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RESEARCH ARTICLE

Latina paradox in Spain? Arrival-cohort effects on the birthweight of newborns of Latina mothers

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Abstract

This study analyses the arrival-cohort effects on the newborn birthweight of Latina women residing in Spain. First, it has been tested whether women of Latin American origin in Spain have an advantage in terms of birth outcomes, a pattern previously documented in the United States and referred to as the 'Latin American paradox'. Second, it has been examined whether this health advantage of Latina mothers varies by arrival cohort.

A novel database provided by the Spanish National Statistics Office that links the 2011 Census with Natural Movement of the Population records from January 2011 to December 2015 has been used. Poisson regression models were applied to test for differences in the incidence rates of low birthweight (LBW) and high birthweight (HBW) among children of Latina and native mothers, controlling for various demographic, socio-economic, and birth characteristics.

Two distinct arrival-cohort effects on perinatal health were observed. On one hand, first-generation Latina women were found to be at a lower risk of giving birth to LBW infants; however, they experienced a higher incidence of HBW during the study period. Second, Latina women of 1.5 generation, likely stressed by increased exposure to the receiving country, exhibited adverse birthweight results.

Keywords: Maternal and Child Health; Population Health; Reproductive Health

Introduction

Extensive research on the health of immigrants revealed that some groups, despite their lower socio-economic status, exhibited equal or better health indicators than natives of receiving countries (Pérez, 2002; Antecol and Bedard, 2006; Markides and Rote, 2019). This phenomenon is commonly referred to as the 'epidemiologic paradox' (Markides and Coreil, 1986). This paradox extends to perinatal health, specifically in birthweight results, where immigrant mothers have been found to have a lower risk of giving birth to LBW babies compared to native mothers (Guendelman et al., 1999; Milewski and Peters, 2014; Racape et al., 2016). In order to explain it, emphasis is placed on the possible positive selection of immigrant mothers (Antecol and Bedard, 2006) and the role of the culture of origin in promoting healthy behaviours (Scribner and Dwyer, 1989; Landale and Oropesa, 2001).

However, the immigrant health paradox appears to diminish according to the duration of residence in the host country, especially among later generations of immigrants. Previous findings emphasised that increased exposure to society in receiving countries can lead to adverse health behaviours which may influence birth outcomes, including a higher incidence of LBW (Teitler

et al., 2012; Teitler et al., 2017; Andrasfay and Goldman, 2020). This pattern is known as the 'paradox of assimilation' (Landale et al., 2000) or 'unhealthy assimilation' (Hummer et al., 2007). Both empirical regularities have been observed especially in countries with a long tradition of migration such as the United States (US) (Pérez, 2002). Within this specific context, a large body of literature highlights that Latino mothers, despite being among the most socio-economically disadvantaged ethnic populations, show unexpectedly favourable birth outcomes when compared to both native and other immigrant collectives (Guendelman et al., 1999; Fuentes-Afflick et al., 1999). Nevertheless, it has been observed that these mothers experience adverse birth outcomes, such as delivering infants with higher (Ceballos et al., 2018) and lower birthweight (Scribner and Dwyer, 1989), as their duration of residence in the host country increases. This is likely due to the process of acculturation to American society.

In the European context, the health advantage in terms of perinatal health of immigrant women over natives in receiving countries has also been confirmed (Harding et al., 2006; Milewski and Peters, 2014; Racape et al., 2016; Sow et al., 2019). In this regard, Spain is not an exception. Previous research highlights differences in perinatal health and birth outcomes according to the mother's nationality (Simó and Méndez, 2014) and maternal country of origin (Speciale and Regidor, 2011; Juárez and Revuelta-Eugercios, 2014; Cebolla-Boado and Salazar, 2016) despite their lower socio-economic profiles (Stanek et al., 2021) and differences in age at birth (Fernández et al., 2011; Fuster et al., 2013; 2015).

In the case of Latina mothers, research from Spain reported a specific pattern. On the one hand, they show an equal or lower risk of delivering newborns with LBW (Agudelo-Suárez et al., 2009; Juárez and Revuelta-Eugercios, 2014). On the other, they have a higher risk of giving birth to HBW infants (Juárez and Revuelta-Eugercios, 2014; Cebolla-Boado and Salazar, 2016). This pattern differs from the paradox related to the Latino population previously highlighted in the US. Latina mothers' perinatal health changes based on how long they've lived in the destination country, affecting birthweights (i.e. higher and lower birthweight) (Scribner and Dwyer, 1989; Ceballos et al., 2018).

Although there is a wealth of existing research on the subject, investigating the trajectories of perinatal health and birth outcomes among immigrant mothers in the destination country remains a challenging endeavour. Generally, summary measures such as duration of residence in the destination country (Teitler et al., 2012, 2017; Ceballos et al., 2018), generational status (Giuntella, 2016; Aradhya et al., 2022), and arrival cohorts of immigrant women (Troe et al., 2007) have been used to address whether adaptation patterns can have an impact perinatal health in general and birth outcomes in particular.

From a life course perspective, maternal age at immigration can be considered as a parameter of interest to explore and measure changes in the health trajectories of immigrant women as it highlights the impact of a certain event (such as arrival in the receiving country) on a woman's life course (Troe et al., 2007). Excluding the effect of arrival cohorts may lead to overestimation in terms of the decline and deterioration of immigrant women's health (Hamilton et al., 2015).

To the best of our knowledge, until recently, data limitations did not allow us to analyse the relationship between arrival cohorts and perinatal health in Spain. Therefore, this will be the first attempt to extend the previous framework of analysis by considering the peculiarity of using arrival cohorts as a predictor of perinatal health outcomes and an indicator of the social integration of Latina mothers in Spain.

Against this background, the main purpose of this study is to analyse the role of arrival cohorts of Latina women at risk for giving birth to children with LBW or HBW, compared with those born to native mothers, who gave birth in the period 2011–2015 in Spain. More specifically, we focus on two arrival cohorts: women who arrived when they were over 16 years of age and who correspond to the first generation (1G) of immigrants and those who arrived in Spain when they were less than 16 years old and belong to generation 1.5 (1.5G).

To do this, we used an innovative database developed by the National Statistics Institute (Instituto Nacional de Estadística, INE) that links the 2011 Spanish Census with Vital Statistics of

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the Natural Movement of the Population (Movimiento Natural de la Población, MNP). It provides significant results on the relationship between the age of arrival of Latina mothers in Spain and birthweight. The research questions addressed in this study are as follows: (1) Do Latina mothers, in the Spanish context, experience better birth outcomes than native mothers, thereby reproducing the 'Latina epidemiological paradox'? (2) To what extent does the perinatal health of Latina women belonging to generation 1.5 converge with that of the native population?

The structure of this article is as follows. First, patterns of perinatal health among Latina women and their main explanations are examined. Second, the literature on the effect of arrival cohorts on perinatal health, paying particular attention not only to the indicator of LBW but also to that of HBW, which has been largely unexplored and underexamined in previous research, has been reviewed. Next, the data and methodology used are described. The major results of the estimation of two Poisson regression models conducted to highlight the differences in the incidence rates of LBW and HBW of children born to Latina mothers compared with Spanish mothers in the established period are presented. Finally, we discuss the results obtained and the limitations of our study.

Literature review and hypothesis

Measuring integration in birthweight through Latinas mothers' arrivals cohort

In the area of migration studies, one of the most common complications is treating the terms 'integration' and 'assimilation' as synonymous, given that in both processes, individuals become part of a larger whole (Heath and Schneider, 2021). However, it should be noted that European academics use 'integration' to define this process (Heath and Schneider, 2021), whereas Americans prefer 'assimilation' (Park, 1950; Portes and Zhou, 1993; Zhou and Gonzales, 2019). Despite a complex conceptualisation and lack of a common empirical measure, social integration is a dynamic and multidimensional process involving the inclusion of immigrants in mainstream institutions, organisations, and relationships of receiving countries (Penninx, 2005; Bosswick and Heckmann, 2007; Heath and Schneider, 2021).

Social integration has important implications for social cohesion, economic progress, and migrants' well-being in receiving countries (Nørredam, 2015; Heath and Schneider, 2021). Within this process, health plays a fundamental role. Poorer health not only precludes the participation and contribution of immigrants to the social, economic, and political life of receiving countries (Perna, 2018) but also intensifies the risk of marginalisation and social isolation (Fonseca and Malheiros, 2005), thereby generating increasing inequalities (Loi and Hale, 2021).

Health can be assessed using various indicators, and among them, birthweight holds significant importance as it serves as a crucial metric for evaluating both individual and collective health outcomes. First, birthweight, like other perinatal indicators, is a reliable and comprehensive measure, with the advantage of being easily accessible through national vital statistics (Kramer, 1987; Wilcox, 2001). Second, it not only reflects the individual health of newborns and their prospects for satisfactory growth throughout life, but it also provides insights into maternal health during pregnancy, as well as the socio-economic and socio-demographic characteristics of the population in question.

Specifically, LBW or very low birthweight (VLBW), respectively, defined as $<$2,500 and $<$1,500 g, are strongly associated with the risk of infant mortality, especially in the neonatal period (Gortmaker and Wise, 1997). Additionally, LBW has been linked to adverse consequences such as learning difficulties and hyperactivity (McCormick et al., 1990), limited socio-economic status (Conley and Bennett, 2000; Heckman, 2012), poorer health conditions, and chronic diseases that persist even in late adolescence and adulthood (Lucas et al., 1999; Boardman et al. 2002; Juárez and Revuelta-Eugercios, 2014). Conversely, infants born with an HBW, defined as above 4,000 g, and referred to as foetal macrosomia are more likely to become overweight and develop diabetes mellitus, among others, during childhood and adulthood (Gaudet et al., 2014).

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As a result, the accessibility to healthcare services for the immigrant population is of utmost importance, as it has significant repercussions on both general health and perinatal health. Pregnant immigrant women require quality prenatal care to ensure optimal foetal development and to identify and address potential complications and/or pregnancy risks (Fair et al., 2020). However, the lack of access to healthcare services and prenatal care for native mothers in general, particularly for immigrants, can lead to serious health consequences. Previous research suggested adverse consequences such as the progression of undiagnosed or untreated chronic diseases, the increased risk of adverse pregnancy outcomes, and jeopardising the health and well-being of both the mother and the newborn (Martín Ibáñez et al., 2006; Hernandez-Rivas et al., 2013; Fair et al., 2020).

Leading research on the health trajectories of immigrant mothers in general, and particularly those of Latina immigrants residing in the US, highlights the role of the time of exposure of immigrant mothers to society in the receiving country and its main consequences (Acevedo-Garcia et al., 2010; Teitler et al., 2017; Ceballos et al., 2018). Exposure time is measured, on the one hand, through the duration of residence measured in years (Bates and Teitler, 2008; Urquia et al., 2012; Ro, 2014; Juárez and Hjern, 2017) and, on the other hand, by comparing the results of the various arrival cohorts of migrant women in receiving countries (Abraído-Lanza et al., 2006; Troe et al., 2007; Hamilton and Hummer, 2011).

In order to highlight immigrant's health trajectories and adaptation challenges, experts distinguish between the first generation (arriving as adults) and the 1.5 generation of immigrants (arriving during childhood) (Rumbaut, 2004). To provide greater precision, the age at which immigrants arrive serves as a clear indicator of the life stage they begin in a new country.

Based on existing studies conducted in the US, it has been observed that Latina women who arrive in the US at an adult age, i.e. 1G, despite having a lower socio-economic status, exhibit similar or even better birth outcomes than natives of the receiving countries (Albrecht et al., 1996; Fuentes-Afflick and Lurie, 1997; Guendelman et al., 1999; Acevedo-Garcia et al., 2007; Acevedo-Garcia et al., 2012). The main explanations for this phenomenon emphasise the self-selection of the healthiest migrants and the protective role of their cultures of origin. First, the prevailing assumption is that people who migrate are not a random sample from their countries of origin but are selected because of certain characteristics (Jasso et al., 2004) and, on average, enjoy a better health status than the population that remains in their country of origin (Palloni and Arias, 2003).

Second, the effects of the protective factors in immigrant culture on health are highlighted (Abraído-Lanza et al., 1999). Traditional Latino culture places a strong emphasis on family and motherhood. The concept of familism, also known as *familismo*, may help to explain the Latino health paradox. Familism emphasises the vital role of families and communities of origin in supporting women during the migration process (Feliciano et al., 2006; Campos et al., 2008; Gallegos and Segrin, 2021). Furthermore, previous research has reported that family cohesion among Latina women may provide health and well-being benefits by reducing feelings of loneliness, buffering the impact of stress on health (Corona et al., 2017), and fostering positive health behaviours including diabetes care and general health practices (Perez and Cruess, 2014). Thus, familism has been identified as an important factor to consider when studying Latina/o health (Davila et al., 2011). Furthermore, the literature indicates that although compared to other countries, Spain continues to be more family-oriented, this pattern is tending to weaken due to increases in women's education levels, their participation in the labour market, changes in family structure, and the gradual transformation of the welfare state model (Moreno Mínguez, 2009; Caïs and Folguera, 2013).

Additionally, it is worth noting that positive feelings toward childbearing together with adopting healthier lifestyles during pregnancy (Callister and Birkhead, 2002) and good dietary practices (McGlade et al., 2004; Gress-Smith et al., 2013) may protect these women from experiencing adverse perinatal outcomes (Zambrana et al. 1997; Acevedo-Garcia et al., 2007).

In contrast, women who migrate at a younger age represent a different group from both first- and second-generation migrants (Rumbaut, 2004). According to previous literature, generation

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1.5 is composed of mothers who experienced formative and early childhood socialisation in their country of origin. However, they must also get accustomed to the consolidation of behaviours of the society of origin and acquisition of those of the society of destination, to which they are mostly exposed (Dune et al., 2017; Teitler et al., 2017). In the case of Latina women belonging to generation 1.5, unlike first-generation women, prolonged and continued exposure to society in receiving countries implies an abandonment of traditional cultural values that leads them to adopt unhealthy habits, such as smoking, alcohol, and/or drug use (McGlade et al., 2004; Abraído-Lanza et al., 2006), choosing less nutritious diets and becoming more physically inactive (Guendelman, 1995; Dubowitz et al., 2007; Fox et al., 2015). This may account for almost twice the prevalence of pre-pregnancy diabetes among non-Hispanic white women (Popkin and Gordon-Larsen, 2004). These behaviours, along with the erosion of family and community ties to the country of origin (Fox et al., 2015), contribute to the deterioration of perinatal health and development of adverse outcomes, such as LBW, small size for gestational age (Callister and Birkhead, 2002; Ceballos and Palloni, 2010; Teitler et al., 2017), or HBW (Jolly et al., 2003; Ceballos et al., 2018). Generation 1.5 immigrants progressively adopt lifestyle patterns and health habits resembling those of the native population. As a result, an expectation arises for a convergence in perinatal health outcomes between these two groups of mothers.

To summarise, conclusions drawn from studies conducted in the US, which explore the Latina paradox concerning birth outcomes, may not directly apply or may manifest differently in other countries. The impact of various social, economic, and healthcare factors in Spain may differ from those in the US. Furthermore, how different arrival cohorts affect perinatal health trajectories and the process of social integration of these women in receiving countries, particularly Spain, remain undetermined.

The Spanish context

In recent decades, the increase in the volume of international migration has driven significant demographic, cultural, and economic changes in most European countries (Arango, 2007). For the purpose of this study, Spain is an ideal laboratory to analyse these changes as it has become one of the most important receiving countries of emigrants in Europe and the world (Reher and Requena, 2009).

During the late 1990s, the substantial increase in population in Spain was primarily attributed to immigrants. Between 2002 and 2008, net immigration accounted for more than 80 per cent of the overall population growth, with the foreign population, of which 30 per cent originated from Latin America, comprising 13 per cent of the total population (Reher and Requena, 2009). The Latin American population in Spain remained one of the main groups until 2011, although it dropped to 5.3% of the total Spanish population.

Regarding socio-demographic characteristics, studies have revealed that Latin American women exhibit relatively low fertility rates, which are not significantly higher than those observed in Europe and Spain (Castro Martín and Rosero-Bixby, 2011). This trend is likely attributed to the migration selection process, which appears to play a dominant role among Latin American women. Their distinct educational, employment, and family profiles, when compared to the average in their society of origin, contribute to these patterns (Castro Martín and Rosero-Bixby, 2011). According to the selection process, migrants typically possess higher levels of human and social capital than the population average. Therefore, it is presumable that they would have exhibited lower fertility rates than the prevailing norm in the society of origin, even if they had not undertaken migration (Castro Martín and Rosero-Bixby, 2011). Concerning perinatal health in general, and in particular to birth outcomes, previous research suggested that Latin American women in Spain present a distinct pattern (similarly only in the group of mothers originating from North African countries) (Agudelo-Suárez et al., 2009; Hernandez-Rivas et al., 2013; Juárez and Revuelta-Eugercios, 2014). Latina mothers, on the one hand, show a reduced risk of giving birth to

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infants with LBW (Agudelo-Suárez et al., 2009; Río et al., 2010; Juárez and Revuelta-Eugercios, 2014; Hidalgo-Lopezosa et al., 2019; Stanek et al., 2021) suggesting a potentially favourable perinatal health profile. On the other, they present a notable increase in the risk of delivering HBW newborns (Mur Sierra et al., 2010; Hernandez-Rivas et al., 2013; Juárez and Revuelta-Eugercios, 2014) and greater average birthweight in newborns (Figueras et al., 2008; Juárez et al., 2014; Cebolla-Boado and Salazar, 2016; Stanek et al., 2020) compared to Spanish natives.

Indeed, the observed pattern among Latina mothers differs from that of other groups of mothers giving birth in the country. For instance, women from high-income countries and/or other European countries have been found to exhibit an equal or lower risk of giving birth to infants with LBW compared to Spanish natives (Agudelo-Suárez et al., 2009; Speciale and Regidor, 2011; Juárez et al., 2014). Similarly, mothers from sub-Saharan Africa are at higher risk of giving birth to both LBW and HBW infants (Agudelo-Suárez et al., 2009; Juárez and Revuelta-Eugercios, 2014). Moreover, mothers from Asia present mixed birthweight outcomes. While some studies indicate an equal or lower risk of delivering newborns with LBW (Juárez and Revuelta-Eugercios, 2014), others suggest a heightened risk of both LBW and HBW among Asian newborns (Agudelo-Suárez et al., 2009; Juárez and Revuelta-Eugercios, 2014).

Main hypothesis

Drawing on earlier research on cohort differences, the birthweight of newborns may vary according to arrival cohorts and the integration process of immigrant mothers in the destination country, we therefore propose the following hypothesis:

H1. Latina women who arrive in Spain in adulthood – 1G – may exhibit a better health status than native mothers (Acevedo-Garcia et al., 2007). Specifically, they are less likely to give birth to children with LBW or HBW (Markides and Coreil, 1986; Albrecht et al., 1996; Guendelman et al., 1999; Ceballos et al., 2018) as the effect of self-selection (Jasso et al., 2004) and/or culture of origin (Campos et al., 2008; Fox et al., 2015) protects them.

H2. Latina women who immigrate to Spain at age 16 – 1.5G – by spending more time in the receiving country and being more receptive to the influence of their adopted societies will be more exposed to characteristics of the new context that may affect their health outcomes (Bates and Teitler, 2008; Acevedo-Garcia et al., 2010; Hamilton and Hummer, 2011; Teitler et al., 2017). Therefore, it can be expected that the perinatal health of this group of mothers will converge with that of the natives of the receiving country.

Data and methods

Data set

Our study on the effect of arrival cohorts on the birth outcomes of Latina mothers in Spain is based on a novel database provided by the Spanish National Statistics Institute that links the 2011 Census with information on individual births that have occurred in the country between January 2011 and December 2015 as collected in the vital statistics of the 'Movimiento Natural de la Población'. Such information on births and mothers collected by vital statistics is complemented by census data on the personal characteristics of such individuals, including sex, age, marital status, country of origin, year of arrival to Spain, educational level, employment status, living conditions, migration status, and type of household. The dataset represents a sample of approximately 10% of the Spanish population[1].

[1]To verify if there has been any bias in linking the census data with vital statistics, sensitivity tests were conducted by comparing the number and distribution of the linked microdata with those of the natural population movement data. It was observed that the overall linkage rate was 89.4%. Additionally, no systematic error has been observed regarding the distribution of the most relevant variables.

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For the selection of the sample, we used individual data on births to Spanish and immigrant mothers of Latin American origin of childbearing age (between 15 and 51 years) from 2011 to 2015. In adherence to the usual practice in birthweight analysis, multiple births and outliers in terms of birthweight (both low and high) and gestational age were excluded. The final analytical sample includes a total of 101,743 observations.

Variables

The two outcomes of interest were LBW and HBW, whose thresholds, following those commonly adopted by the literature, were set as below 2,500 g and above 4,000 g, respectively (Juárez, 2011). The operationalisation of birthweight was carried out according to the research of Juárez (2011), which rigorously and systematically defines the biologically acceptable minimum and maximum birthweight thresholds by weeks of gestation, comparing tables from several countries. Therefore, both atypical weight cases and missing information on outcome variables have been eliminated.

The main explanatory variable was the age of maternal immigration, which was calculated by subtracting the year of birth of the mother from the year of immigration. Once the age of arrival of mothers in the receiving country was obtained, we distinguished between two cohorts of arrival: (1) Latina women who arrived in Spain when they were aged over 16 years (1G); (2) Latina women who arrived in Spain when they were aged under 16 years (1.5G). This cut-off point was chosen because in Spain children are obliged to attend school until the age of 16. The group of native Spanish mothers during the study period was considered the reference category for our analysis.

Different covariates were included, such as newborn characteristics associated with birthweight, i.e. sex of the newborn (on average, girls have been found to have a lower birthweight than boys), (Kramer, 1987; Juárez and Revuelta-Eugercios, 2014), birth order being established as 1st, 2nd, 3rd, and successive (the firstborn being smaller than the successive ones).

Concerning mothers' characteristics, age at birth was grouped into three categories: under 25 years, between 25 and 34 years, and 35 years and older (Fortney et al., 1982; Dennis and Mollborn, 2013; Kosińska et al., 2019). In terms of living situation, whether mothers were living in nuclear (couple with children) single parent, couple childless, or non-nuclear households were examined (Castro-Martín, 2010; Dello Iacono et al., 2022), as well as the region where such births took place. In terms of socio-economic status, we included educational level which was divided into three categories (primary education or less, secondary, and tertiary), and occupational status comprising employed, unemployed, retired, and other situations.

Modelling strategy

To study the relationship between the arrival cohorts of Latina mothers and their risk of giving birth to infants with LBW or HBW, incidence rate ratios (IRRs) using Poisson regression models were estimated. These ratios indicate how much the probability of LBW and HBW increases (or decreases) concerning the reference categories of the predictor variable and the other covariates. Specifically, two Poisson regression models were elaborated: one for LBW and another for HBW, both adjusted for Latina women's arrival cohorts and their birth characteristics, socio-demographic, and socio-economic profiles. In addition, average adjusted predictions for both low and high weight according to Latina maternal generation have also been calculated.

Results

Table 1 summarises the descriptive statistics of the arrival cohorts of 1G and 1.5G Latina immigrant women and Spanish natives. First, the overall differences in LBW rates among different groups of mothers who gave birth between 2011 and 2015 are small. Specifically, 1.5G Latina and native Spanish mothers exhibited slightly higher percentages of LBW babies, 6.4% and 5.2%,

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Table 1. Descriptive Statistics for the Arrival Cohorts of Latina Immigrant Women and Native Spanish Women

	Natives		1G Latina mothers		1.5 G Latina mothers	
	n	%	*n*	%	*n*	%
Births (2011-2015)	96489	94.3	4043	4	1211	1.2
Low birthweight	4979	5.2	173	4.3	77	6.4
High birthweight	5098	5.3	366	9.1	62	5.1
Sex of the newborn						
Male	49828	51.6	2145	53.1	627	51.8
Female	46661	48.4	1898	46.9	584	48.2
Birth order						
1	50892	52.7	1761	43.6	779	64.3
2	38767	40.2	1646	40.7	359	29.6
3+	6830	7.1	636	15.7	73	6
Gestational age (weeks)						
Normal	85949	89.1	3557	88	1081	89.3
Preterm	10540	10.7	486	12	130	10.7
Age of mother at birth						
<25	4357	4.5	161	4	559	46.2
25–34	49760	51.6	2168	53.6	459	37.9
>35	42372	43.9	1714	42.4	193	15.9
Education of mother						
Primary or less	24163	25	1099	27.2	708	58.5
Secondary	30587	31.7	1739	43	317	26.2
Tertiary	41739	43.3	1205	29.8	186	15.4
Mother's labour status						
Employee	66647	69.1	2026	50.1	418	34.5
Unemployed	22476	23.3	1415	35	422	34.8
Retired	1158	1.2	53	1.3	41	3.4
Another situation	6208	6.4	549	13.6	330	27.3
Marital status						
Unmarried	39357	40.8	1400	34.6	840	69.4
Paired	54079	56	2417	59.8	347	28.7
Separated	2759	2.9	206	5.1	19	1.6
Widow	294	0.3	20	20	5	0.4
Household structure						
Unipersonal	5928	6.1	134	3.3	28	2.3
Single parent	6171	6.4	167	4.1	119	9.8
Childless couple	24671	25.6	820	20.3	117	9.7

(*Continued*)

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Table 1. (*Continued*)

	Natives		1G Latina mothers		1.5 G Latina mothers	
	n	%	*n*	%	*n*	%
Couple with children	48706	50.5	1562	38.6	505	41.7
Non-nuclear household	11013	11.4	1360	33.6	442	36.5
Region of birth						
North	13004	13.5	444	11	124	10.2
NorCen	13156	13.6	482	11.9	148	12.2
Centre	17605	18.2	1044	25.8	318	26.3
East	30418	31.5	1578	39	462	38.2
South	22306	23.1	495	12.2	159	13.1
Total	96489	94.3	4043	4	1211	1.2

Source: Authors' calculations using 2011 Spanish census and births registered between January 2011 and December 2015.

respectively, than 1G Latinas (4.3%). Conversely, concerning HBW, throughout the period considered, it was observed that among 1G Latina mothers, there was a higher frequency of births with HBW (9.1%) compared with 5.2% among native mothers and 5.3% among 1.5G Latina women (Table 1). Continuing the analysis with socio-demographic and socio-economic characteristics, we observed that 1G Latina women tend to give birth to children at a later age with higher socio-economic profiles, as measured by educational level and employment status. In addition, they are also more likely to have partners (59.8%) and live in nuclear households (38.6%). In contrast, 1.5G women tend to have a very low level of education (58.5%) and usually give birth under the age of 25 years (46%; Table 1).

In conclusion, according to the initial examination of the data, it appears that there are differences between the Latina women who comprise the different arrival cohorts concerning native Spanish women. Mothers belonging to the 1.5G immigrants, being more exposed to society in their receiving countries, exhibit birth characteristics more like those of native mothers in terms of LBW rates and birth order. In contrast, 1G Latina mothers have a high rate of HBW births compared with the other groups of mothers in the sample.

To extend the analysis beyond these descriptive results, Tables 2a and 2b show the results of the estimation of two Poisson regression models to analyse the incidence of LBW and HBW for the different cohorts of the arrival of Latina women in Spain as against those of native Spanish women.

In the model in Table 2a, IRRs for LBW were estimated. The results reveal that 1G Latina mothers have a significantly lower risk of LBW (IRR = 0.82) than native and 1.5G Latinas. Adjustments for birth characteristics (sex of the newborn and birth order) and the socio-demographic and socio-economic profiles of the mothers (age at birth, level of education, occupational status, living arrangements, and region of birth) tended to reveal statistically significant results in line with the existing literature. As expected, it was found that first-time mothers giving birth to girls, who are older and of lower socio-economic status, are more likely to give birth to LBW babies.

In Table 2b, the estimated IRRs for HBW are shown. Contrary to our expectations, 1G Latina mothers have an incidence ratio of 1.6 for HBH, compared with the other groups of mothers (there is hardly any difference between native and 1.5G Latina immigrants). To summarise, if all

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Table 2a. Incidence Rate Ratios (IRR) of Low Birthweight

	LBW	
	IRR	(SE)
Origin (ref. natives)		
Gen 1.5	1.0189	(0.1209)
Gen 1	0.8249***	(0.0647)
Sex of the newborn (ref. male)	1.1279***	(0.0312)
Birth order (ref 1)		
birth order: 2	0.6556***	(0.0221)
birth order: 3+	0.6619***	(0.0407)
Age of the mother at birth (ref. 25–34)		
<25	1.0352	(0.0653)
35+	1.29091***	(0.0388)
Household structure (ref. couple with children)		
Unipersonal	0.9537	(0.0589)
Single parent	1.0563	(0.0605)
Childless couple	1.0438	(0.0384)
Non-nuclear household	1.0774	(0.0469)
Education of the mother (ref. primary)		
Secondary	0.8403***	(0.0302)
Tertiary	0.6628***	(0.0246)
Mother's labour status (ref. employee)		
Unemployed	1.1498***	(0.0389)
Retired	1.0120	(0.1225)
Other situation	1.1338**	(0.0626)
Region (ref. Norte)		
Norcen	0.9503	(0.0532)
Centre	1.1839***	(0.0591)
East	1.0790	(0.0501)
South	1.0308	(0.0511)
Cons	0.0601	(0.0034)
Number of obs	96.217	
Pseudo R2	0.010	

Source: Authors' calculations using the 2011 Spanish census and births registered between January 2011 and December 2015.
*P-value = <0.05.
**P-value = <0.01.
***P-value = <0.001.

other factors are equal, being a 1G immigrant mother appears to increase, and not decrease, the likelihood of adverse birth outcomes, specifically HBW in this case.

Figure 1 displays average adjusted predictions for both low and high weight according to maternal generation. Among Latina mothers of 1G, the probability of giving birth to infants with

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Table 2b. Incidence Rate Ratios (IRR) for High Birthweight

	HBW	
	IRR	(SE)
Origin (ref. natives)		
Gen 1.5	1.0695	(0.1399)
Gen 1	1.6563***	(0.0923)
Sex of the newborn (ref. male)	0.5174***	(0.0150)
Birth order (ref 1)		
birth order: 2	1.4787***	(0.0575)
birth order: 3+	1.6269***	(0.0840)
Age of the mother at birth (ref. 25–34)		
<25	0.9538	(0.0699)
35+	0.9538	(0.0276)
Household structure (ref. couple with children)		
Unipersonal	0.9440	(0.0615)
Single parent	1.0245	(0.0572)
Childless couple	0.9710	(0.0368)
Non-nuclear household	1.0089	(0.0428)
Education of the mother (ref. primary)		
Secondary	1.0218	(0.0376)
Tertiary	1.0007	(0.0370)
Mother's labour status (ref. employee)		
Unemployed	0.9682	(0.0326)
Retired	1.1528	(0.1332)
Other situation	0.9490	(0.0537)
Region (ref. Norte)		
Norcen	0.7548	(0.0380)
Centre	0.6330	(0.0306)
East	0.8056	(0.0330)
South	0.8847	(0.0387)
Cons	0.0745	(0.0040)
Number of obs	96.514	
Pseudo R2	0.023	

Source: Authors' calculations using the 2011 Spanish census and births registered between January 2011 and December 2015.
**P*-value = <0.05.
***P*-value = <0.01.
****P*-value = <0.001.

low weight is reduced compared to Spanish natives. However, they were found to be more likely to give birth to HBW offspring. On the other hand, in the birth outcomes of mothers who arrived in Spain at less than 16 years of age, the LBW coefficients are very close to the Spanish natives, as compared with 1G Latinas.

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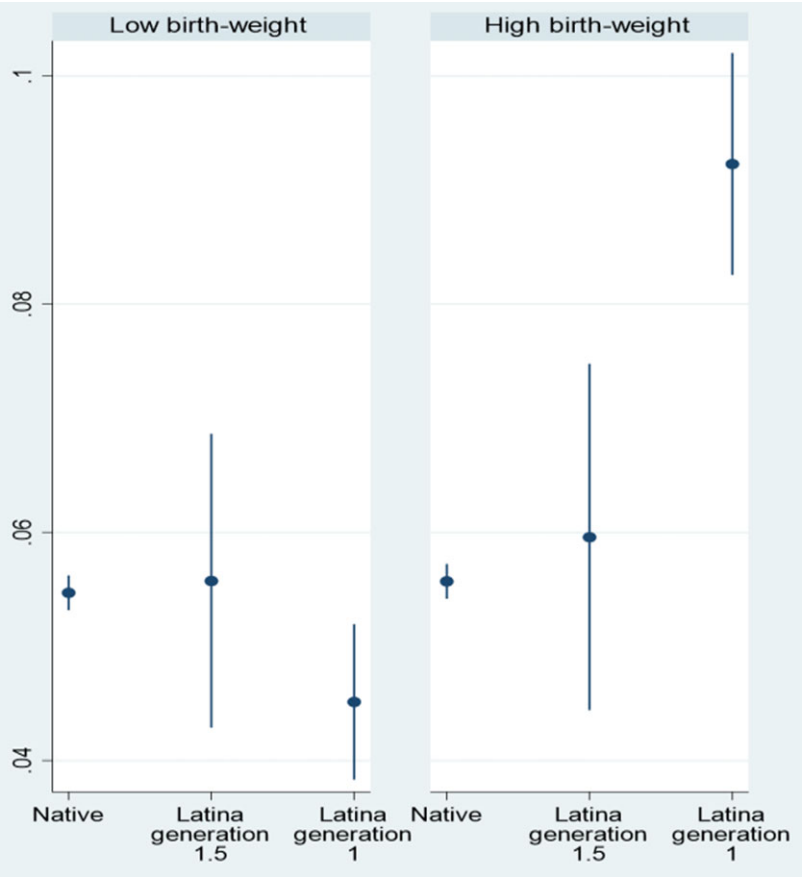

Figure 1. Adjusted Predictions for both Low- and High Birthweight According to Origin and Maternal Generation.

Discussion and conclusion

The purpose of this study was to analyse the role of arrival cohorts of Latina women on the risk of giving birth to newborns with LBW or HBW, compared with those born to native mothers who gave birth in the period 2011–2015 in Spain. We focused on first-generation Latin American women who arrived in Spain when they were at age 16 and those who arrived when they were under 16 years old, belonging to generation 1.5. Our findings indicate two significant effects of different arrival cohorts of Latina mothers on birthweight.

First, 1G Latina women exhibit a lower incidence of LBW. However, they are at a higher risk of giving birth to children with HBW than both 1.5G and native mothers. Second, among 1.5G Latina mothers, the incidence rate of LBW is more similar to the values for native mothers than for first-generation Latinas. In contrast, the incidence of HBW is higher compared to native mothers, but not as high as that of first-generation women.

The first finding only partly supports H1. Previous studies mostly developed in the American context, suggest that first-generation Latina women tend to have equal or better birth outcomes than native mothers, despite their lower socio-economic status (Guendelman et al., 1999; Albrecht et al., 1996; Callister and Birkhead, 2002; McGlade et al., 2004; Acevedo-Garcia et al., 2007; Acevedo-Garcia et al., 2012). However, concerning the Spanish context, this health advantage occurs only partially, because first-generation mothers seem to be protected against the risk of LBW due to the effect of previous migratory selection (Jasso et al., 2004) and/or culture of origin

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(Fox et al., 2015). However, the supposed protection provided by selective migration processes or culture of origin does not explain the negative outcome of HBW. Previous findings from Spain reported a higher risk of delivering newborns with HBW among immigrant mothers from high-income countries and other European countries (Martín Ibáñez et al., 2006; Mur Sierra et al., 2010; Juárez and Revuelta-Eugercios, 2014), North Africa (Restrepo-Mesa et al., 2015; Cebolla-Boado and Salazar, 2016), and Sub-Saharan Africa (Juárez and Revuelta-Eugercios, 2014). The risk of HBW among those born to immigrant mothers is mainly associated with weight gained during pregnancy, the presence of previous pathologies like gestational diabetes, and other aspects related to the habits and lifestyles that women have had during pregnancy (Martín Ibáñez et al., 2006; Hernandez-Rivas et al., 2013).

The second finding also wanted to ascertain if the perinatal health of the middle generation of Latinas converges with that of the native-born population. Specifically, it was assumed that women who arrive in their receiving country as children and/or adolescents, being more exposed to the behaviours, lifestyles, and habits of society in their receiving countries, experience perinatal health more similar to that of native women than to that of first-generation Latinas (Bates and Teitler, 2008; Acevedo-Garcia et al., 2010; Hamilton and Hummer, 2011). The results of the analysis show that among 1.5G Latina women, the incidence rate of LBW is more like the values for native mothers than for first-generation Latinas. The results collected are consistent with previous research and, therefore, with H2 above.

Nonetheless, it is essential to interpret our findings within the context of the data utilised and the particularities of the Spanish setting. First, the birth data employed in our study were obtained from vital statistics spanning the period of the recession caused by the worldwide economic and financial crisis of 2008. This period was marked by a significant surge in unemployment rates and school dropouts (Aguilar-Palacio et al., 2015), particularly challenging for young individuals, especially among immigrants (Aguilar-Palacio et al., 2015).

In the Spanish context, the economic crisis had an immediate impact on perinatal health and birth outcomes. Prevalence of underweight at birth (< 3rd percentile at each gestational age) and small-for-gestational-age cases increased (Palència et al., 2018), alongside a rise in disparities in LBW based on the mother's education level (Juárez et al., 2014). Previous research has suggested that the crisis influenced perinatal well-being by deteriorating material conditions and elevating maternal stress (Margerison-Zilko et al., 2017). Consequently, it is plausible to hypothesise that the adverse birth outcomes, among 1G and 1.5G of Latina, might be associated with the mentioned circumstances.

Second, despite Spain's nationwide healthcare system ensuring universal access to a wide array of services, including prenatal care, considerable austerity measures were introduced following the crisis's onset, encompassing financial reductions and the privatisation of services. Moreover, in 2012, a decree-law of urgent measures was enacted to safeguard the sustainability of the health system, which entailed restricting healthcare services for undocumented immigrants. Therefore, we should also consider the possibility that some of the first-generation and 1.5-generation Latina mothers might have been undocumented. Consequently, the higher risk results of LBW or HBW among the newborns of these mothers could also be partly explained by inadequate prenatal care, stemming from limited access to healthcare services due to their undocumented status.

This analysis contributes to the existing literature in several ways. (1) Research on the effect of arrival cohorts on perinatal health has mainly focused on comparing birth outcomes of first- and second-generation immigrant mothers, paying less attention to the consequences of arriving in receiving countries at a young age. In this aspect, the study is an attempt to extend the previous framework of analysis by considering the peculiarity of using arrival cohorts as a predictor of perinatal health outcomes and an indicator of the social integration of Latina mothers in receiving countries. (2) The study challenges previous research findings that first-generation Latina mothers have better perinatal health than receiving countries' natives. Specifically, findings show that, in the Spanish context, unlike the case in the US, a pioneer in research related to the perinatal health

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of Latina women, the Latina paradox occurs only in part because of the positive incidence of HBW among infants born to first-generation mothers. (3) Newborn birthweight of Latina immigrant mothers who arrive in Spain at a young age is more similar to that of native mothers than to that of first-generation immigrant mothers. (4) The incidence of LBW and HBW among Latina mothers' newborns may be due to socio-structural factors in the country of destination.

In summary, results suggest that, both the socio-economic and socio-demographic profile of the mothers, as well as the selection process before migration and different exposure to cultural and behavioural factors in receiving countries, play an important role in the health trajectories and social integration process of Latina mothers in Spain.

Results should be considered in the context of certain limitations. Although the main predictors of birthweight, such as birth order, sex of the infant, and maternal age, were controlled; it was impossible to use others related to the mothers' previous health, such as nutritional status, infections, tobacco, alcohol or drug use, and exposure to poor environmental conditions. This limitation is due to the fact that the birth registers lack potentially relevant data on maternal health behaviours, health system utilisation, and the general health conditions of mothers. In conclusion, future population-based studies of perinatal experiences should include arrival cohorts to measure the future health trajectories of immigrant mothers in receiving countries.

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Competing interests. The authors have no conflicts of interest to declare.

Ethical standard. All methods applied in this study were carried out in concordance with the Organic Law 3/2018 on the Protection of Personal Data and the guarantee of digital rights (Ley Orgánica 3/2018 de Protección de Datos Personales y garantía de los derechos digitales). This research is not based on experimental protocols, but it is entirely and exclusively based on population-based data from Spanish Vital Statistics. All the individual information contained in the microdata has been duly anonymised by INE. The research project has been approved by the Confidentiality Committee of Instituto Nacional de Estadística (Spanish National Statistics Institute)

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