (47.7)		894 (58.7)	357 (40.7)	
Maternal country of birth									
Native	1,045 (47.1)	105 (57.4)	0.057	1,035 (47.5)	115 (52.3)	0.044	629 (41.3)	521 (59.3)	<0.001
PSAC ^a	533 (24.0)	35 (19.1)		533 (24.4)	35 (15.9)		431 (28.3)	137 (15.6)	
Brazil	256 (11.5)	15 (8.2)		243 (11.1)	28 (12.7)		191 (12.5)	80 (9.1)	
Other countries ^b	384 (17.3)	28 (15.3)		370 (17.0)	42 (19.1)		272 (17.9)	140 (15.9)	
Parity									
Multiparous	1,082 (51.3)	84 (47.7)	0.362	1,057 (51.1)	109 (50.2)	0.805	729 (50.6)	437 (51.8)	0.554
Primiparous	1,027 (48.7)	92 (52.3)		1,011 (48.9)	108 (49.8)		713 (49.4)	406 (48.2)	
Gestational age (weeks)									
≥37	2,025 (93.1)	162 (89.5)	0.067	1,986 (92.9)	201 (92.6)	0.886	1,395 (93.5)	792 (91.8)	0.117
<37	149 (6.9)	19 (10.5)		152 (7.1)	16 (7.4)		97 (6.5)	71 (8.2)	
Mode of delivery									
Vaginal/instrumental	1,562 (70.4)	123 (67.2)	0.361	1,539 (70.6)	146 (66.4)	0.194	1,064 (69.9)	621 (70.7)	0.655
Cesarean section	656 (29.6)	60 (32.8)		642 (29.4)	74 (33.6)		459 (30.1)	257 (29.3)	
Gave birth in a BFH									
No	767 (34.6)	59 (32.2)	0.522	734 (33.7)	92 (41.8)	0.015	515 (33.8)	311 (35.4)	0.425
Yes	1,451 (65.4)	124 (67.8)		1,447 (66.3)	128 (58.2)		1,008 (66.2)	567 (64.6)	
Smoking during pregnancy									
No	1,959 (90.1)	159 (87.8)	0.330	1,922 (89.9)	196 (90.3)	0.843	1,352 (90.8)	766 (88.5)	0.068
Yes	215 (9.9)	22 (12.2)		216 (10.1)	21 (9.7)		137 (9.2)	100 (11.5)	
Exclusive BF									
No	1,116 (50.3)	124 (67.8)	<0.001	1,104 (50.6)	136 (61.8)	0.002	716 (47.0)	524 (59.7)	<0.001
Yes	1,102 (49.7)	59 (32.2)		1,077 (49.4)	84 (38.2)		807 (53.0)	354 (40.3)	
Any BF									
No	411 (18.5)	53 (29.0)	0.001	409 (18.8)	55 (25.0)	0.025	235 (15.4)	229 (26.1)	<0.001
Yes	1,807 (81.5)	130 (71.0)		1,772 (81.2)	165 (75.0)		1,288 (84.6)	649 (73.9)	

^aIncludes Angola, Cape Verde, Guinea-Bissau, Mozambique, and São Tomé e Príncipe.^bIncludes mothers born in: Europe (65.5%), most of whom were born in Eastern Europe (51.5%); Americas (13.6%); Asia (13.3%); and non-PSAC (7.5%). BF, breastfeeding; BFH, Baby-Friendly Hospital; PSAC, Portuguese-speaking African countries.

TABLE 2. EXPOSURE TO MARKET FACTORS AND BREASTFEEDING RATES IN NATIVE AND MIGRANT MOTHERS

Market factor	All sample (N=2,401)	Native (n=1,150) n (%)	Migrant (n=1,251) n (%)	p	PSAC ^a (n=568) n (%)	Brazil (n=271) n (%)	Other countries ^b (n=412) n (%)	p
Receipt from a health professional of								
Free formula sample	183 (7.6)	105 (9.1)	78 (6.2)	0.008	35 (6.2)	15 (5.5)	28 (6.8)	0.057
Bottles/teats/pacifiers	260 (10.8)	143 (12.4)	117 (9.4)	0.015	37 (6.5)	26 (9.6)	54 (13.1)	0.001
Industry-sponsored gift	32 (1.3)	15 (1.3)	17 (1.4)	0.907	4 (0.7)	1 (0.4)	12 (2.9)	0.010
Industry-sponsored brochure	220 (9.2)	115 (10.0)	105 (8.4)	0.173	35 (6.2)	28 (10.3)	42 (10.2)	0.044
Have seen								
Special displays	699 (29.1)	456 (39.7)	243 (19.4)	<0.001	86 (15.1)	45 (16.6)	112 (27.2)	<0.001
Formula discounts	878 (36.6)	521 (45.3)	357 (28.5)	<0.001	137 (24.1)	80 (29.5)	140 (34.0)	<0.001
Ads	1,073 (44.7)	603 (52.4)	470 (37.6)	<0.001	186 (32.7)	101 (37.3)	183 (44.4)	<0.001
Exclusive BF								
No	1,240 (51.6)	669 (58.2)	571 (45.6)	<0.001	239 (42.1)	131 (48.3)	201 (48.8)	<0.001
Yes	1,161 (48.4)	481 (41.8)	680 (54.4)		329 (57.9)	140 (51.7)	211 (51.2)	
Any BF								
No	464 (19.3)	312 (27.1)	152 (12.2)	<0.001	31 (5.5)	47 (17.3)	74 (18.0)	<0.001
Yes	1,937 (80.7)	838 (72.9)	1,099 (87.8)		537 (94.5)	224 (82.7)	338 (82.0)	

^aIncludes Angola, Cape Verde, Guinea-Bissau, Mozambique, and São Tomé e Príncipe.

^bIncludes mothers born in: Europe (65.5%), most of whom were born in Eastern Europe (51.5%); Americas (13.6%); Asia (13.3%); and non-PSAC (7.5%).

BF, breastfeeding; PSAC, Portuguese-speaking African countries.

exposure to special displays and discounts. In addition, we observed that migrant women were significantly less exposed to market factors than their native counterparts. PSAC-mothers were the least exposed to all types of market factors, with the exception of industry-sponsored gifts (e.g., baby bib or spoon).

Rates of exclusive and any breastfeeding in native and migrant mothers

The rates of exclusive and any breastfeeding were higher among migrant women (54.4% and 87.8%, respectively) than among natives (41.8% and 72.9%, respectively) (Table 2). In unadjusted Cox regression models, migrant mothers were less likely to discontinue either exclusive ($HR=0.78$, 95% CI=0.70–0.88, $p<0.001$) or any breastfeeding ($HR=0.50$, 95% CI=0.41–0.61, $p<0.001$), when compared to native women (Tables 3 and 4). Similar results were obtained after adjusting for market factors and other relevant covariates (Table 4). The association was stronger for discontinuation of any breastfeeding ($aHR=0.54$, 95% CI=0.44–0.66, $p<0.001$) than for discontinuation of exclusive breastfeeding ($aHR=0.81$, 95% CI=0.72–0.91, $p<0.001$). When compared to native Portuguese women, PSAC-born mothers had the lowest likelihood of discontinuing either exclusive ($aHR=0.75$, 95% CI=0.64–0.88, $p<0.001$) or any breastfeeding ($aHR=0.25$, 95% CI=0.17–0.37, $p<0.001$). No differences were found between Brazil-born mothers and native Portuguese.

Effect of market factors on exclusive breastfeeding discontinuation

As shown in Table 3, market factors associated with discontinuation of exclusive breastfeeding on univariate Cox regression were free formula samples, industry-sponsored

brochures, and formula discounts. All the remaining associated variables were included as confounders in the final models. After performing the adjusted Cox regression, free formula samples ($aHR=1.37$, 95% CI=1.13–1.66, $p=0.002$) and discounts of formula ($aHR=1.22$, 95% CI=1.09–1.38, $p=0.001$) were significantly associated with discontinuation of exclusive breastfeeding, while no significant association was observed with industry-sponsored brochures (See Table 4, Model 1).

Effect of market factors on any breastfeeding discontinuation

Discounts of formula constituted the only market factor associated with discontinuation of any breastfeeding in the crude model (Table 3). After adjusting for covariates that were statistically significant in the univariate analysis, discounts of formula still reduced the probability of any breastfeeding at any time ($aHR=1.21$, 95% CI=1.00–1.46, $p=0.046$).

Discussion

Market factors influence the discontinuation of both exclusive and any breastfeeding, irrespective of migration status or maternal country of birth. Women receiving free formula samples from a health professional or having seen formula discounts are more likely to stop exclusive breastfeeding. Exposure to formula discounts is also a risk factor for any breastfeeding discontinuation. Thus, marketing factors impact native and migrant mothers in the same way. However, migrant women were less exposed to formula industry marketing and less likely to discontinue exclusive and any breastfeeding when compared to natives.

Lower exposure to formula marketing among PSAC-born mothers may be explained by the fact that most of the PSAC-born participants in our study gave birth at a Baby-Friendly

TABLE 3. FACTORS ASSOCIATED WITH DISCONTINUATION OF EXCLUSIVE AND ANY BREASTFEEDING BY USING COX'S REGRESSION

<i>Exposure</i>	<i>Exclusive BF discontinuation</i>		<i>Any BF discontinuation</i>	
	<i>HR (95% CI)</i>	<i>p</i>	<i>HR (95% CI)</i>	<i>p</i>
Receipt from a health professional of				
Free formula sample	1.45 (1.20–1.75)	<0.001	1.22 (0.92–1.63)	0.172
Bottles/teats/pacifiers	0.92 (0.77–1.10)	0.354	0.83 (0.63–1.11)	0.216
Industry-sponsored gift	0.80 (0.51–1.26)	0.339	0.53 (0.24–1.20)	0.128
Industry-sponsored brochure	1.20 (1.00–1.43)	0.051	1.19 (0.90–1.58)	0.229
Have seen				
Special displays	1.05 (0.93–1.19)	0.395	0.95 (0.78–1.16)	0.616
Formula discounts	1.30 (1.16–1.45)	<0.001	1.37 (1.14–1.64)	0.001
Ads	0.92 (0.82–1.03)	0.134	0.92 (0.77–1.10)	0.362
Maternal education				
Primary/none	Reference		Reference	
Secondary	0.96 (0.83–1.11)	0.581	1.06 (0.84–1.33)	0.652
Tertiary	0.82 (0.71–0.96)	0.011	0.85 (0.66–1.09)	0.198
Migration status				
Native	Reference		Reference	
Migrant	0.78 (0.70–0.88)	<0.001	0.50 (0.41–0.61)	<0.001
Maternal country of birth				
Native	Reference		Reference	
PSAC ^a	0.71 (0.61–0.83)	<0.001	0.23 (0.16–0.33)	<0.001
Brazil	0.91 (0.76–1.10)	0.334	0.79 (0.58–1.07)	0.129
Other countries ^b	0.81 (0.69–0.95)	0.009	0.70 (0.54–0.90)	0.006
Parity				
Multiparous	Reference		Reference	
Primiparous	1.13 (1.00–1.26)	0.043	1.10 (0.91–1.33)	0.315
Gestational age (weeks)				
≥37	Reference		Reference	
<37	1.57 (1.29–1.92)	<0.001	1.41 (1.04–1.91)	0.027
Mode of delivery				
Vaginal/instrumental	Reference		Reference	
Cesarean section	1.16 (1.03–1.31)	0.014	1.07 (0.87–1.30)	0.531
Gave birth in a BFH				
No	Reference		Reference	
Yes	0.84 (0.75–0.94)	0.003	0.77 (0.64–0.93)	0.005
Smoking during pregnancy				
No	Reference		Reference	
Yes	1.25 (1.05–1.49)	0.014	1.80 (1.40–2.31)	<0.001

^aIncludes Angola, Cape Verde, Guinea-Bissau, Mozambique, and São Tomé e Príncipe.

^bIncludes mothers born in: Europe (65.5%), most of whom were born in Eastern Europe (51.5%); Americas (13.6%); Asia (13.3%); and non-PSAC (7.5%).

BF, breastfeeding; CI, confidence intervals; HR, hazard ratio; PSAC, Portuguese-speaking African countries.

Hospital.²⁰ This may have contributed to protect them from in-hospital distribution of industry-sponsored products. In addition, based on data collected within the baMBINO study, PSAC-born mothers are less proficient in the Portuguese language than Brazil-born mothers. Although PSAC's official language is Portuguese, a wide range of other languages are spoken by women included in this group (e.g., Creole in Cape Verde and multiple languages in Angola, Guinea-Bissau, Mozambique and São Tomé e Príncipe). Thus, it is possible that language barriers may have hindered communication with health professionals^{24,25} resulting in less information being provided or understood, including information about industry-related products.

It should be noted that although migrant women have a lower risk of exclusive and any breastfeeding discontinuation than natives, migration status and maternal country of birth do not represent a protective factor against the negative influence of formula industry marketing. When present, free formula samples and formula discounts affect breastfeeding practices of migrant and native women to the same extent. Comparatively, women born in PSAC were less likely to discontinue exclusive and any breastfeeding than native Portuguese women, but no differences were observed between Brazil-born and native women. Brazilian-born mothers have been found to value the emotional bond associated with the practice of breastfeeding.²⁶ These cultural factors may have contributed to making them less permeable to the

TABLE 4. ADJUSTED HAZARD RATIOS FOR EXCLUSIVE AND ANY BREASTFEEDING DISCONTINUATION

	N	HR (95% CI)	p	Model 1 aHR ^a (95% CI)	p	Model 2 aHR ^b (95% CI)	p
Exclusive BF discontinuation	1,240						
Market factors							
Formula free sample	183	1.45 (1.20–1.75)	<0.001	1.37 (1.13–1.66)	0.002	1.37 (1.13–1.66)	0.001
Industry-sponsored brochure	220	1.20 (1.00–1.43)	0.051	1.05 (0.87–1.27)	0.623	1.04 (0.87–1.26)	0.657
Formula discounts	878	1.30 (1.16–1.45)	<0.001	1.22 (1.09–1.38)	0.001	1.22 (1.09–1.37)	0.001
Migration status							
Migrant	1,251	0.78 (0.70–0.88)	<0.001	0.81 (0.72–0.91)	<0.001	—	
Maternal country of birth							
PSAC ^c	568	0.71 (0.61–0.83)	<0.001	—		0.75 (0.64–0.88)	<0.001
Brazil	271	0.91 (0.76–1.10)	0.334	—		0.92 (0.76–1.11)	0.365
Other countries ^d	412	0.81 (0.69–0.95)	0.009	—		0.82 (0.70–0.96)	0.015
Any BF discontinuation	464						
Market factors							
Formula free sample	183	1.22 (0.92–1.63)	0.172	NA		NA	
Industry-sponsored brochure	220	1.19 (0.90–1.58)	0.229	NA		NA	
Formula discounts	878	1.37 (1.14–1.64)	0.001	1.21 (1.00–1.46)	0.046	1.19 (0.99–1.43)	0.072
Migration status							
Migrant	1,251	0.50 (0.41–0.61)	<0.001	0.54 (0.44–0.66)	<0.001	—	
Maternal country of birth							
PSAC ^c	568	0.23 (1.57–0.33)	<0.001	—		0.25 (0.17–0.37)	<0.001
Brazil	271	0.79 (0.58–1.07)	0.129	—		0.81 (0.59–1.11)	0.182
Other countries ^d	412	0.70 (0.54–0.90)	0.006	—		0.72 (0.56–0.93)	0.013

NA indicates that the variables with no significant association in univariate Cox Regression were not included in the model. Women exposed to each market factor were compared with non exposed ones. Native women are the reference category for migrant status and maternal country of birth.

^aBesides market factors, HR were adjusted for *migration status* (migrants versus natives) and (1) maternal education, smoking during pregnancy, gestational age, parity, mode of delivery, giving birth in a Baby-Friendly Hospital as for exclusive BF discontinuation; (2) smoking during pregnancy, gestational age, giving birth in a Baby-Friendly Hospital when assessing any BF discontinuation.

^bBesides market factors, HR were adjusted for *maternal country of birth* and (1) maternal education, smoking during pregnancy, gestational age, parity, mode of delivery, giving birth in a Baby-Friendly Hospital as for exclusive BF discontinuation; (2) smoking during pregnancy, gestational age, giving birth in a Baby-Friendly Hospital when assessing any BF discontinuation.

^cIncludes Angola, Cape Verde, Guinea-Bissau, Mozambique, and São Tomé e Príncipe.

^dIncludes mothers born in: Europe (65.5%), most of whom were born in Eastern Europe (51.5%); Americas (13.6%); Asia (13.3%); and non-PSAC (7.5%).

aHR, adjusted hazard ratios; CI, confidence intervals; BF, breastfeeding; HR, hazard ratio; PSAC, Portuguese-speaking African countries.

appealing messages of the formula industry, reducing their recall of exposure to marketing strategies. Further qualitative research is needed to gain a more in-depth understanding on this matter.

Previous research has found a negative effect of pre- or postnatal free formula samples provision on breastfeeding outcomes.^{4–6,27–31} Our findings support studies suggesting that the receipt of free samples increases the risk of exclusive breastfeeding discontinuation.^{12,30,31} Health professionals are a trusted source of information and support concerning infant feeding. Thus, the provision of free formula samples by a health professional may be interpreted as an endorsement¹² of the use of breast milk substitutes. Furthermore, it may contrast with verbal counseling on optimal infant feeding practices, conveying mixed messages.³² In this regard, Reiff et al. suggested that hospital “modeling” of formula use may be more effective in shaping early infant feeding practices than verbal advice supportive of breastfeeding.³² However, the distribution of formula samples, which is forbidden in Baby-Friendly Hospitals in Portugal and elsewhere, may occur also in other health care settings.^{28,29} This was observed in our study and in previous research leading to an increase in the risk of suboptimal breastfeeding.²⁹ Moreover, our findings

suggest that the provision of free formula samples by health professionals influences native and migrant mothers in the same way.

Another key finding of our study is that formula discounts were negatively associated with any and exclusive breastfeeding, regardless of migration status and maternal country of birth. It may be that mothers who stopped any and exclusive breastfeeding prematurely are more likely to recall formula discounts, pointing out a mechanism of reverse causality. However, discounts are a price reducing strategy that may induce the purchase of formula even when not necessary.³³ In addition, the perception of an equal nutritional value to that of breast milk and the increased availability and affordability of formula in the host country have been reported by migrant women as reasons for formula feeding.^{34,35} Furthermore, the relative affordability in the host country may induce the purchase of formula by women coming from settings where it represents a status symbol.³⁴ Nevertheless, our findings show that the negative effect of formula discounts span over all mothers, and not solely migrants.

It is important to point out that, in Portugal, national law forbids the provision of free samples and discounts of infant formula only (i.e., intended for infants aged 0–6 months),

while the International Code covers all kinds of breast milk substitutes. However, sales promotions of follow-up formulas and toddler milks are often used to also advertise infant formula as part of the same line of products, through a mechanism of cross promotion, namely by using similar packaging, branding, and labeling.³⁶ Consequently, new mothers may not understand the difference between promotion of different types of formula, interpreting it as infant formula advertisement.³⁷ Thus, banning the discounts of all types of formulas from retailers is fundamental.

Our study is subject to some limitations. The time of exposure to market factors is unknown. Although it was not possible to identify in which reproductive stage women were more influenced by industry marketing, we were able to assess its impact on any and exclusive breastfeeding discontinuation. Data on exposure and outcome variables were collected at the same time, with the potential for reverse causality. Information about breastfeeding initiation, duration, and exclusivity intentions, which are a predictor of infant feeding behaviors, was not collected. However, our study contributes to strengthen evidence of the negative impact of formula samples provision on exclusive breastfeeding duration not only at the hospital but also in other health care settings. Moreover, we assessed the influence of different types of marketing strategies, some of which have been poorly studied so far (i.e., promotions at retailers, including special displays and price discounts). Finally, we found that being less exposed to market factors protected migrant populations from breastfeeding discontinuation. Although important, this finding may serve as an invitation to the industry to target migrant mothers and thus should be addressed with caution. Arguably, it brings awareness to health services for the need to extend special protections to these vulnerable populations because, if equally exposed to market factors, they will experience the same disadvantages observed among natives.

Conclusions

Our findings show that receiving free formula samples by a health professional is a risk factor for discontinuation of exclusive breastfeeding. In addition, formula discounts negatively influence both any and exclusive breastfeeding duration. Being migrant does not modify the association between exposure to market factors and breastfeeding duration.

Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due to a confidentiality agreement securing participants' privacy and anonymity, but they are available from the corresponding author on reasonable request.

Author Contribution Statement

All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by C.L. and H.B. The first draft of the article was written by C.L. H.B. and C.F. critically reviewed previous versions of the article. All authors read and approved the final article.

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Author Disclosure Statement

No competing financial interests exist.

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4.3. PAPER III

The Influence of Human-Milk Substitutes Marketing on Breastfeeding Intention and Practice among Native and Immigrant Brazilian Women

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Submitted

The Influence of Human-Milk Substitutes Marketing on Breastfeeding Intention and Practice among Native and Immigrant Brazilian Women

Abstract

Background

The International Code of Marketing of Breast-milk Substitutes is a global public health policy aiming to protect breastfeeding from the influence of human-milk substitutes marketing. Brazil is one of the few countries substantially implementing it. Most countries adopted selected provisions, including Portugal.

Research aim

To understand whether women's perspectives on breastfeeding intention and practice are influenced by human-milk substitutes marketing upon migration to a country with fewer provisions of the International Code of Marketing of Breast-milk Substitutes, by comparing native women living in Brazil and immigrant Brazilian women living in Portugal.

Method

A multi-sited qualitative case study was conducted in Brazil and Portugal (2018–2019). Semi-structured interviews were performed with native (N = 16) and immigrant (N = 15) Brazilians. Women aged 18 or above, mothers to 0–12 month infants and without contraindications to breastfeed were eligible for the study. Heterogeneity sampling was employed based on socioeconomic status and infants' age. Content analysis was conducted using NVivo.

Results

Brazilian immigrants were more aware of the potential negative influence of human-milk substitutes marketing than natives. Sociocultural factors contributed to Brazilian immigrants being less permeable to the impact of human-milk substitutes marketing in the host country, where a less protective breastfeeding environment was perceived.

Conclusions

Sociocultural factors including breastfeeding promotion strategies and a strong breastfeeding culture at the home country appear to play a protective role on breastfeeding intention and practice among Brazilians migrating to a country with less provisions of the International Code of Marketing of Breast-milk Substitutes.

Background

Human milk is the ideal food for the healthy growth and development of infants (Victora et al., 2016). The World Health Organization ([WHO], 2021) recommends early initiation of breastfeeding within 1 hour of birth, exclusive breastfeeding up to 6 months of age and continued breastfeeding up to 2 years of age or beyond. However, only 44% of infants aged 0–6 months are exclusively breastfed globally (WHO, 2021). Breastfeeding practices are influenced by individual (maternal and infant characteristics and relationship) and structural factors (sociocultural and market context) (Rollins et al., 2016). The study of structural market factors has been gaining prominence, however, given its increasing role in shaping breastfeeding intention and practice (Baker et al., 2021; Harris & Pomeranz, 2020; Hastings et al., 2020). Exposure to human-milk substitutes (HMS) marketing can instill doubt about optimal infant feeding, reducing mothers' confidence on their ability to breastfeed and significantly increasing breastfeeding cessation (Baker et al., 2020; Lisi et al., 2021b; Parry et al., 2013).

In 1981, the World Health Assembly approved the International Code of Marketing of Breast-milk Substitutes (the Code), a global public health policy aiming to regulate unethical and inappropriate marketing of HMS (WHO, 1981, 2017). It is the responsibility of each Member State to adopt national legislation, or other suitable measures, to bring the Code provisions into effect (WHO, 1981).

In 2020, only 25 countries had substantially implemented the Code (WHO, UNICEF & IBFAN, 2020). Brazil is one of those countries (Law No. 11.265, 2006) and it has been acknowledged worldwide as an example in breastfeeding promotion (Rollins et al., 2016). Portugal, where Brazilians are the largest migrant group (Oliveira, 2020), is, conversely, one of the countries where only a few Code provisions were adopted (Decree Law No. 62, 2017).

While a favorable sociocultural context may work to protect breastfeeding, poor Code implementation may create a less enabling environment for breastfeeding (Piwoz & Huffman, 2015). However, less is known about how migration to countries with limited legal provisions of the Code influences women's perspectives about infant feeding practices. Evidence shows that immigrant status is an important determinant of breastfeeding (Dennis et al., 2019). Immigrant women have better breastfeeding outcomes than their native counterparts (Dennis et al., 2019) and that is also observed in Portugal (Kana et al., 2018). Nevertheless, HMS marketing has been associated with breastfeeding discontinuation among both Portuguese native and immigrant mothers (Lisi et al., 2021b). Based on this evidence, it is important to inquire whether migrant women living in host countries where the Code is not fully implemented are exposed to market factors and if that leads to suboptimal infant feeding. Thus, we conducted a qualitative case study to understand whether women's perspectives on breastfeeding intention and practice are influenced by HMS marketing upon migration to a country with fewer provisions of the Code, by comparing native women living in Brazil and immigrant Brazilian women living in Portugal.

Methods

Design

A multi-sited qualitative case study drawing on semi-structured interviews was conducted in Portugal and Brazil. This design enabled a comparison between women's perspectives in two settings where the Code is implemented to distinct degrees. This study received ethical approval from the Ethics Committee of the Institute of Public Health of the University of Porto (Proc.No. CE18085 /10th May 2018) in Portugal and the Committee for Ethics in Research of the University of São Paulo (Proc.No. 3.241.864/3rd April 2019) in Brazil.

Setting and Relevant Context

Starting in the 1980s, Brazil implemented several policies and programs including the Code, the National Program for Promotion of Breastfeeding, the Baby-Friendly Hospital Initiative (BFHI) and the Mother-Kangaroo Strategy (Victora et al., 2011). These synergic strategies address both the individual and structural determinants of breastfeeding and have resulted in an upward trend in exclusive breastfeeding rates (i.e. feeding the infant only human milk) between 1986 and 2006 (Boccolini et al., 2017), which remained high up until 2015 at 56.1% (Gonçalves et al., 2019; Santos et al., 2019). Between 1982 and 2014, an increase in breastfeeding rates has been observed also in Portugal (Kislaya et al., 2020), which may have resulted from increased maternity leave duration and BFHI implementation. However, in 2014, the United Nations Committee on the Rights of the Child (2014) expressed concern with the decline of exclusive breastfeeding between 4 and 6 months postpartum from 50.2% to 22.4% and inappropriate HMS marketing (IBFAN Portugal, 2014).

Sample

Native and immigrant Brazilian women above 18 years of age who were mothers to infants between 0–12 months and without contraindications to breastfeeding were eligible for the study. Purposive heterogeneity sampling was employed to guarantee maximum variation of perspectives based on two criteria: women's socioeconomic status (i.e., maternal education and household income) and infants' age, which was deliberately chosen to reduce recall bias.

In Portugal, participants were recruited through the project *Migrants and perinatal health: barriers, incentives and outcomes* (baMBINO) – a nationwide study which investigated perinatal health and healthcare experience of immigrant women living in Portugal and that is described elsewhere (Lisi et al., 2021a). A sub-sample of Brazilian mothers living in the Porto Metropolitan Area, Porto District and Braga District was selected

from the baMBINO's cohort. Mothers who accepted to be recontacted after taking part in the baMBINO's survey were invited to participate in this study through telephone. In Brazil, participants were recruited at two private clinics (an obstetric/gynecologic clinic and a pediatric clinic) located in the municipality of Osasco in the Metropolitan Region of São Paulo. São Paulo was selected as a preferential site for research because the largest group of Brazilian immigrants interviewed in Portugal were born in that state. The participants recruited at the obstetric and gynecological clinic were informed about the study by the medical staff after their postnatal consultations, while participants recruited at the pediatric clinic were informed by trained administrative staff. All eligible women were invited to participate in this study by the first author. No money compensation was given to participants. Interviewing continued until thematic saturation was reached (Guest et al., 1995). This methodological principle was used to determine the size of our sample, which is adequate to respond to our research question. A total of 16 Brazilian natives and 15 Brazilian immigrants participated in the study.

Data Collection

Between June 2018 and January 2019 individual, in-person, semi-structured interviews were conducted with Brazilian immigrants, and between May and June 2019 with Brazilian natives. All participants were handed in a Study Information Sheet and given the opportunity to clarify any arising doubts before starting the interview. Written consent was obtained from all participants. Interviews were carried out by the first author, who is a medical doctor fluent in Portuguese, and who was a full-time PhD student when the data was collected. The interview guide explored a variety of topics related to infant feeding practices, the influence of HMS marketing and, in the case of immigrant Brazilians, also migratory experience. Sociodemographic and other infant feeding related data were also collected.

Brazilian immigrants were interviewed in the dates, time and location most convenient to them (e.g., place of work, home, coffee shop), while Brazilian natives were interviewed at the clinics following their consultations. Interviews lasted approximately between 30 and 60 minutes.

In order to minimize power differentials, the first author opted to (a) introduce herself as a researcher, and never a medical doctor, and (b) position herself at a 45-degree angle from participants, when interviews took place at a healthcare setting. Furthermore, her own migratory experience to Portugal contributed to establish empathy with Brazilian immigrants and to be aware of migration-related issues during data analysis.

Interviews were digitally recorded, transcribed verbatim and reviewed for accuracy by the first author. Participants' anonymity was ensured by identifying them through an alphanumeric code in all documents and any electronic database and by guaranteeing the confidentiality of their statements.

Data analysis

Participants' characteristics are reported as numbers and proportions in Table 1. Sociodemographic data were retrieved from the form completed before each interview. Data on breastfeeding intention and practice and HMS marketing exposure were derived from interviews' content. We reported breastfeeding practices at the moment of interview, if the child was aged less than 6 months. Otherwise, recalled breastfeeding practices at 6 months postpartum were reported. Exclusive breastfeeding was defined as feeding the child only human milk (WHO, 2008). If the child was given any food or drink, including HMS, we classified it as any breastfeeding.

Qualitative data were analyzed by the first author using content analysis. A pre-defined coding framework was defined following the topic domains of the interview guide and emerging themes were added to the framework as analysis progressed (Stemler, 2000).

NVivo software (QSR International) was used to assign codes to relevant expressions and sentences, to identify new themes and sub-themes (Table 2), and to examine patterns and differences in mothers' perspectives taking into account their migration status and socioeconomic characteristics, in a reflexive and iterative manner. The direct quotes from mothers used to illustrate our findings were translated from Portuguese to English by the first author. They are presented throughout the text and in Tables 3 and 4. Trustworthiness was ensured through prolonged engagement in the field, a reflexive journal, and thoughts documentation as data analysis proceeded.

Results

Characteristics of the Sample

Immigrant and native Brazilians had a relatively similar level of education and household income. Most immigrants had been living in Portugal for more than 5 years and the majority of them were mothers to infants aged 6 months or older. Immigrant mothers were more exposed to free formula samples and HMS advertising. The number of native and immigrant Brazilians who breastfed exclusively or who opted for other types of infant feeding was similar (Table 1).

Table 1*Brazilian Native (N = 16) and Immigrant (N = 15) Participants' Characteristics.*

Characteristic	Brazilian natives n (%)	Brazilian immigrants n (%)
Maternal age (years)		
18–24	2 (13)	1 (7)
25–34	12 (75)	7 (47)
≥ 35	2 (13)	7 (47)
Infant age (months)		
< 6	13 (81)	3 (20)
≥ 6	3 (19)	12 (80)
Maternal education		
Primary education/none	0 (0)	2 (13)
Secondary education	10 (63)	5 (33)
Tertiary education	6 (38)	8 (53)
Parity		
Multiparous	7 (44)	10 (67)
Primiparous	9 (56)	5 (33)
Marital status		
Married/Committed	15 (94)	15 (100)
Single	1 (6)	0 (0)
Length of stay in Portugal		
≤ 5 years	N/A	6 (40)
> 5 years	N/A	9 (60)
Family household income ^a		
Low	3 (19)	3 (20)
Middle	9 (56)	10 (67)
High	4 (25)	2 (13)
Intention to breastfeed		
Yes	16 ^b (100)	15 (100)
No	0 (0)	0 (0)
Any breastfeeding		
Yes	14 (88)	12 (80)
No	2 (13)	3 (20)
Exclusive breastfeeding		
Yes	9 (56)	9 (60)
No	7 (44)	6 (40)
Exposure to free formula samples		
Yes	0 (0)	4 (27)
No	16 (100)	11 (73)
Exposure to human-milk substitutes advertising		
Yes	9 (56)	13 (87)
No	7 (44)	2 (13)

Note. N/A = Not applicable.

^a It was calculated based on multiples of minimum wage (MW) as follows: ≤ 2 MW = low household income; > 2 MW and ≤ 6 MW = middle household income; > 6 MW = high household income. In Portugal, the MW was 580 (Euro) at the time of data collection. Since household income categories were pre-defined within the [Information withdrawn for blinded peer-review] project, we used 500 (Euro) as an approximation of MW. In Brazil, MW was 1163,55 (Real).

^b Among Brazilian natives, two women planned to introduce formula before 6 months because of return to work and one intended to introduce fruit at 4 months.

Breastfeeding beliefs and intentions

Both natives and immigrant women intended to breastfeed their infants. Most of them wished to continue breastfeeding for at least one year or for as long as possible. Breastfeeding was described as a “natural thing” and it was considered the best option by all participants (3.1a-b) (Table 3). Some of them recalled how common it was for children to be breastfed in their families (3.2a-b). Nevertheless, three native women planned to introduce formula because they had to return to work.

Breastfeeding was also described as necessary to experience full motherhood and as something planned out since childhood (3.3a), though this was more commonly expressed by native Brazilians: “I think if I didn't breastfeed, I wouldn't be a complete mother” (Native 4).

Both native and immigrant women recognized the nutritional, immunological and health benefits of human milk (3.4a-b) and highly valued the mother-child bond established through breastfeeding (3.5a-b). Some natives believed that shorter breastfeeding duration prevented them from developing an emotional bond with their infants, who were also found to be more susceptible to disease after breastfeeding discontinuation (3.6a-b). Among multiparous immigrant women, previous breastfeeding knowledge influenced the intention to continue breastfeeding (3.6c), while primiparous women expressed the need to seek information about breastfeeding more often (3.7a-b).

Infant Feeding Practices and Experiences

Despite their initial breastfeeding intentions, several women encountered problems that led them to introduce formula. Among native Brazilians, two women abandoned breastfeeding and switched to formula and five opted for mixed feeding (i.e. a combination of human milk and formula). The reasons given by mothers to introduce formula were baby cry, prolonged sucking and sleeping problems and low infant weight, which was interpreted to be

caused by low milk supply (3.1a-b) (Table 3). In one instance, formula was introduced to enable the child to get used to it before the mother's return to work (3.2a).

Most native women trusted health professionals to select the best infant formula brand in the market (3.3a-b). Nevertheless, one low-income native woman opted for a formula type that she saw sponsored on television, without consulting with a pediatrician. The commercial led her to believe that the milk product advertised, which was cheaper compared to infant formulas, was adequate and of good quality. However, the product was not appropriate to her infant's age: "The milk [formula] advertising is so good, that you believe it is very good... It's not just milk. They complement [it], you know? With proteins, sources of vitamins, you know?" (Native 3).

Several Brazilian immigrants also introduced formula in spite of their breastfeeding intentions. One participant switched to formula out of convenience (3.4a). Another two discontinued breastfeeding after several unsuccessful attempts related to baby refusal of the breast (3.5a) and to perceived low milk supply (3.1c). Two immigrant women still breastfeeding stated that they introduced formula because of medical advice in the aftermath of infant weight concerns (3.6a-b). One of them was even encouraged to stop breastfeeding, but she persisted on doing it (3.6b). Another woman was told by a health professional to introduce food before her child reached six months (3.6c).

Mothers' expectations of breastfeeding sometimes contrasted with a less positive lived experience of feeding their infants human milk. While both native and immigrant primiparous women were aware that breastfeeding can be a difficult practice (3.7a-b), native Brazilians stated how public discourse in Brazil tends to address it in an idealized fashion (3.8a-b), which is reinforced by breastfeeding campaigns (3.8b). Nevertheless, although some natives and immigrants reported pain or difficulties in breastfeeding (caused by sore, flat or inverted nipples, mastitis), they considered it an overall positive and enjoyable experience

(3.9a-b) that brought them feelings of sadness when they were not able to breastfeed as planned (3.10a).

Exposure to HMS Marketing

Brazilian immigrants were more exposed to HMS marketing than natives and were targeted by several formal marketing strategies. For example, exposure to free formula samples was reported only by immigrants and it occurred in several settings: (a) during infant care workshops organized by private labs in the form of gift bags containing also other items (e.g. pacifiers); (b) in health care settings, and by a health professional after medical recommendation to use formula; and, (c) by post, after registration at a baby club (though only the follow-on formula type). Additionally, almost all immigrant women reported exposure to all forms of marketing at retail points (i.e., pharmacies and supermarkets), including discounts (e.g., “buy two, get one free”), catalogues, special displays, posters and product visibility in the shelves. Conversely, among natives, only one woman was exposed to discounts and another two recalled product visibility at retail points. One native woman observed an increase of product diversification, though not in advertising: “I have the impression that the market has grown a lot, with more products, but without advertising. At the same time, there is a stimulus to give human milk” (Immigrant 9).

Television commercials were also reported by immigrants and natives, as were magazine ads through to a much smaller extent. Social media marketing, websites and e-mail promotions were indicated by some immigrant women, and formula promotion through “mom Instagram influencers” and a WhatsApp video were reported by natives. In health care settings, industry-sponsored brochures were recalled by one native and two immigrant women, whereas one immigrant woman was exposed to a poster of a formula company. However, some natives (4.1a) and almost half of immigrant women stated that advertising

generally did not get their attention (4.1b), unless they needed to buy formula (4.1c) (Table 4).

Mothers' Perspectives on HMS Marketing

Immigrants were more likely than natives to express concern about how free formula samples' distribution might discourage breastfeeding, namely by inducing mothers to test them on their child and then ending up switching to formula (4.1a-b): "When they are small [children], free samples... I am against it because it is an incentive to not breastfeed" (Immigrant 15). Conversely, native women manifested positive attitudes towards free formula samples more often than immigrants because, as they reasoned, infant formula is high priced and that offered them an opportunity to try the product without having to buy an entire can (4.2a-c). Only two participants were favorable to free samples provision by a health professional, provided that formula was medically indicated (4.3a-b).

Both immigrants and natives believed that formula advertising might incentivize HMS introduction, namely by transmitting a message of convenience (4.4a-b), especially to new mothers (4.4c), or the idea that infant formula is nutritionally equivalent or superior to human milk (4.5a,c,d). The latter was observed especially among mothers with low nutritional literacy (4.5b,e). Immigrants warned that advertising induces mothers into believing that formula-fed chubby infants are healthy infants (4.6a-b). Moreover, both immigrants and natives believed that formula advertising and visibility may be especially appealing for mothers experiencing breastfeeding difficulties (4.7a-b). Product visibility and in-store placement were also perceived as a subliminal invitation to buy formula (4.8a).

Some native women stated that formula advertising made them think of what their child's future feeding needs would be and even offered a feeling of relief and hope by enabling them to identify and eventually lean on an alternative to human milk, should the

need ever arise (4.9a-b). For an immigrant woman this anticipation of infant's feeding needs was associated with consumerism in the host country:

They [future mothers] think: “maybe it's better to buy [a formula can] now [before birth]. I have to take advantage of it [discounts]. I can take a can or two already, so they're already at my house [when the baby is born].” (Immigrant 9)

Some immigrants living in Portugal for over five years perceived formula feeding to be the norm in the host country (4.10a-b). One even stated that she had been encouraged to discontinue breastfeeding and to switch to formula by her native Portuguese clients: “Here [they tell me] (...): ‘I can't believe you're still breastfeeding this child’ (...). In the first months when as I working... I have a lot of clients, and they always said: ‘Buy milk [formula]’” (Immigrant 7). This contrasted with Brazilian immigrants' perception of strong breastfeeding promotion in their home country through breastfeeding campaigns involving endorsement by female celebrities, social media and social mobilization (i.e. Breastfeeding Week), which contributed to strengthen a culture of breastfeeding: “There are many programs on TV, on the radio, many advertisements and incentives [to breastfeed]. In soap operas that is very common...” (Immigrant 16).

It is worth noting that when asked about HMS advertising, some native women actually recalled breastfeeding campaigns rather than industry marketing: “Normally (...) when I think about advertising, I think about the mother breastfeeding, not the mother giving the bottle” (Native 9).

Discussion

Most Brazilian immigrants stated that they did not shift their intentions to breastfeed after moving to a country with less Code provisions despite being more subject to contact with HMS marketing. This appears to be explained by a strong breastfeeding culture that has been passed on to them since childhood, invigorated and sustained through continuous policy

on breastfeeding promotion in their country of origin. As shown in a previous study (Lindsay et al., 2017), breastfeeding is considered the infant feeding norm in Brazil. These perspectives were echoed by Brazilian natives in our study for whom the act of breastfeeding was strongly associated with motherhood. Brazilian immigrants living in Portugal also perceived breastfeeding as the best option to nurture their infants. Aside from recognizing the nutritional benefits of human milk for the child, both immigrants and natives believed that the act of breastfeeding was crucial in establishing an emotional bond with the child (Rocha et al., 2018). These cultural factors may help explain why a similar proportion of immigrant and native Brazilians were exclusively breastfeeding their infants, even though immigrants were more exposed to HMS marketing.

Breastfeeding intentions are predictive of better breastfeeding outcomes (Meedya et al., 2010; Xu et al., 2021) and might have contributed to immigrant women being less permeable to market factors exposure in the host country (Lisi et al., 2021b). Several women compared HMS advertising messages to the information conveyed through breastfeeding promotion campaigns in their home country, distilling the former's potential to induce unnecessary formula use and its negative consequences (e.g., premature breastfeeding cessation). This awareness appears to have been built through early exposure to strategies aimed at sensitizing both institutional and lay stakeholders to the importance of breastfeeding (Pérez-Escamilla et al., 2012; Rea, 2003). These strategies began to be more vigorously implemented since 1981, when the Code was adopted, through mass media and ads printed in lottery tickets, bills and bank statements. Yet, prior to 1988, when the Code was first implemented, breastfeeding was already promoted through commercials featuring artists' and celebrities' testimonials (Rea, 2003). Together, these efforts contributed to increase social mobilization and women engagement in breastfeeding, which fostered a sociocultural context in Brazil highly supportive of breastfeeding (Pérez-Escamilla et al., 2012; Rea, 2003).

Brazilian immigrants were more aware of the potential negative impact of HMS marketing than natives. Their perspectives may have been influenced by contact with a host context upholding cultural beliefs at contrast with their own beliefs and where formula feeding is perceived as more socially accepted. Contrary to what was shown in a previous study, however, this clash between the perceived cultural values and infant feeding norms prevailing in the home and host countries did not result in formula being introduced (Choudhry & Wallace, 2012). Indeed, our findings do not point to a decline in breastfeeding intentions nor in exclusive breastfeeding in the host country. Nevertheless, Brazilian immigrants were subject to more industry marketing than before migrating, which may increase the risk of breastfeeding discontinuation under particular circumstances (Lisi et al., 2021b). For example, reduced or lack of family support linked to migration may lead immigrant women to buy formula out of need or for convenience. Furthermore, immigrants tend to rely more on health professionals in the host country (McFadden et al.; 2014). Marketing through health professionals might be more powerful than direct-to-consumer strategies (e.g. formula samples sent by post or ads) in inducing formula use (Huang et al., 2013; Waite & Christakis, 2016; Wright & Waterston, 2006). Immigrants may thus be more affected by professional advice that is influenced by industry marketing. Future research is needed to better understand how HMS marketing through health professionals may influence immigrants' breastfeeding intention and practice.

Finally, both native and immigrant Brazilians were exposed to several marketing strategies. Native women reported exposure to formula commercials on television and advertising by social media mom influencers in Brazil, pointing out to possible violations of the Code despite existing strong national legislation (Law No. 11.265, 2006). In contrast, immigrant women reported exposure to infant formula samples and other industry-sponsored products through participation in private-sponsored workshops and registration in baby clubs

(Harris & Pomeranz, 2020; Hastings et al., 2020), a form of direct-to-consumer marketing forbidden by the Code but not by Portuguese legislation (Decree-Law 62, 2017). In one instance, an infant formula sample was provided by a health professional, contravening national regulations preventing that similar practices discourage exclusive breastfeeding (Lisi et al., 2021b; Rosenberg et al., 2008; Snell et al., 2016).

We believe that our study contributed to gain a deeper understanding of Brazilian immigrants' perspectives about the impact of HMS marketing on breastfeeding outcomes. Our study also points to the importance of developing and implementing measures to reduce the influence of market factors and increase the dissemination of breastfeeding promotion strategies in Portugal.

Limitations

Unlike Brazilian immigrants who were recruited from a pool of participants giving birth at public maternities, native women were recruited at private clinics, which might point to the latter having a higher socioeconomic status. However, some of the immigrant participants referred to having used or that they would have used the private health care sector if they were in Brazil, suggesting that this bias might be lower than expected. Additionally, exposure to marketing was self-reported and may have been subject to recall bias. Furthermore, the analysis was conducted by the first author thus preventing researcher triangulation. However, the quality of the findings was ensured through data sources triangulation (i.e., application of the same method to informants in two different settings).

Conclusions

Although Brazilian immigrants reported being subject to HMS marketing more often than Brazilian natives, the majority did not change their breastfeeding intention and practice after moving to a country with limited Code provisions. Brazilian immigrants were also more aware about the potential negative impact of HMS marketing on optimal breastfeeding

outcomes. Sociocultural factors, namely strategies promoting breastfeeding and a strong breastfeeding culture in their home country, may have played an important protective role against the HMS marketing influence on breastfeeding intention and practice.

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114 | Breastfeeding, industry marketing and migration in the era of globalization

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Table 2*Data Analysis Structure.*

Theme	Definition	Sub-Theme	Definition
Breastfeeding beliefs and intentions	Participants' intention to breastfeed their infant and influencing factors	Breastfeeding as the natural infant feeding choice	Breastfeeding as the natural way of feeding one's own infant
		Memories about breastfeeding	Women recalling family members breastfeeding
		Breastfeeding as a dream	Desire of becoming a mother and breastfeeding one's own infant
		Breastfeeding as the best choice	Breastfeeding as the best option to feed one's own infant
		Emotional bond between mother and child	Mother-child attachment through the act of breastfeeding
		Previous breastfeeding experience	Multiparous women opting to breastfeed due to their previous breastfeeding experience
		Breastfeeding information	Primiparous women's need to seek for breastfeeding information

Theme	Definition	Sub-Theme	Definition
Infant feeding practices and experiences	Type of infant feeding and participants' experience with feeding their infants	Low human milk supply	Women's perception of inadequate human milk production
		Return to work	Introduction of formula due to the need to return to work
		Formula brand recommended by health professionals	Women seeking for medical advice on the best formula brand in the market
		Convenience	Introduction of formula to better conciliate motherhood responsibilities with other responsibilities in the host country
		Infant refusal of the breast	Infant showing signs that he/her does not want to suck the breast
		Medical advice to introduce formula and food	Introduction of formula or food as a result of medical recommendation
		Awareness of difficulties associated with breastfeeding	Anecdotal reports of other mothers about the difficulties encountered in breastfeeding

Theme	Definition	Sub-Theme	Definition
		Idealized depictions of breastfeeding	Expectation of a positive breastfeeding experience contrasting with women's lived experience
		Enjoyable experience	Breastfeeding described as a lovely experience despite difficulties and pain
		Feelings of sadness for not being able to breastfeed	Feelings of sadness associated with the impossibility of breastfeeding as initially planned
Exposure to human-milk substitutes marketing	Participants' recall of being exposed to human-milk substitutes marketing	Paying attention to formula advertising	Women paying attention to formula advertising only when they need to buy them
Mothers' perspectives on human-milk substitutes marketing	Participants' feelings and opinions about human-milk substitutes marketing	Free formula samples as an incentive	Free formula samples are believed to induce formula use, thus discouraging breastfeeding
		Positive attitude because of formula price	Women who agree with free formula samples distribution in order to be able to try the product

Theme	Definition	Sub-Theme	Definition
			before buying an entire can of formula, which is expensive
		Positive attitude towards provision of free formula samples by a health professional	Favorable attitude towards free formula samples provision by a health professional when the provided formula is medically indicated
		Convenience	Formula advertising conveying the message that formula feeding is more convenient than breastfeeding
		Nutritional and health claims influence	Formula advertising conveying the message that infant formula is equivalent or superior to human milk
		Chubby formula-fed infant	Images of formula-fed chubby infants used in formula advertising are associated with healthy infants
		Appealing for mothers with breastfeeding problems	Formula advertising inducing formula feeding among mothers

Theme	Definition	Sub-Theme	Definition
			experiencing breastfeeding problems
		Product in-store placement	Product visibility and in-store placement inducing women to buy formula in an indirect way
		Expectation of future need of formula	Formula advertising anticipating the need of using the milk product in the future
		Formula feeding norm at host country	Formula feeding perceived as more accepted by society in the host country

Table 3

Breastfeeding Beliefs and Intentions, and Infant Feeding Practices and Experiences – Supplementary Quotes.

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
3. Breastfeeding beliefs and intentions	3.1 Breastfeeding as the natural infant feeding choice	[3.1a] Native 6: “I always counted on that [breastfeeding]. No, I didn't make plans.”	[3.1b] Immigrant 2: “Ah, I think it's...a natural thing.”
	3.2 Memories about breastfeeding	[3.2a] Native 2: “Everyone in my family has always breastfed.”	[3.2b] Immigrant 11: “My mother breastfed me until... a long time.”
	3.3 Breastfeeding as a dream	[3.3a] Native 2: “I think since I was little... since I dreamed of having a baby... I was going to breastfeed.”	
	3.4 Breastfeeding as the best choice	[3.4a] Native 6: “The issue of both food, immunity, affection, comfort, and everything. So that's why I wanted it.”	[3.4b] Immigrant 13: “What I really think is that breastmilk is better...”
	3.5 Emotional bond between mother and child	[3.5a] Native 2: “It's a bond between me and her... it's a special moment!”	[3.5b] Immigrant 8: “...my daughter loves breastmilk. It is a very enjoyable contact between mother and daughter, right? “
	3.6 Previous breastfeeding experience	[3.6a] Native 17: “Because I couldn't breastfeed my [previous] son, my milk completely dried up due to the antibiotics I was taking.	[3.6c] Immigrant 7: “I already breastfed the first one for many months and [with] the second one I wanted to do the same thing”.

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
		So I didn't have that bond with him, did I?	
		[3.6b] Native 11: "It's because my other daughter... I took her off my breast at four months. Then she got really sick... That's why I wanted, with this one, to give her breastmilk."	
	3.7 Breastfeeding information	[3.7a] Native 13: "So, actually, I did a lot of research, talking to the gynecologist, talking to friends, and research that I see on the Internet."	[3.7b] Immigrant 10: "When I got pregnant, I researched a lot about everything, about childbirth, about... breastfeeding".
3. Infant feeding practices and experiences	3.1 Low milk supply	[3.1a] Native 3: "Because the milk didn't do it... breastfeeding [was not enough] for him. He screamed of hunger." [3.1b] Native 9: "So when I see that he is not satisfied with the last feeding of the night [and that] he is not able to sleep because of hunger, then I give him a little supplement."	[3.1c] Immigrant 10: "I had milk. Then it started to come out [only] a little and I bought the pump. And then it came out at 40 ml, 60 ml. And then I stopped. Then I introduced powdered milk."
	3.2. Return to work	[3.2a] Native 7: "When I'm not with him [due to work], then he will take another milk, other foods. And when I'm with him, [it will be]	

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
		breastmilk, up to 2 years... He's starting to get formula to get used [to it]”.	
	3.3. Formula brand recommended by health professionals	[3.3a] Native 1: “I just asked if I could use this milk [formula] that I already had in mind. Then he [health professional] said that it is one of the best milks. And that everything else [provided by that formula] is very good, regarding the nutrients that are essential at this stage.” [3.3b] Native 5: “I was previously advised by the pediatrician and he had already prescribed artificial milk [at the hospital, after birth]. I just had not used it yet [after discharge]. I kept insisting on breastmilk. But then it wasn't enough for her.”	
	3.4 Convenience		[3.4a] Immigrant 16: “It was really my choice. Just to... to make my life easier.”
	3.5 Infant refusal of the breast		[3.5a] Immigrant 10: “The baby has to suck to be able to have milk and, in this case, he didn't

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
			want any more and so I continued with the bottle.”
	3.6 Medical advice to introduce formula and food		[3.6a] Immigrant 12: “In the consultations to weigh her, she [family nurse] saw that she was losing a lot of weight, so she introduced the supplement.” [3.6b] Immigrant 13: “In the first few days, when the nurse came to my house to make the heel prick screening, she saw that she [the baby] was not gaining the weight that was necessary, so she recommended the introduction of artificial milk. And at the time, she even advised me to stop breastfeeding and to just stick to artificial milk. And I said that I would like to continue breastfeeding.” [3.6c] Immigrant 6: “When he reached the fourth month, four and a half months, the pediatrician saw that he was gaining [weight] and such, but that he needed to feed from other sources. So she told us to

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
			introduce the porridge and to introduce the soup.”
	3.7 Awareness of difficulties associated with breastfeeding	[3.7a] Immigrant 15: “Because before having breastfed, [before] having this experience, we listen to a lot of stories and we hear stories: ‘Oh, because it hurts... because it bleeds...’”	[3.7b] Immigrant 8: “Then you know, everyone says: ‘Right, that it's all very bad.’ ‘Oh, the nipple cracks!’ ‘Oh, it hurts a lot!’ I had no problem.”
	3.8 Idealized depictions of breastfeeding	[3.8a] Native 9: “Breastfeeding is not that beautiful thing that everyone says it is. It hurts like hell.” [3.8b] Native 3: “Here, in Brazil there is a campaign on breastfeeding. The campaign is very strong. So you see a lot of actresses [saying]: ‘Breastfeed your child [until] he's two years old’. But they don't talk about the painful aspects. So, when you live it in reality, you find it's not like that at all.”	
	3.9 Enjoyable experience	[3.9a] Native 1: “In the beginning, in the first fifteen days, it was very painful, complicated... but it is very pleasant to feed, to breastfeed.”	[3.9b] Immigrant 8: “And that is very enjoyable. It's a very enjoyable act.”

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
	3.10 Feelings of sadness for not being able to breastfeed	[3.10a] Native 1: “But I feel sorry for not being able to breastfeed”	

Table 4

Exposure to and Mothers' Perspectives on Human-Milk Substitutes Marketing – Supplementary Quotes.

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
4. Exposure to human-milk substitutes marketing	4.1 Paying attention to formula advertising	[4.1a] Native 2: “I think that as I had a lot in my head that I was going to breastfeed, I never stopped to pay attention.”	[4.1b] Immigrant 14: “I might have seen it but I didn't give it so much importance.” [4.1c] Immigrant 16: “So when it's something that I think is insignificant, I don't... so, I don't remember seeing it. I really started looking into formula [adds] after her [infant] weight got low.”
	4.2 Positive attitude because of formula price	[4.2a] Native 5: “So, it would be nice, right? Because I know many [people] that cannot afford to buy	[4.2c] Immigrant 10: “I think it's good for the fact that you won't

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
		it [infant formula], because the cost is a little high.” [4.2b] Native 8: “I think this is valid, right? Just like me, as I bought of emergency for my daughter, I paid 80 R\$ a can. I think the price is absurd!”	spend, hum, money. Because a can isn't cheap. You're going to buy a can, your baby can say he doesn't adapt and then you don't know what to do with that milk.”
	4.3 Positive attitude towards provision of free formula samples by a health professional	[4.3a] Native 9: “If I got a [free formula] sample, I wouldn't use it unless it's a doctor's recommendation. [For instance], the pediatrician says: ‘You can introduce infant formula, you need to introduce infant formula’. And she [the pediatrician] says: ‘I have this one [free formula sample]. Can I use this one to see if your baby adapts to it?’”	[4.3b] Immigrant 13: “I think that when it's done [free formula samples distribution] by a health professional, I think there's no harm... as long as it's something that's been prescribed, it's not a random thing, like ‘Take this’, isn't it? “
	4.4 Convenience	[4.4a] Native 7: “Because of the ease... ‘Ah, I can't stand it during the night!’ The mother is tired, she has the bottle, the father can... I think that, in some cases, she [mother] sees how easy it is, and	[4.4b] Immigrant 6: “I think that many mothers can be induced to say: ‘Wow, so it's easier, right, to give the bottle.’ Because it is. Anyone can give it. It doesn't have to be me. I can go out, I can work, I can leave him with a nanny. I can leave him with his

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
		ends up replacing it without need, right?”	grandmother, if I had his grandmother here...” [4.4c] Immigrant 14: “It influences new mothers; I think new mothers tend to go to the more practical side.”
	4.5 Nutritional and health claims influence	[4.5a] Native 15: “The idea of the advertisement is that they try to show that artificial milk is... [that] it's very similar to breastmilk, that it tries to bring the same quality, the benefits of breastmilk.” [4.5b] Native 13: “If you have correct information, you will read the advertisement and it will not influence you at all. But if you don't have it... you have mothers who give [brand of a toddler milk] or even carton milk [cow milk] to newborns, which I don't agree with.”	[4.5c] Immigrant 9: “It automatically suggests that if my milk is weaker, it is much better to buy milk from a pharmacy.” [4.5d] Immigrant 8: “What I think is the most dangerous [thing is to say] that it is absolutely normal and that artificial milk gives the same as breast milk... that it can go beyond this breastfeeding process, as if the food was just food and not the act of ensuring more affection for the child.” [4.5e] Immigrant 3: “I think that an uninformed mother, she has the idea that it can be similar to breast milk, because that's what formulas say, that formulas have to be very close to breast milk.”

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
	4.6 Chubby formula-fed infant		[4.6a] Immigrant 8: “Advertising conveys this idea to the mother: ‘I give my milk and he/she doesn't get fat. I added the artificial milk, he/she's fat, so he/she's healthy.’ I saw this [happen] with a Portuguese friend of mine here.” [4.6b] Immigrant 16: “Yeah, I think that's what mothers feel, when they come to... the advertising, a super cute advertisement for a really chubby baby with really pink cheeks, they think: ‘Wow, what a healthy baby!’”
	4.7 Appealing for mothers with breastfeeding problems	[4.7a] Native 6: “As I had many difficulties breastfeeding, I live in conflict. I used to think: ‘Oh, guys, if I bought a can that is in front of me, everything would be easier’.	[4.7b] Immigrant 6: “Look, I think that, at a time when breastfeeding is difficult, the nipple is cracked, it hurts... Because breastfeeding hurts, tires, [it] limits, right? Physically, time wise... I think that many mothers can be induced, thus, to say: ‘Wow, so it's easier, right, to give the bottle.’

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
	4.8 Product in-store placement		[4.8a] Immigrant 9: “In other words, if you have a child and you are going to buy a pacifier, or you are going to buy diapers, they must go through the milk. It is also, I say, a subliminal message.”
	4.9 Expectation of future need of formula	[4.9a] Native 15: “(...) it [advertising] didn't arouse any feelings, except for... I don't know, for: ‘Oh, maybe this milk is good for my daughter’, if she needs to drink. Maybe it's a milk that I would choose for my daughter to take.” [4.9b] Native 9: “I think it's a plan B. Saying: ‘If I can't breastfeed, I have one [can] there... I don't need to despair because I have plan B and my child will not be deprived of food’. It's a relief.”	
	4.10 Formula feeding norm at host country		[4.10a] Immigrant 4: “Here in Portugal, (...) you rarely see them [Portuguese mothers] breastfeeding. (...) It is not possible that such a large

Theme	Sub-theme	Supporting quotes	
		Brazilian natives	Brazilian immigrants
			percentage [of bottle feeding] is all because they [Portuguese mothers] did not have milk. It doesn't happen to all mothers.” [4.10b] Immigrant 7: “I find it more common to breastfeed in Brazil than here. It is common there, it is natural. Here it's not so much anymore. I don't know if that is because women don't want to [breastfeed] or if it's because of a lack of encouragement and information.”

5. Discussion

This thesis contributes to fill the gap in the literature about the influence of breastmilk substitutes' industry marketing on infant feeding practices, among diverse populations, by comparing migrant and native women. A large body of evidence has shown the negative effects of market factors on optimal infant feeding practices, yet only a few studies assessed their influence on ethnic minority groups and underserved populations (Romero-Gwynn, 1989; Snell et al., 1992). Comparing the effect of breastmilk substitutes' industry marketing on infant feeding practices across diverse populations is crucial to ensure more equitable global public health policies and interventions to promote optimal infant nutrition.

The baMBINO project offered a unique opportunity to conduct this comparative study, due to its national reach, the longitudinal design and the recruitment of a large number of migrant participants coming from several countries. Infant feeding practices were assessed during the first in-hospital day and, later, from one to six months postpartum. The choice of these two time points provided a chance to follow the trajectory of infant feeding practices over time and to assess the influence of contextual structural factors that may enable, or not, an environment free of commercial interests.

By adhering to specific global standards in line with the Code (WHO, 2018), the Baby-Friendly Hospital Initiative aims to foster the provision of high quality care to women and their children, namely by protecting them against the influence of breastmilk substitutes' industry marketing. Its positive effect on short- and long-term breastfeeding outcomes have been well-established (Pérez-Escamilla et al., 2016). What had not been studied yet was whether the Baby-Friendly Hospital Initiative has a similar impact on migrants' breastfeeding practices when compared to natives. To answer this question, I first compared in-hospital exclusive breastfeeding rates between migrant and native women. We found that these rates were higher among migrant women, in line with previous studies (Henderson et al., 2018; Zuppa et al.,

2010). We also found that the rates of in-hospital exclusive breastfeeding during the first day were very high among both populations. This points to a sociopolitical environment that is favorable to breastfeeding promotion, and which has led to 14 maternity wards working towards and receiving accreditation as Baby-Friendly. Furthermore, the Portuguese National Committee of Baby-Friendly Hospital Initiative created in 1991 changed its name to National Committee of Baby-Friendly Initiative in 2016, clearly pointing out its commitment towards extending the accreditation to other settings aside from hospitals, i.e. to groups of health care centers (ACES), universities and companies (UNICEF, n.d.).

After stratifying women according to place of birth (i.e. Baby-Friendly Hospitals vs non-Baby-Friendly Hospitals), it was observed that in non-accredited hospitals women from Eastern European countries were more likely to exclusively breastfeed than natives. In Baby-Friendly Hospitals, no differences were found between migrant and native women. Findings from a study carried out in Belgium showed that native women who gave birth in a Baby-Friendly Hospital had higher rates of exclusive breastfeeding than those who delivered in non-Baby-Friendly Hospitals (Robert et al., 2018). The authors suggest that the Baby-Friendly Hospital Initiative may act as a booster for women who are already keen to exclusively breastfeed, by enhancing their convictions (Robert et al., 2018). Arguably, this might also explain the results presented in this thesis. Baby-Friendly Hospitals are likely to offer an environment that encourages native women to exclusively breastfeed, and who would otherwise present lower exclusive breastfeeding rates during the first in-hospital day. This has important global public health implications, highlighting the Baby-Friendly Hospital Initiative's potential to increase exclusive breastfeeding and to attenuate existing disparities by bringing native groups closer to the high rates presented by specific migrant groups.

In non-Baby Friendly Hospitals, the higher rates of exclusive breastfeeding among women from Eastern European Countries may be explained by sociocultural factors. Qualitative studies focusing on care delivery to Eastern European women living in Portugal showed that they were used to babies being breastfed at the hospital in their home countries (Coutinho et al., 2014). Furthermore, they tend to have a more proactive attitude regarding communication with health professionals (Almeida et al., 2014). This may have contributed to them obtaining more information and to helping them be more protected from the negative influence of industry marketing and engage in optimal breastfeeding practices. Assessing the role played by these sociocultural and market factors required further research to explain the differences found between migrant and native women. To address this question I started by conducting a quantitative study focusing on the impact of formula industry marketing on breastfeeding rates comparing native and migrant women. And, as it will be discussed further on, I then went on to conduct a multi-sited qualitative study to understand whether moving to a country with fewer legal provisions to protect women against breastmilk substitutes marketing influenced the perspectives of migrant women about breastfeeding intentions and practices.

Our quantitative study showed that there were significant differences between migrant and native women's breastfeeding rates: exclusive and any breastfeeding duration were higher among migrant women than among natives. Similar results were found by Kana et al. (2018) in a study conducted in Portugal. When looking into exposure to market factors, migrant women were less exposed than natives. Nevertheless, our study showed that the provision of free formula samples by a health professional and exposure to formula discounts had a negative effect on breastfeeding practices both among migrant and native women. Migrant women also presented a lower risk of exclusive and any breastfeeding discontinuation when compared to

natives. However, when exposed to market factors, migrants had the same likelihood of discontinuing exclusive and any breastfeeding as natives.

Women born in Portuguese Speaking African Countries (PSAC) were the least exposed to almost all the market factors analyzed. Most of them gave birth in a Baby-Friendly Hospital, which might have protected them from in-hospital exposure to industry-sponsored products. Furthermore, data from project baMBINO shows that they self-rated as less proficient in the Portuguese language than women from Brazil. This might be due to the fact that, although Portuguese is the official language in PSAC, a large number of other languages are spoken. Language barriers have been found to lead to less effective communication between health professionals and women (Almeida et al., 2014; Brehm Christensen et al., 2016; De Freitas et al., 2020), which may have resulted in less information being delivered to or understood by PSAC women, including information about industry-related products. When compared to natives, PSAC women were less likely to discontinue exclusive and any breastfeeding. A similar trend was not found among Brazilian women who were as likely as native women to stop exclusive and any breastfeeding, even though they reported being less exposed to industry marketing than natives. Previous research (Rocha et al., 2018) conducted among Brazilian native women has pointed to the importance of breastfeeding as a way to establish an emotional bond between mother and child. This sociocultural factor may have contributed to making Brazilian migrants less amenable to formula industry marketing messages and, as such, reduce their recalling of exposure to those messages. The need to gain a more in-depth understanding of how these factors may work to mediate the effects of exposure to industry marketing on breastfeeding intentions and practices, informed the decision to carry out a qualitative study comparing the perspectives of Brazilian migrants living in Portugal with native women living in Brazil, which will be discussed further ahead.

Our quantitative study on the impact of formula marketing on breastfeeding also showed that exposure to free formula samples is a risk factor for discontinuation of exclusive breastfeeding, regardless of migration status or maternal country of birth. Several international studies have showed the negative effect of free formula samples on optimal breastfeeding outcomes, when they are distributed at hospital discharge (Bergevin et al., 1983; Feldman-Winter et al., 2012; Rosenberg et al., 2008; Sadacharan et al., 2014) or in other healthcare settings (Howard et al., 2000). The results presented in this thesis strengthened the conclusions of previous studies about the negative association between the provision of free formula samples by a health professional and exclusive breastfeeding (Rosenberg et al., 2008; Sadacharan et al., 2014; Snell et al., 1992) offering further insight on how it presents in Portugal. The distribution of free formula samples by trusted health professionals may be perceived by women as an endorsement to its use. These actions may be at odds with the verbal recommendation of breastfeeding usually made by health professionals, thus conveying mixed messages to women (Reiff & Essock-Vitale, 1985). To protect women from the influence of free formula samples, it is crucial to stop these from being handed in by health professionals.

Formula discounts were also associated with suboptimal breastfeeding practices by increasing the likelihood of both exclusive and any breastfeeding discontinuation. To our knowledge, the effect of this marketing strategy has not been the focus of a quantitative assessment before, even though violations of the Code were reported in this regard in countries such as Brazil (Silva et al., 2020). One possible explanation for these results is the presence of a mechanism of reverse causality, meaning that women who stop exclusive and any breastfeeding prematurely have a higher odds of recalling exposure to discounts. Qualitative research has also provided some insights that help to understand how migrant women might be influenced by formula discounts. The perception that formula milk is of equal nutritional value as that of breastmilk, together with a comparatively higher affordability and availability of

formulas in the host country, are among the factors that may drive formula consumption by migrant women (Rossiter & Yam, 2000; Vaughn et al., 2010). Furthermore, the use of breastmilk substitutes is perceived as a symbol of higher social status, especially for women coming from low income countries (Rossiter & Yam, 2000). Nevertheless, the results of our study show that formula discounts have a negative effect on breastfeeding duration among both migrant and native women.

It should be noted that, due to the diverse background of women participating in the baMBINO study, no distinction was made between the different types of formula (i.e. infant formula, follow-on formula and toddler milk) and the general term of “artificial baby milk” was used. Therefore, it was not possible to identify which type of product was promoted. The Portuguese law forbids free formula samples and discounts of infant formula only (Decree Law No. 62/2017). However, the breastmilk substitutes industry may take advantage of this gap in the legislation by using a mechanism called cross-promotion (WHO, 2019). This mechanism consists of using packaging, branding and labelling of a product, (for example follow-on formulas or toddler milk) that is very similar to that used to promote infant formula. This is a strategy to indirectly promote infant formula without breaking the law. Thus banning discounts of all type of formula at retailer shops, as has been recommended by the Code, is a fundamental measure that should be undertaken to protect both migrant and native women from the negative influence of formula industry marketing.

To understand if women’s breastfeeding intention and practice are influenced by exposure to breastmilk substitutes’ industry marketing, upon migration to a country with limited Code provisions, I conducted a multi-sited qualitative case study comparing the perspectives between native Brazilian women and immigrant Brazilian women living in Portugal. The different degree of Code implementation in the two research sites (substantial in

Brazil and limited in Portugal) offered an opportunity to understand how women's perspectives on breastfeeding intention and practice are influenced by market factors, after moving to a country with a different sociocultural environment.

The study revealed that women's breastfeeding intentions did not shift after migration to a country with fewer legal provisions of the Code, albeit being exposed to breastmilk substitutes marketing to a greater extent. This may be due to a strong breastfeeding culture handed down over generations and influenced by continuous and multiple strategies promoting breastfeeding in their country of origin. Immigrant Brazilian women described breastfeeding as the infant feeding norm in Brazil, as showed also by Lindsay et al. (2017), and considered it the best way to feed their child. Their perspectives were consistent with those of native Brazilian women, who attributed a strong sense of motherhood to the act of breastfeeding. Besides recognizing the health benefits related to breastmilk, both immigrant and native Brazilians highlighted the importance of the act of breastfeeding in establishing an emotional bond with the child (Rocha et al., 2018). These cultural factors might explain why, despite being more exposed to market factors in the host country, the proportion of immigrant Brazilian women exclusively breastfeeding is similar to that of Brazilian natives. The intention to breastfeed is predictive of better breastfeeding outcomes (Meedya et al., 2010; Xu et al., 2021) and may have protected immigrant Brazilian women from the effect of exposure to breastmilk substitutes' marketing strategies. Such strategies were at odds with breastfeeding promotion campaigns in the country of origin, which were mentioned by several immigrants participating in our study. Since 1981, subsequent breastfeeding campaigns on mass media and print material, which involved also artists and celebrities, were enacted in order to sensitize both institutional stakeholders and the general public on this matter, thus contributing to a favorable sociocultural environment to breastfeed (Pérez-Escamilla et al., 2012; Rea, 2003).

Although being more exposed to breastmilk substitutes marketing, Brazilian immigrant women showed more awareness of its potential negative impact on optimal breastfeeding practices than Brazilian natives. This may be due to the clash between immigrant women's cultural values and perceived societal acceptability of formula in the host country, which, contrary to what was previously described in the literature (Choudhry & Wallace, 2012), did not result in a decline of breastfeeding intention and exclusive breastfeeding. However, lack of close family and support in the host country might induce formula introduction for convenience. Moreover, immigrants rely more on medical advice after migration. Thus, they might be more exposed to the indirect influence of marketing strategies meant for health professionals (Grummer-Strawn et al., 2019; Wright & Waterston, 2006). Health professionals' behaviors driven by the influence of industry marketing (i.e. provision of free formula samples, recommendation of formula) may be more effective than other forms of direct-to-consumer marketing (Huang et al., 2013; Waite & Christakis, 2016).

Although the exposure to breastmilk substitutes marketing was higher among Brazilian immigrants, both native Brazilian and immigrant Brazilian women were exposed to it. In one instance, a free infant formula sample was provided to an immigrant woman by a health professional, which is not allowed by the Portuguese law (Decree Law No. 62/2017). Registrations to baby clubs or participation to workshops organized by private labs were other situations under which free formula samples distribution occurred in the host country, in contrast with the Code recommendations. However, even in Brazil, where more Code provisions were implemented, formula commercials and mom Instagram influencers were mentioned, showing that industry may circumvent the Code, even in presence of a strong national legislation.

In summary, this thesis provides new insights about the influence of breastmilk substitutes marketing on infant feeding practices among native and migrant women. Infant feeding practices were assessed since at a very early stage, showing that the Baby-Friendly Hospital might help to reduce in-hospital first-day exclusive breastfeeding disparities between migrant and native women, whose exclusive breastfeeding rates would be otherwise comparatively lower. At a later stage of infant life, optimal breastfeeding practices may be hindered by exposure to free formula samples and discounts. Although being less exposed to breastmilk substitutes marketing strategies and having a lower risk of any and exclusive breastfeeding discontinuation compared to natives, migrants are negatively affected by exposure to market factors to the same extent of natives. This calls for stronger regulation of breastmilk substitutes industry marketing, namely the enforcement of law provisions regulating free formula samples and formula discounts. Finally, the qualitative study, showed that, after migration to a country with fewer legal provisions of the Code, Brazilian women were more exposed to market factors, but also more aware of their potential negative influence on breastfeeding intention and practice. Breastfeeding promotion strategies and a strong breastfeeding culture in their country of origin might play a role in protecting them from the effects of exposure to breastmilk substitutes industry marketing. These findings show that strategies promoting breastfeeding may foster and sustain breastfeeding intention and practice, countering the potential negative consequences of breastmilk substitutes marketing, not only in countries with a strong implementation of the Code, but also in those ones with limited Code provisions. However, they point to the need to strengthen protection against market factors in countries with few Code provisions, in order to ensure optimal infant feeding for both migrant and native women.

Strengths and limitations

A major strength of the study conducted within the project baMBINO is its nationwide research design and the diverse population recruited. A high proportion of public maternity units were enrolled in mainland Portugal (82%), accounting for 84% of the total live births in Portugal, in 2018. These included 11 out of the 14 Baby-Friendly Hospital facilities. Furthermore, migrant women recruited in the study had a wide range of backgrounds, coming from 81 foreign countries. Data on infant feeding were collected during postnatal hospital stay after delivery, thus minimizing potential for recall bias. This study has also several limitations. Data on breastfeeding initiation, duration and exclusivity intentions, and previous breastfeeding experience among multiparous women were not collected. These are a predictor of infant feeding behaviors. Information on the reasons for in-hospital supplementation was also not available. Furthermore, all the maternity units enrolled in the project baMBINO were located in public hospitals, where the percentage of cesarean sections, which was negatively associated with timely initiation of breastfeeding, is almost the double. This might limit the generalization of findings to these settings. Additionally, the information on exposure to market factors was collected at the same time of the outcome, thus the exact reproductive stage in which the exposure occurred is unknown. This may allow for potential reverse causality. However, different types of market factors were evaluated, some of which have been poorly investigated in the literature (i.e., promotions at retailers, including special displays and price discounts). Their impact on breastfeeding practices was assessed, strengthening the evidence on the association between free formula samples and discontinuation of exclusive breastfeeding.

As to the qualitative case-study, its major strength was the opportunity to compare women's perspectives about the influence of breastmilk substitutes marketing on breastfeeding intention

and practice, in two countries with different degrees of Code implementation into the law. Study limitations are related to the native participants have been exclusively recruited in the State of São Paulo, whose policies and breastfeeding promotion initiatives may differ from those implemented in other areas of Brazil. Also, while immigrant women were recruited within the public health system, natives were invited to participate in private healthcare settings. This may question the comparability of results. However, some immigrant women mentioned that, if they were in Brazil, they would use the private system and a few of them used it before coming to Portugal. Thus the comparison between Brazilian natives and immigrants might be feasible, and less subject to bias. Furthermore, there is a risk of these findings being used by breastmilk substitutes industry to target migrant women in a more personalized fashion. Nevertheless, they can also serve to inform policy makers and healthcare services to develop and implement new strategies and initiatives to protect migrant women from the commercial influence of industry.

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Appendix 1

**Short questionnaire about infant feeding and exposure to industry marketing of
breastmilk substitutes and other related products**

Feeding practices

Let's talk now about your baby's feeding practices.

1. Was your child ever breastfed or fed breastmilk (this include milk expressed or breastmilk from a donor)?

☐ Yes

☐ No

☐ Don't know/ don't remember

2. How did you feed your child in the last 24 hours?

(Read aloud and check all that apply in the table below)

	Yes	No
Breastmilk, including milk expressed or breastmilk from a donor (Do not ask this question if the baby was never breastfed or fed breastmilk)		
Infant formula		
Water		
Other liquids		
Foods other than milk (for example, mashed food, soup, fruit)		

3. Was your child ever given

	Yes	No
Infant formula		
Water		
Other liquids		
Foods other than milk (for example, mashed food, soup, fruit)		

Ask Q3 only in case the mother answers no to Q2; then keep asking the other options of Q2. If the mother answers yes only to breastmilk (including milk expressed or breastmilk from a donor) in the last 24 hours, skip to Q7.

If the baby was never breastfed or fed breastmilk, skip to Q6

4. How old was your child when he/she was first fed with some liquids or foods other than breastmilk (including water)?

_____ Months _____ Weeks _____ Days

☐ Don't know/ Don't remember

5. Which are the reasons why your child was fed with some liquids or foods other than breastmilk (including water)?

(Allow mother to answer and check one or more than one. Then skip to Q7)

☐ Lack of support from health professionals

☐ Lack of support from family

☐ Return to work

☐ Medical contraindications to breastfeeding for the mother

Please specify _____

☐ Medical contraindications to breastfeeding for the child

Please specify _____

☐ No milk supply (I did not have milk)

☐ Insufficient milk supply/ Concerns related to inadequate milk supply (I did not have enough milk)

☐ Baby Weight Loss / Baby Weight Concerns

☐ Advice from a health professional

Please specify _____

☐ Breastfeeding problems

☐ It is easier to use infant formula

☐ Other

Please specify _____

6. Which are the reasons why you did not breastfeed your child?

(Allow mother to answer and check one or more than one)

☐ Lack of support from health professionals

☐ Lack of support from family

☐ Medical contraindications to breastfeeding for the mother

Please specify _____

☐ Medical contraindications to breastfeeding for the child

Please specify _____

☐ No milk supply (I did not have milk)

☐ Insufficient milk supply/ Concerns related to inadequate milk supply (I did not have enough milk)

☐ Baby Weight Loss / Baby Weight Concerns

☐ Advice from a health professional

Please specify _____

☐ It is easier to use infant formula

☐ Other

Please specify _____

Exposure to commercial practices

7. Did you or a member of your family receive some of these items from a health professional for your child?

(Read aloud and check one or more than one)

	Yes	No	<i>(Please specify where and who was)</i>
Free samples of artificial baby milk			
Bottles, teats or pacifiers			
A gift with the brand of an infant formula company			
Booklets or leaflets of an infant formula company			

8. Have you ever seen:

(Read aloud and check one or more than one)

	Yes	No			
Special displays of artificial baby milk <i>(exhibitors that draw the attention to the products of a particular brand)</i> <i>(please specify where)</i>					
Discounts of artificial baby milk <i>(please specify where)</i>					
			<i>If yes, please specify</i>	Yes	No
Advertising of artificial baby milk			Television		
			Shop/ Pharmacy		
			Magazine/ Newspaper		
			Billboard/Posters <i>(please specify where)</i>		
			Email		
			Internet		
			SMS		

Sources of information about breastfeeding and infant formula

9. Which were your sources of information about breastfeeding:
(Allow mother to answer and check one or more than one)

- ☐ Family doctor
- ☐ General practitioner
- ☐ Obstetrician, Gynecologist, OBGYN
- ☐ Midwife
- ☐ Nurse/ nurse practitioner
- ☐ Pediatrician
- ☐ Childbirth classes
- ☐ Previous pregnancy
- ☐ Family or friends
- ☐ Booklets or leaflets
- ☐ Books
- ☐ Television
- ☐ Shop/ Pharmacy
- ☐ Magazine/ Newspaper
- ☐ Billboard/Posters
- ☐ Radio
- ☐ Internet
- ☐ I have not received any information
- ☐ I did not need information
- ☐ Other

Please specify

10. Which were your sources of information about infant formula:
(Allow mother to answer and check one or more than one)

- ☐ Family doctor
- ☐ General practitioner
- ☐ Obstetrician, Gynecologist, OBGYN
- ☐ Midwife
- ☐ Nurse/ nurse practitioner
- ☐ Pediatrician
- ☐ Childbirth classes
- ☐ Previous pregnancy
- ☐ Family or friends
- ☐ Booklets or leaflets
- ☐ Books

- ☐Television
- ☐Shop/ Pharmacy
- ☐Magazine/ Newspaper
- ☐Billboard/Posters
- ☐Radio
- ☐Internet
- ☐I have not received any information
- ☐I did not need information
- ☐Other

Please

specify _____

Information about the superiority of breastfeeding compared with infant formula

11. Compared with infant formula, do you think that, in terms of quality, breastmilk is:

(Read aloud and check one)

- ☐Superior
- ☐Almost equivalent
- ☐Equivalent
- ☐Inferior
- ☐Don't know

Comments

Appendix 2

Topic guide for the interviews with native and immigrant Brazilian women²

Questions	Topics/Suggestions
I. Intentions and feeding practices	
1. While you were pregnant of your most recent baby, did you plan how you would feed him/her?	[If yes] How did you plan to do it? What factors influenced your decision? [If no] What were the reasons for changing the initial plan?
2. After birth, was it possible to feed your baby according to what you planned?	
3. (For mothers who breastfed) Overall, how was your experience with breastfeeding?	
4. (For mothers who breastfed) For how long have you breastfed? Did you plan in advance how long would you like to breastfeed your baby?	[If yes] Did you breastfeed for as long as you had planned? If not, why did you stop breastfeeding?
II. Expectations about the information provided and support to infant feeding practices	
5. Have you ever had doubts about your baby's feeding?	[If yes] Have you tried to clarify these doubts? [If yes] In what way did you try to clarify them? By your own or have you asked for help?
6. In your opinion, what is the role that health professionals should play in regard to infant feeding?	
7. Have you received any information about how to feed your baby from a health professional?	[If yes] What kind of information did you receive? What did you think about the information provided? [If no] Would you like to have received information from a health professional? What kind of information?
8. Did you receive any support to feed your baby from a health professional?	[If yes] What kind of support? What did you think about the support provided? [If no] Would you have received support from a health professional? If yes, why?
III. Perspectives on the influence of industry marketing on infant feeding practices	
9. Do you recall seeing artificial baby milk advertising [e.g. ads, leaflets]? If so, where (e.g. health center, hospital, pharmacy, in a shop, in the street)?	What do you remember about artificial baby milk advertising?
10. In your opinion, what impressions and feelings are aroused by the advertising of artificial baby milk in pregnant women and mothers?	To what extent has advertising of artificial baby milk influenced your decisions about feeding your baby?

² This topic guide was originally written in English to integrate the study protocol that was submitted in English to the Ethics Committee. For the purposes of the interviews, it has been translated into Portuguese and it was administered in that language.

