Relationship Between Level of Education and Breastfeeding Duration Depends on Social Context: Breastfeeding Trends Over a 40-Year Period in Spain

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Abstract
This article presents trends of breastfeeding in Spain from the 1960s to the end of the century, analyzing the relationship between level of education and breastfeeding duration. A sample of 666 adult women provided data about breastfeeding practices for children born between 1958 and 2002. Joinpoint regression models for breastfeeding duration for the firstborn child throughout these years show a U-shaped curve, with a sharp decrease at the beginning of the 1970s (–17.2%) and a gradual increase toward the end of the century (1.9%). However, the trend for women with primary studies shows a constant decrease throughout the whole period (–7.4%), while higher education levels relate to a positive trend from the 1970s onward (3.4%). The authors conclude that in the Spanish context, maternal level of education is not associated with breastfeeding duration in the same direction or with the same magnitude across time. Factors related to breastfeeding should be studied, taking into account social context.

Keywords
breastfeeding, education, Spain

It is well known that breastfeeding has short- and long-term health benefits to children, mothers, and society.1–3 The World Health Organization and UNICEF4 highly recommend exclusive breastfeeding for 6 months and continued breastfeeding until the baby is 2 years old. However, although there are large differences among countries, breastfeeding rates fall short of these figures all over the world.5 For instance, in Spain in 2006, only 63.3% of infants were breastfed (partially or fully) during the first 3 months and 38.7% for 6 months.6 Most European countries have similar rates.5

Multiple factors are associated with willingness to breastfeed. The main ones can be categorized as demographic (age or marital status), socioeconomic (level of education, socioeconomic status, working conditions, social support, or possibility of maternity leave), psychological (beliefs about breastfeeding, motivation to breastfeed, breastfeeding planning, self-confidence in the ability to breastfeed, association between maternal identity and breastfeeding, personality, or presence of psychological disorders), and biomedical (smoking, milk production, or breast and nipple condition).7–11 But not all factors refer exclusively to the mother. Circumstances related to the woman’s partner and family, the social milieu where the mother lives, and health promotion interventions in hospitals and health services must be also taken into account.12–15

Most factors influencing breastfeeding are not constant within and between societies and may vary over the years. For example, it is well known that the mother’s level of education appears to be associated to the decision to breastfeed. Different studies have found a direct relationship between level of education and frequency of initiation and continuation of breastfeeding.7,14,16–18 However, in Spain, only 5.8% of the women born in the 1940s held a university degree, compared to 20.3% of those born in 1965.19 Accordingly, concomitant changes in breastfeeding rates should have occurred during this period.

Something similar may occur in relation to other factors, such as age at first maternity, which is related to breastfeeding behavior,7,16,20 and may change over the years. Additionally, interventions to promote breastfeeding have not been consistent throughout the last decades. Although health services...
and personnel should be educated about the importance of breastfeeding, the implementation and dissemination of structured programs promoting breastfeeding have become generalized only in recent years. Indeed, these programs have been absent for a long period.

Hence, taken together, these societal changes and the introduction of structured interventions to promote breastfeeding should have had an impact on breastfeeding trends. However, there is no evidence that these factors always exert their effects in the same direction or with the same magnitude, independent of the social context or the effect of other societal pressures.

Analyzing the evolution of breastfeeding trends alongside that of the factors that may influence them would help us to understand how and why mothers decide whether to breastfeed their offspring or not. Moreover, this knowledge should be useful in analyzing and optimizing the effect of health promotion programs, helping to direct and tailor the interventions for the groups that may benefit most. To fulfill these objectives, we examine the evolution of breastfeeding rates from the 1960s to the end of the century in a sample of adult women. Additionally, we analyze the relationship between these trends and differences in the mothers’ levels of education.

**Study Methods and Design**

Participants were adult female-female twins born between 1940 and 1966 who are members of the Murcia Twin Registry (MTR). The MTR is a population-based register of twins in the Region of Murcia (southeast Spain), which is held by the University of Murcia and the Regional Health Council. The Region of Murcia is one of the Spanish administrative divisions, with nearly 1.4 million inhabitants, half of which are concentrated in large urban areas (56.4%). Women participating in the MTR are located through the computerized databases of the regional health care system, which is free and universal and keeps up-to-date information on all the residents in the region. Women are incorporated into the register if the main inclusion criteria are met: pairs with both members alive at the time of initiating the MTR, with administrative residence in the region, and with no presence of disorders or disabilities that could limit their active and conscious participation. Participation is completely voluntary and not remunerated. Women included in the MTR represent about 85% of the twins of these ages living in the geographical area and, as a population-based register, so reflect the population characteristics of the region.

Data were collected in 2007 via telephone interview, with the general objectives of establishing initial contact with the twins and collecting basic demographic, health, and lifestyle information. Among other issues, the questionnaire gathered information on breastfeeding patterns, levels of education at the moment of data collection, and additional demographic data. The MTR in itself—as well as the instruments, data collection procedures, and planned analyses derived from this research and reported in this article—has been approved by the Murcia University Ethical Committee.

Data from women who had given birth were selected from the MTR data set, resulting in an analytical sample of 666 participants. Only data relating to the first child were taken into account, to simplify the results. The dependent variable was recorded as duration of breastfeeding for firstborn child in months, with no reference to exclusive breastfeeding. Level of education was dichotomized into 2 levels: primary education (ie, 5 years or less of institutional education) and secondary or higher. Since the objective of this study is not the determination of the relative effects of genetic and environmental factors on breastfeeding, data on twin zygosity and subsequent analyses are not provided.

Descriptive analyses were conducted to describe the mean breastfeeding duration of each participant’s firstborn child by year of birth. Results are reported for 5-year intervals. Second, to analyze in greater detail the association between level of education and breastfeeding trends, we present the results of joinpoint regression models. This procedure identifies points where a statistically significant change occurred over time in the linear slope of the trend. In joinpoint analysis, the best-fitting points are chosen where the rate changes significantly (increases or decreases). The analysis starts with the minimum number of joinpoints and tests whether one or more joinpoints are statistically significant and should be added to the model (up to 4 joinpoints). In the final model, each joinpoint informs a statistically significant change in trend, and an annual percentage of change (APC) is computed for each of those trends by means of generalized linear models, assuming a Poisson distribution. Significant changes include variations in direction or in the rate of increase or decrease. The APC is tested to determine if it is different from the null hypothesis, that the APC is 0%. The joinpoint procedure enables the running of a comparability test to contrast 2 sets of trend data whose mean functions are represented by joinpoint regression. A test of parallelism to detect whether the 2 regression mean functions were parallel was conducted to compare trends according to level of education. Joinpoint analyses were performed using the Joinpoint Regression Program 3.4.3 software from the Surveillance Research Program of the US National Cancer Institute.

**Results**

**Sociodemographic Data**

Women in this sample had their first baby at the age of 24.4 (4.5) years, with the annual mean ranging from 20.7 (2.1) in the early 1960s to 34.7 (4.1) in the late 1990s. Period of study includes children born between 1958 and 2002. About half the women (55.1%) had completed only primary studies. Table 1 shows means and percentages for the main variables under study stratified by 5-year periods.
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Eight out of 10 women (80.4%) initiated breastfeeding with their firstborns. Mean duration of breastfeeding was 4.2 (5.2) months. More than half the babies (56.1%) were breastfed for at least 3 months and 24.9% for 6 months. However, mean duration of breastfeeding changed in the course of time. Figure 1 shows the mean values of breastfeeding duration for the period studied. There is a U-shaped trend, with the highest values before 1965 (mean breastfeeding, nearly 10 months). Thereafter, mean values show a sharp decline, with the lowest durations of breastfeeding registered in the 1970s. It is not until the 1980s when breastfeeding duration starts to rise again until the 1990s, when children were breastfed for nearly 6 months on average.

**Evolution of Breastfeeding and Level of Education**

As we have pointed out, the mean duration of breastfeeding fell dramatically between the 1960s and 1970s. This evolution, however, presents some differences according to the mother’s level of education (Figure 2). In the second half of the 1960s, the decrease was more pronounced among primary studies women (PSW) than secondary studies women (or higher; SSW). In the early 1970s, the decrease in breastfeeding duration continued for both groups, but the relative rate of this decline changed, and it was sharper among SSW as compared to PSW. Mean duration of breastfeeding remained between 3 and 4 months throughout the 1970s and 1980s. There were no clear differences during this period related to maternal education. During the 1990s, SSW showed an increasing tendency to breastfeed their babies for longer, which lasted until the end of the series; however, PSW did not show such an increase.

To evaluate these trends in greater detail, a joinpoint regression analysis was conducted, taking into account level of education. Table 2 presents the results of this procedure, and Figure 3 compares breastfeeding trends for PSW and SSW. Due to a reduced sample in the extremes of the series, data were averaged for the first and last points, until 1965 (1958–1965) and after 1995 (1995–2002). The trend for the whole

![Figure 1](image-url)

**Figure 1.** Mean breastfeeding duration by year of birth of first child.

**Table 1.** Main Sociodemographic and Breastfeeding Characteristics of the Sample in Relation to the Firstborn Child

<table>
<thead>
<tr>
<th>Birth of First Child, y</th>
<th>Age at Maternity, y</th>
<th>Women With Primary Studies, %</th>
<th>Breastfeeding Duration, mo</th>
<th>Breastfeeding, %</th>
<th>Breastfeeding Duration, mo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td></td>
<td>mo &gt; 3 mo &gt; 6 mo</td>
<td>n Primary Studies, %</td>
</tr>
<tr>
<td>≤ 1965</td>
<td>34</td>
<td>20.7 (2.1)</td>
<td>94.1</td>
<td>9.9 (7.6)</td>
<td>61.3</td>
</tr>
<tr>
<td>1966–1970</td>
<td>85</td>
<td>22.4 (2.7)</td>
<td>79.5</td>
<td>6.2 (7.1)</td>
<td>65.9</td>
</tr>
<tr>
<td>1971–1975</td>
<td>106</td>
<td>23.3 (3.2)</td>
<td>74.5</td>
<td>2.6 (3.2)</td>
<td>40.4</td>
</tr>
<tr>
<td>1976–1980</td>
<td>143</td>
<td>23.1 (3.7)</td>
<td>60.1</td>
<td>3.9 (4.9)</td>
<td>52.2</td>
</tr>
<tr>
<td>1981–1985</td>
<td>105</td>
<td>23.5 (4.4)</td>
<td>50.5</td>
<td>3.4 (3.4)</td>
<td>58.6</td>
</tr>
<tr>
<td>1986–1990</td>
<td>92</td>
<td>25.0 (2.9)</td>
<td>31.9</td>
<td>3.3 (3.5)</td>
<td>56.5</td>
</tr>
<tr>
<td>1991–1995</td>
<td>71</td>
<td>28.9 (2.7)</td>
<td>19.7</td>
<td>4.3 (4.1)</td>
<td>62.3</td>
</tr>
<tr>
<td>≥ 1996</td>
<td>30</td>
<td>34.7 (4.1)</td>
<td>16.7</td>
<td>5.8 (8.6)</td>
<td>50.0</td>
</tr>
<tr>
<td>Total</td>
<td>666</td>
<td>24.4 (4.5)</td>
<td>54.9</td>
<td>4.2 (5.2)</td>
<td>56.1</td>
</tr>
</tbody>
</table>
sample showed a significant decline until 1972 (APC = –17.2%, \( P < .05 \)), followed by a small gradual increase from then onward (APC = 1.9%, \( P > .05 \)).

Nonetheless, there were differences according to level of education. As can be seen (Figure 3), the best-fitting model for PSW showed zero joinpoints, with a significant negative APC (–7.4%, \( P < .05 \)), which means no significant change in the trend direction in this group. Joinpoint analysis for SSW, however, presented a different evolution. The best-fitting model in this case showed 1 joinpoint. The trend is initially negative (APC = –23.0%, \( P < .05 \)) until the early 1970s. From then onward, there is a steady rise (APC = 3.4%, \( P < .05 \)) until the end of the series. A comparability test to contrast both sets of data showed that trends for PSW and SSW were different and not parallel (\( P < .05 \)). To further test the robustness of these trend differences, sensibility analyses were performed. The direction of findings and the significance of the comparability test (\( P < .05 \)) were maintained even if the first and last data points of the curves were eliminated. In analyzing each trend individually, the one for PSW was still negative and significant when data were deleted from the end of the series until 1990 (1965–1990; APC = –2.7, \( P < .05 \)). For SSW, when data were deleted from the beginning of the series, the joinpoint logically disappeared, but the positive trend (opposite to that of PSW) was still significant starting in 1970 (1970–1995; APC = 3.0, \( P < .05 \)).

**Discussion**

Our analysis of breastfeeding trends over several decades in a population from the southeast of Spain demonstrates that the association between maternal education and breastfeeding is not consistent over time.

In the present investigation, we observed striking changes in the evolution of breastfeeding rates in Spain throughout the second half of the 20th century. According to our data, in the early 1960s, the mean duration of breastfeeding was relatively high, but it decreased from then until the 1970s, when the...
lowest values were registered. Mean duration of breastfeeding did not increase again until the early 1990s. Social changes that took place during the period account for this evolution.

High breastfeeding rates during the 1950s and early 1960s in Spain have been explained by the existence of a cultural milieu oriented to breastfeeding protection. This can be exemplified by large families in rural backgrounds with the close presence of older women who assisted new mothers in the learning of breastfeeding.26 During the third quarter of the 20th century, nearly 10 million people migrated from rural to industrialized areas within the country.27 This caused a great social transformation with significant changes in family structure and lifestyle during the 1960s and 1970s. These changes included a reduction in family size with a more limited presence of other female relatives and the growing incorporation of women to the labor market.28,29 These factors, with the promotion and increasing availability of formula milk, led to a negative attitude toward breastfeeding as well as the loss of the traditional transmission of breastfeeding culture.29

This scenario seemed to change from the 1980s onward, and breastfeeding duration began to rise from the end of the decade until the end of the century. A number of factors appear to be associated to this increase. Some of them have been reported in other countries, such as the publication of research on the relationship between breastfeeding and health, the public promotion of breastfeeding, the “return to the nature” movement, and the progressive increase of the partner’s involvement in the care of the baby.30,31 Additionally, government initiatives are crucial in understanding this increase in breastfeeding rates. The duration of maternity leave in Spain increased from 6 to 14 weeks between 1965 and 1989 and to 16 weeks from then onward. In parallel, the growing concern of health institutions led to the establishing of the first structured breastfeeding support groups in the area in 1986. In the 1990s, the Spanish government adhered to the International Code of Marketing of Breast-milk Substitutes; the first Spanish hospital got the Baby-Friendly Hospital Initiative accreditation; and the Spanish Association of Pediatrics set up a Breastfeeding Committee, an important fact in the initiation of specialized research and the promotion of breastfeeding in this country. All together, these factors appear to be responsible for the increase in mean breastfeeding duration that we detected in the last decade of the 20th century.

Nevertheless, these changes showed different trends according to a relevant socioeconomic variable—namely, level of education. Among women with fewer school years, breastfeeding duration reduced very early in the period studied and remained at low levels for the rest of the duration. Meanwhile, among women with secondary education or higher, the duration of breastfeeding also reduced markedly until the 1970s, but then it began to increase steadily until the late 1990s. To explain these differences, we should take into account that years of education is a relatively stable variable after adulthood in this population and may be considered an index for other important variables, such as socioeconomic status, quality of employment, and access to health services, which appear to be related to the initiation and continuation of breastfeeding.3,7-15 It is probable that efforts in the last decades to promote breastfeeding and messages emphasizing the clear benefits of human milk have reached those women with higher levels of education more easily.32 These women are also more likely to have a higher socioeconomic status and better jobs, which may allow them to keep breastfeeding for longer.

Figure 3. Trends of breastfeeding duration (months) for first child according to level of education (joinpoint analysis).
It should be stressed that our data compare trends during a specific period and do not provide information about future tendencies, nor should they be used to compare PSW and SSW on a point-by-point basis. These trends may change again following societal evolution, and mothers with higher levels of education may set the pace for other women. Thus, more recent data show that breastfeeding duration in Spain is increasing in all groups but rising faster among women with lower education levels.\textsuperscript{33}

Consequently, we can infer from these data that the relationship between the level of education and breastfeeding duration is variable. That is, its influence may vary, depending on other social conditions, such as women’s social role or health promotion messages. This variation seems to occur not only at different time points but also with distinct social conditions. Thus, as Haku reported, the association between duration of breastfeeding and level of education is positive in Western societies but inverse in developing countries.\textsuperscript{18}

We can conclude that the level of education is related to women’s decisions about breastfeeding, but this relationship is likely to be mediated through interaction with other social context variables. Family structure, social support, norms about natural or artificial infant feeding, working conditions, health promotion interventions or hospital practices, among others, could moderate this interaction. Hence, the effect of maternal education changes with circumstances, and its influence does not remain stable over time. This has 2 important implications: First, we have to take into account mothers’ levels of education to improve breastfeeding promotion interventions; interventions should be adapted to the needs of different groups of women. Second, research should consider the social environment in which influential factors take place, as this may modulate the impact of such factors.

This research has some limitations that need to be taken into consideration. First, data collection through self-report is a tool with some well-known limitations. A recent review introduced another issue in that all of them have at least one sister of their age who could serve as a supportive system or negative influence for breastfeeding, which may not be present in women without twin sisters. Finally, data concerning variables that could significantly improve our understanding of breastfeeding trends are not available for this study. Data on partner support, family structure, and socioeconomic status could shed light on our results and help to expand on this issue in future research.

In spite of the limitations mentioned, our findings can help us understand the role of mothers’ levels of education on the decision to breastfeed. Future interdisciplinary research may clarify possible interactions of this index with other relevant variables, such as personal characteristics, partner support, and the impact of health promotion activities.

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