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Poorer countries have more pro-breastfeeding actions than rich countries: ecological study of 98 countries

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Summary
This study sought to verify the association between gross domestic product values in purchasing power parity (GDP PPP) and scores from the *World Breastfeeding Trends Initiative* (WBTi) tool. This is an ecological study conducted with 98 low-income (n = 43), middle-income (n = 27), and high-income (n = 28) countries. The assessment of pro-breastfeeding actions was obtained from the WBTi and the GDP PPP from the World Bank. The mean and standard deviation (SD) of the total scores and of each item of the WBTi were estimated. The ANOVA test and the Tukey test were used to compare the means of the WBTi tool according to the GDP PPP of the countries. The association between GDP PPP and the total scores and of each item of the WBTi was analyzed by linear regression. Higher WBTi scores were identified for the items on health care and nutrition systems (item 5: mean = 6.4; SD: ±2.0) and valid information support (item 7: mean = 6.4; SD: ±2.5). The means for the total score and for items 3 (implementation of the code), 7 (valid information support), 9 (breastfeeding in emergencies) and 10 (monitoring and evaluation) were higher in low- and middle-income countries and for item 4 (maternity leave) in high-income countries ($p < 0.05$). We observed a negative association between GDP PPP and the total score of the tool (β = -2.67; 95% CI: -5.06; -0.29), item 3 (β = -0.50; 95% CI: -0.91; -0.08), item 7 (β = -0.67; 95% CI: -1.07; -0.27), item 8 (breastfeeding and HIV; β = -0.59; 95% CI: -1.07; -0.11) and item 9 (β = -0.91; 95% CI: -1.34; -0.48). We observed a positive association between GDP PPP and item 4 (maternity protection; β = 0.63; 95% CI: 0.24; 1.02). Countries with lower GDP PPP had higher tool scores, with the exception of maternity protection, which had a higher score in countries with higher GDP PPP.

Introduction

Countries' economic classification and gross domestic product (GDP) shape the structural context of breastfeeding [1] . Recent studies reveal an inverse association between a country's level of economic development and breastfeeding rates [2,3] . In high-income countries, although breastfeeding rates are low, there was an upward trend between 1990 and 2015 [2] . Furthermore, countries with the same economic classification have different trajectories of breastfeeding, with some countries showing an increase in their rates, while others show a decrease [2,3,4] .

Breastfeeding rates can increase when countries implement and coordinate two or more pro-breastfeeding policies and actions [1,2,5] . In low-income countries, actions aimed at training health professionals, strategic use of data and mass media predominate [2] . In middle-income countries, the main pro-breastfeeding actions were training health professionals, implementing baby-friendly hospitals, strengthening maternity protection and implementing the *International Code of Marketing of Breast-milk Substitutes* [2] . In high-income countries, the main actions were legislation to protect breastfeeding in public places, mandatory insurance coverage for lactation counselling and breast pumps, and providing space and time for expressing breast milk at work [2] . Additionally, the strong involvement and participation of civil society stands out in strengthening breastfeeding as a powerful element in all countries, regardless of economic classification [1,2,5] .

The *World Breastfeeding Trends Initiative* (WBTi) tool allows the analysis of the national and global panorama of pro-breastfeeding policies, programs and actions, since its creation in 2004 [6,7]. The main objectives of the WBTi are to monitor and evaluate the progress of pro-breastfeeding policies, programs and financing to support decision-making on the subject in countries [8]. In a study carried out with data from this tool in 40 low- and middle-income countries, it was found that in the last 20 years the total score for most countries was less than 70 points out of a total of 100 points, with worse performance for the items referring to actions in emergency situations, HIV and infant feeding and maternity protection [9].

Currently, studies available in the literature using data from the WBTi tool focus on describing its status, without verifying its association with information on the economic level of countries [6,9,10,11,12,13], especially in high-income countries. Additionally, information on the types of actions that predominate in each country according to economic classification is scarce. The use of the WBTi tool can generate advances in the implementation of pro-breastfeeding policies and programs in countries [6,9,10,11,12,13]. Therefore, the objective of this study was to verify the association between GDP *per capita* values and WBTi tool scores.

Methods

Study design, data source and inclusion criteria

This is an ecological study conducted with data from 98 low-, middle- and high-income countries. Data on pro-breastfeeding policies and programs in countries were obtained from the WBTi tool (**https://www.worldbreastfeedingtrends.org/**) and the income classification of countries was obtained from the World Bank *website* (**https://www.worldbank.org/en/home**). All countries that conducted at least one WBTi assessment were included, and the most recent year of the assessment was selected if countries had more than one WBTi assessment.

Predictor

The income classification of the countries was carried out based on the GDP values in purchasing power parity (PPP GDP) whose cut-off points are proposed by the World Bank, corresponding to the year of evaluation of the WBTi tool for each country in the study. Thus, the countries were classified into three bands: low income for a PPP GDP value below USD 4,255; middle income for a PPP GDP value between USD 4,256 and USD 13,205; and high income for values above USD 13,205. Based on this classification, 43 countries analyzed were classified as low income (43.9%), 27 as middle income (27.6%) and 28 as high income (28.6%).

Outcomes

The outcomes were the total and item scores of the WBTi tool. The WBTi tool consists of 10 items related to pro-breastfeeding policies and programs, which are: national policy, governance and financing (item 1); Baby-Friendly Hospital initiative/10 steps to successful breastfeeding (item 2); implementation of the *International Code of Marketing of Breast-milk Substitutes* (item 3); maternity protection (item 4); health care and nutrition systems (item 5); counseling services for pregnant and lactating women (item 6); valid information support (item 7); infant feeding and HIV (item 8); feeding infants and young children in emergencies (item 9); monitoring and evaluation (item 10). Each item related to pro-breastfeeding policies and programs receives a score ranging from 0 to 10 and is composed of a list of sub-items so that the scoring can be performed. These subitems measure the presence of a given policy, its implementation and, in some items, an indicator of its effectiveness. Here is an example of the composition of the first indicator, Item 1 - national policy, program and coordination: this indicator is composed of eight items that generally indicate the presence of a breastfeeding policy officially adopted/approved by the government (yes/no); presence of a national

plan and whether it is funded; presence of a national committee and how it is coordinated. The sum of the 10 items makes up the total score, ranging from 0 to 100. Scores above 70 points for these items represent greater progress in the existence and implementation of pro-breastfeeding policies and programs.

Statistical analysis

First, the total and item scores of the WBTi tool, the GDP PPP and the respective income classification (ranges) of the countries selected for the study were collected. Subsequently, the mean and standard deviation of the total and item scores of the WBTi tool were estimated according to the country's economic classification.

The analysis of variance (ANOVA) test and the Tukey test were performed to compare the means of the tool scores (total and each item) according to the income classification (low, medium and high income). The value of $p < 0.05$ was adopted for significance.
Initially, a scatter diagram was created between the GDP PPP values (*log*) and the WBTi score (partial and total scores). Subsequently, linear regression was performed to verify the association between the GDP PPP values (on a logarithmic basis) and the total scores and those of each item of the WBTi tool.

All analyses were performed using STATA SE, version 15.1 (**https://www.stata.com**). There was no need to submit the research to a research ethics committee, since all data from the WBTi tool and GDP and economic classification of countries are in the public and free domain.

Results

The overall WBTi score ranged from 19 points in Libya to 87.5 points in Cuba. Only 14 countries scored above 70, seven of which were low-income, six were middle-income and only one was high-income. In low-income countries, the score ranged from 22.5 points to 77 points; in middle-income countries, it ranged from 19 points to 87.5 points; and in high-income countries, it ranged from 25.5 points to 74.5 points (data not shown in tables).

Table 1 shows the averages of the total score and of each item of the WBTi tool. The average total score was 53.6 points (±14.5). The highest averages of the partial scores were observed in items 5 (6.4±2.0) and 7 (6.4; ±2.5), followed by item 3 with an average of 6.1 (±2.4).

We highlight that most of the scores for each item fell between 4.3 and 7.3 points and that the worst scores were seen in the item infant and young child feeding in emergencies (item 9) across all income classifications (low = 3.2±3.1; medium = 2.5±2.3; high = 0.8±1.4) (Table 1). In general, the means of the total and each item scores were higher for most items of the tool in low- and middle-income countries compared to high-income countries. We observed a lower mean for item 3 for high-income countries compared to middle- and low-income countries ($p < 0.05$). We verified a higher mean for item 7 for low-income countries compared to middle- and high-income countries ($p < 0.05$). We observed higher means in low-income countries compared to high-income countries for the total score and item 10 ($p < 0.05$). We observed a lower average for item 9 for high-income countries compared to middle- and low-income countries ($p < 0.05$). Also regarding this item, we observed a lower average in middle-income countries compared to low-income countries ($p < 0.05$). As for item 4 (maternity leave), we observed a higher average in high-income and middle-income countries compared to low-income countries ($p < 0.05$) (Table 1).

We observed a negative association between the GDP *per capita* values and the total score of the WBTi tool (β = -2.67; 95%CI: -5.06; -0.29) (Figure 1). Furthermore, we noted a negative association for the items implementation of the Code (item 3) (β = -0.50; 95%CI: -0.91; -0.08), valid information support (item 7) (β = -0.67; 95%CI: -1.07; -0.27), infant feeding and HIV (item 8) (β = -0.59; 95%CI: -1.07; -0.11) and feeding of infants and young children in emergencies (item 9) (β = -0.91; 95%CI: -1.34; -0.48). We also observed a positive association between the value of GDP *per capita* and the score for the maternity protection item (item 4) (β = 0.63; 95% CI: 0.24; 1.02).

Discussion

We found higher averages for the total score and for four items of the tool (implementation of the code, support of valid information, policies on breastfeeding and HIV, and breastfeeding in emergencies) in low- and middle-income countries compared to high-income countries, indicating that more pro-breastfeeding actions are implemented in these countries.

Regarding item 3, the content analyzed refers to the degree of implementation and enforcement of the World Health Assembly resolutions through legal measures and enforcement of the code [9] . The presence of a more robust code in low- and middle-income countries seeks to curb the influence of breast milk substitute companies in these countries. The infant formula industries are headquartered in high-income countries, where the consumer market is already practically saturated. There is government pressure from the formula industries to weaken the code [2, 5, 14, 15] . This may influence the lower scores on the WBTi tool and shows the fragility of policies due to the presence of formula companies. One strategy to expand profits and the consumer market is to sell products in low- and middle-income countries, along with aggressive marketing tactics. Thus, in these countries there is less government pressure to curb the code, enabling more robust measures to control the aggressive marketing of these companies [2, 5, 14, 15] . Another possible situation would be the existence of the code in low- and middle-income countries prior to the massive entry of infant formula companies. Although most countries recognize the importance of the code through legislation that prohibits promotions of breast-milk substitutes, the main barriers encountered in countries regarding their legislation include the lack of political will, interference from the breast-milk substitute industry, limited understanding of the code, insufficient human and financial resources, and the absence of accountability, monitoring, and enforcement mechanisms for the code [15] .

It is worth noting that 194 countries are members of the World Health Organization (WHO) and 144 (74%) countries have adopted some legal provision to implement the code [15] . Only 16% of nations have adopted measures that are significantly in line with the code, and only 15% have laws that fully cover its scope. This means that, for most countries, the code has not yet been fully incorporated into legislation [15] . Another important point is that the potential increase in a country's GDP may generate greater openness to growth in formula consumption [3] and greater interest from industries in emerging markets, especially in low-income countries. The literature shows that the consumption of diets with higher levels of infant formula has accelerated in recent decades, especially in highly populated lower-middle and upper-middle income countries [5] . Additionally, approximately one in three newborns in low- and middle-income countries receives prelacteal feeding, and only one in two newborns is placed at the breast within the first hour of life [1] . On the other hand, several countries, especially high-income ones, do not have data on breastfeeding, indicating that little importance is given to the topic [2, 14] . Furthermore, the idea that breastfeeding is anti-work and anti-feminist is disseminated in the media in these countries [16] .

Even countries with good WBTi scores need to make efforts to effectively implement and monitor the code, as the presence of a law alone is not enough to bring about change [6, 9] . It is hoped that strong

global advocacy and the increasing availability of tools to implement the code will overcome many of these barriers and accelerate progress towards full compliance [15] . Full implementation of the code would enable mothers and families to make better decisions about infant and young child feeding, through information free from commercial influences and misleading marketing practices, and should be seen by countries as a public health and human rights priority [15] .

Another item of the WBTi tool with the highest score in low-income countries was the item support of valid information (item 7). This item examines the type of information, whether it is technically correct or not, and which information, education, and communication strategies are used by States on infant and young child feeding [6, 9] . Although poorer countries are more vulnerable, they have a greater concern regarding breastfeeding and include management and guidance on breastfeeding in health services, influencing the development of more policies and programs, which could justify, at least in part, our results[1]. We also highlight that poorer countries with norms and traditions of prioritizing breastfeeding may have an easier time structuring stronger policies and programs with health promotion and education actions in the routine of services and incorporating more indicators related to infant feeding [1, 12] .

Of the total number of countries analyzed in this study, 24.5% are countries in the sub-Saharan Africa region, considered one of the poorest regions in the world. Despite the current economic outlook of this region, the item on infant feeding policies and HIV (item 8) of the WBTi tool was better scored in low-income countries. This item examines what type of support for feeding infants and young children is made available through policies and programs to HIV-positive women [9] . Poorer countries are more vulnerable to HIV infection, with extremely high prevalence, and are more concerned with measures to contain infection by the virus, justifying the results found. In high-income countries, the prevalence of HIV is not as high, the health system is more structured and has better health conditions in the prevention and treatment of HIV.

We noted that infant and young child feeding in emergencies (item 9) had a higher score in low-income countries. This item is important to identify which policies and programs exist in countries to protect and support mothers in adequately feeding their babies during disasters [6, 9] . Emergencies and disasters, especially civil wars and climate emergencies, are more frequent in low-income countries. Therefore, these countries would have greater concerns and, consequently, more policies on this topic. In contrast, richer countries are able to structure themselves more quickly when disasters, such as earthquakes, occur and have better health conditions, so they would not have greater concerns. A more structured health system in richer countries could influence the response to emergencies.

The types of health system structures needed to promote breastfeeding in emergencies could include: specific training of health professionals for emergency situations; contingency plans with strategies to support breastfeeding; stocking supplies such as breastfeeding support *kits* and nutritional supplements for lactating women; safe and private spaces in shelters and emergency centers to support breastfeeding; mobile health units equipped to support families in affected areas; awareness campaigns and breastfeeding support groups; monitoring systems to track breastfeeding rates during and after emergencies; data collection and analysis to assess the effectiveness of breastfeeding interventions and identify areas for improvement; supportive policies such as maternity protection to guarantee the right to breastfeed in all circumstances; implementation and enforcement of the code to prevent inappropriate promotion of formula; intersectoral collaboration between different sectors (health, social welfare, civil defense); and partnerships with international organizations to provide technical and logistical support [17, 18, 19] . The item infant and young child

feeding in emergencies (item 9) needs to take precedence over pro-breastfeeding policies and programs [6,9] and the literature also shows us that most countries fail to prepare support for women to feed their babies optimally during disasters [6,9,12,13] .

In this study, high-income countries scored better on the item maternity protection (item 4). This item is used to measure the status of maternity rights, including paid leave, breastfeeding breaks, paternity leave, workplace accommodation for breastfeeding or expressing breast milk, daycare or childcare facilities, and monitoring systems for maternity rights [6,9] . Most of the high-income countries included in this study valued maternity protection more than poorer countries. Possible reasons for this may be better employment structures and a higher percentage of women in formal employment, more structured work-related issues, and a more structured and organized social and economic framework. Furthermore, it is important to note that the decrease in the birth rate in rich countries, together with initiatives to promote parenthood, such as extended maternity and paternity leave, may also be reasons for valuing maternity protection in these countries [20] . Countries with low scores on maternity leave need to implement and monitor social welfare, pro-breastfeeding, and social security policies.

Contextual factors, such as GDP *per capita* , are among the determinants of breastfeeding [1,2,3] . During the 20th century, breastfeeding was less frequent in high-income countries, and in the 21st century, it was less common in low- and middle-income countries among women with higher incomes, higher levels of education, and who live in urban areas [2] . This trend may be explained by the perception that breast-milk substitutes were considered modern and prestigious, while breastfeeding was often associated with poverty and lack of sophistication [2] . Even after more than a quarter of a century of implementation of several pro-breastfeeding policies and programs, such as the *Innocenti Declaration* and the Baby-Friendly Hospital initiative, global breastfeeding rates still fall considerably short of international targets [2] . It is crucial to evaluate investments aimed at promoting breastfeeding, both in contexts with higher purchasing power and in poorer regions, considering the costs associated with not promoting this practice [2] . Our results corroborate the literature and showed that all items of the tool at all income levels are below the desired level (9.1 points of the tool), especially in high-income countries.

Currently, 98 countries have applied the WBTi tool at least once, and our study found a variation of 68.5 points in the total score of the tool among these countries. There are also discrepancies in the performance of countries on the tool within the same geographic region, as in a previous study conducted with five Latin American countries [21] . This great variability in the WBTi tool score shows the great global heterogeneity in the development, implementation and evaluation of pro-breastfeeding actions among countries. The WBTi evaluation process is based on objective criteria, and each country has a team trained to carry out the evaluation. Additionally, to apply the tool, it is necessary to mobilize a team at the national level.

We highlight as the main positive point of this study the analysis of the WBTi tool and its association with the GDP *per capita* of the countries, absent in previous studies [6,9,10,11,12,13] . Additionally, we can identify the need for advances in the implementation of pro-breastfeeding actions, especially in high-income countries.

However, the main limitation of this study is inherent to the WBTi tool: the presence of countries with scores for each item and the total score do not reflect the same scored items, since the scores for the 10 items of the pro-breastfeeding programs and policies are generated from the scores for the subitems of each item. The subitems are varied and, consequently, the panoramas of the countries

are also varied. In other words, given the variability of the subitems of the 10 items, the tool cannot distinguish the *set* of countries from another country based solely on the partial or total score of the tool.

Breastfeeding is shaped by a range of historical, socioeconomic, cultural and individual factors. Low-income countries have contextual determinants of breastfeeding, such as the economic level investigated in this study, which influence them to invest more in actions on code implementation, valid information support, policies on breastfeeding and HIV and breastfeeding in emergencies. High-income countries invest more in actions to protect mothers. Monitoring and evaluation efforts of pro-breastfeeding actions through the WBTi tool will increase the likelihood of maternal or family adoption of breastfeeding. The synergy generated by the combination of different pro-breastfeeding actions and the participation of civil society in countries are important elements that also help to increase breastfeeding rates. Efforts to improve the items that received low scores in the WBTi and improve those with higher scores are necessary to maintain the progress.

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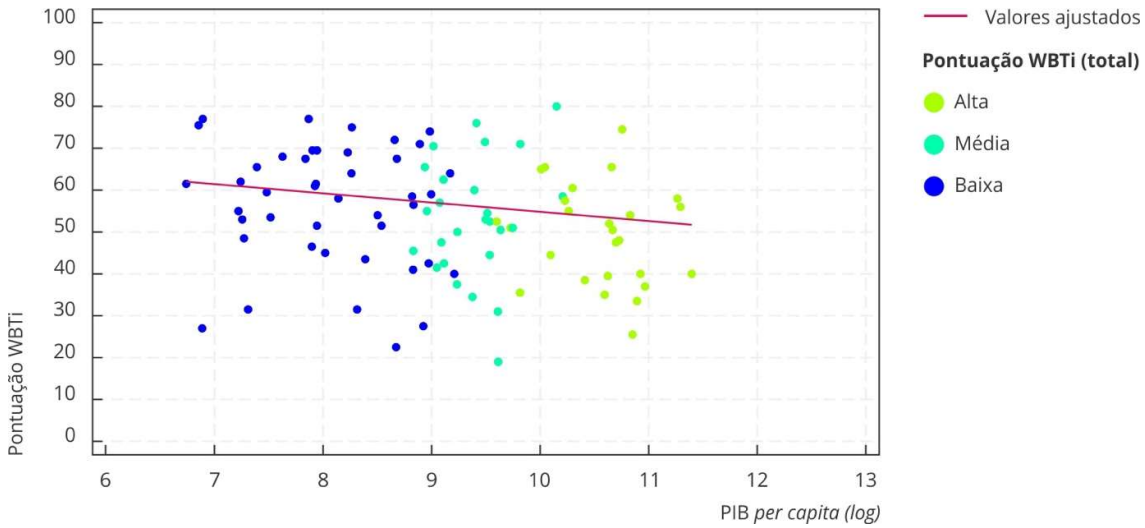
Table 1 - Mean and standard deviation (SD) of the partial and total scores of the World Breastfeeding Trends Initiative (WBTi) tool according to the country's income classification.

	Total	Items									
		1	2	3	4	5	6	7	8	9	10
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Countries	53.6 (±14.5)	5.8 (±2.8)	4.8 (±2.6)	6.1 (±2.4)	5.1 (±2.3)	6.4 (±2.0)	5.7 (±2.0)	6.4 (±2.5)	5.5 (±2.9)	2.3 (±2.8)	5.6 (±2.8)
Income classification											
Low	56.5 (±14.5) [a]	6.0 (±2.4) [a]	4.3 (±2.8) [a]	6.4 (±2.6) [a]	4.4 (±2.1) [a]	6.8 (±2.2) [a]	6.0 (±1.9) [a]	7.3 (±2.1) [a]	6.0 (±3.1) [a]	3.2 (±3.1) [a]	6.1 (±2.7) [a]
Average	54.4 (±15.6) [a,b]	6.3 (±2.7) [a]	5.6 (±2.5) [a]	6.6 (±2.3) [a]	5.4 (±2.4) [b]	6.3 (±1.9) [a]	5.1 (±2.4) [a]	5.7 (±2.5) [b]	5.5 (±2.3) [to]	2.5 (±2.3) [b]	5.4 (±2.7) [a,b]
High	48.4 (±12.3) [b]	4.8 (±3.4) [a]	4.9 (±2.3) [a]	5.3 (±2.1) [b]	5.9 (±2.4) [b]	5.9 (±1.8) [a]	5.9 (±5.9) [a]	5.8 (±5.7) [b]	4.8 (±3.1) [a]	0.8 (±1.4) [c]	5.1 (±2.9) [b]

Note: Item 1 – National policy, governance and financing; Item 2 – Baby-Friendly Hospital initiative/10 steps to successful breastfeeding; Item 3 – Implementation of the International Code of Marketing of Breast-milk Substitutes; Item 4 – Maternity protection; Item 5 – Health care and nutrition systems; Item 6 – Counselling services for pregnant and lactating women; Item 7 – Valid information support; Item 8 – Infant feeding and HIV; Item 9 – Infant and young child feeding in emergencies; Item 10 – Monitoring and evaluation. Different letters indicate significant differences by income classification (p-value < 0.05).

Figure 1



Scatterplot between gross domestic product (GDP) *per capita* (*log*) *and the total score of the World Breastfeeding Trends Initiative* (WBTi) tool .