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Original

Social inequalities, advanced maternal age, and birth weight. Evidence from a population-based study in Spain

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ABSTRACT

Objective: To examine whether advanced maternal age (≥40 years) is linked to an increased likelihood of low or high birth weight among native and foreign-born mothers giving birth in Spain.
Method: A cross-sectional study was conducted using a novel database provided by the Spanish National Statistics Office which links the 2011 Census with information on individual births (2011-2015) from the Vital Statistics (Natural Movement of the Population). First, multinomial logistic regression models were used to estimate the potential association between maternal age and the likelihood of having a baby with low or high birth weight. Second, average adjusted predictions of giving birth to children with low, high, and adequate weight for the origin and the maternal age at birth were also calculated.
Results: Findings indicate that women with advanced maternal age showed an increased probability of giving birth to low birth weight infants. Conversely, mothers aged below < 30 years had an elevated risk for high birth weight infants. When considering maternal migratory status, the findings were mixed. On one hand, foreign-born mothers showed a higher likelihood of delivering infants with high birth weight; on the other, they displayed a lower risk of low birth weight among newborns in comparison to Spanish natives.
Conclusions: The study addresses two key aspects. First, it highlights the increased risk of low birth weight in mothers delivering at an advanced age. Second, it emphasizes the importance of accounting for maternal migratory status when investigating the association between age at birth and birth weight outcomes among immigrant mothers.

Desigualdades sociales, edad materna avanzada y peso al nacer. Evidencia de un estudio basado en la población en España

Palabras clave:
Edad materna
Peso al nacer
Recién nacido
Embarazo
Adulto

RESUMEN

Objetivo: Examinar si la edad materna avanzada (>40 años) está relacionada con una mayor probabilidad de bajo o alto peso al nacer en los nacidos de madres inmigrantes y nativas en España.
Método: Se utiliza una base de datos novedosa proporcionada por el Instituto Nacional de Estadística de España que vincula el Censo de 2011 con información sobre nacimientos individuales (2011-2015) de las Estadísticas Vitales (Movimiento Natural de la Población). Los modelos de regresión logística multinomial se utilizaron para estimar la posible asociación entre la edad materna y la probabilidad de bajo o alto peso en los nacidos. Se calcularon predicciones ajustadas promedio para el peso bajo, alto y adecuado según el origen y la edad materna.
Resultados: La edad materna avanzada se asocia con una mayor probabilidad de bajo peso en los nacidos. Por el contrario, las madres menores de 30 años presentan un riesgo elevado de tener bebés con alto peso. Sin embargo, al considerar el origen materno, los resultados fueron mixtos. Por un lado, las madres nacidas en el extranjero mostraron una mayor probabilidad de nacidos con alto peso; por otro, presentaron un menor riesgo de bajo peso en los nacidos.
Conclusiones: El estudio destaca dos aspectos clave. En primer lugar, pone de relieve el mayor riesgo de bajo peso al nacer en las madres que dan a luz a una edad avanzada. En segundo, la importancia de tener en cuenta el estatus migratorio materno en la asociación entre la edad materna y el peso al nacer.

Introduction

Delayed childbearing is a widely observed phenomenon across high- and low-income countries.[1] This trend can be attributed to several factors, including greater accessibility of effec-

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tive contraception among women, increased opportunities for higher education, professional employment, and advancements in assisted reproductive techniques.[2]

The implications of advanced motherhood (≥40 years) for mothers and their offspring are ambiguous. On the one hand, mothers in this age group, who choose delayed motherhood, often possess higher levels of education, income, and access to prenatal care, which can contribute to their enhanced psychological, social, and economic preparedness for childbirth.[2] On the other, advanced maternal age is recognized as a significant risk factor for maternal health during pregnancy.[3,4] Previous literature reported a wide array of adverse pregnancy outcomes associated with advanced maternal age. These encompass increased risk for miscarriage, chromosomal abnormalities, stillbirth, preterm birth, pre-eclampsia, gestational diabetes mellitus, increased rate of caesarean section, foetal growth restriction, low birth weight (LBW) and high birth weight (HBW), among others.[3–5] Several factors may modulate and moderate the association between advanced maternal age and adverse birth outcomes including previous chronic pathologies, nutritional intake, as well as maternal health characteristics.[6,7]

Conversely, it also highlighted that giving birth at a young age can affect perinatal health and birth outcomes, especially low birth weight.[8] Therefore, maternal age is considered a well-established risk factor for adverse birth outcomes since both being too young and of advanced maternal age are associated with a multitude of adverse birth outcomes.[6,8]

A positive association between advanced maternal age and adverse birth outcomes has been mainly observed among mothers giving birth in high-income countries, such as the United States, Australia, Japan, the United Kingdom, Ireland, Denmark, Norway, Sweden and Finland, spanning a time frame from 1970 to 2000,[3] 1980-1987 versus 2005-2008,[4] 2004-2008[5] and finally 1999-2012; 2001-2014.[7] In the European context, Spain is not an exception. The country's very low fertility rates and delayed childbirth contribute to Spain's position as one of the countries with the strongest tendency to have children at an advanced maternal age.[9] Previous research shows the effect of advanced maternal age on birth weight outcomes, particularly the increased risk of LBW in newborns.[10–12] However, mixed results stand out when considering maternal migration status and the timing of fertility of foreign-born mothers. First, despite facing limited socio-economic conditions, foreign-born mothers tend to have an equal or reduced risk of delivering infants with LBW,[13,14] a phenomenon commonly known as the epidemiological paradox.[15] Second, although the fertility timing of most immigrant women is significantly earlier than that of native-born women,[16] a positive association between foreign-born status, older age at delivery, and LBW has been observed.[14] That is, immigrant women who give birth at an advanced age are at greater risk of giving birth to LBW babies.

Against this background, the study aims to examine whether advanced maternal age is related to an increased risk of LBW or HBW among native and foreign-born mothers giving birth in Spain.

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Method

Study population and data sources

A cross-sectional study using a novel database provided upon request by the Spanish National Statistics Institute was conducted. This database links a large sample of the 2011 Census* with information on individual births that took place in the country between January 2011 and December 2015 from the Vital Statistics (Natural Movement of the Population). Specifically, the data on births and mothers collected by Vital Statistics were linked to the 2011 Census data on personal maternal characteristics, including sex, age, marital status, country of origin, education level, employment status, living conditions, and migration status. The dataset represents a sample of approximately 10% of the Spanish population. In order to obtain the data, a request can be made to the Spanish National Statistics Institute.

For the analytical sample, single live births in 2011-2015 to women of reproductive age (12-55 years) were considered (n = 140,544). Stillbirths (n = 79), multiple births (n = 6456), and births with data entry errors resulting in biologically improbable birth weight for gestational age (n = 1800) were excluded. In addition, observations with missing birth weight (n = 2516) and gestational age (n = 20,002) were dropped. The study population consisted of 109,691 births. Of these, 89.2% were born to Spanish natives and 10.8% to foreign-born mothers. Figure 1 shows the selection flow and study population.

Outcome and covariates

The main outcome of the study is birth weight, which, according to the standard criteria widely used in the study field has been categorized into three groups: LBW (<2500 g), normal birth weight (2500-3999 g) and HBW (≥ 4000 g). The exposure variable was maternal age at delivery previously categorized into the following groups: < 30, 30-34, 35-39 and ≥40 years. The age group 30-34 years was chosen as the reference category because, between 1996 and 2015, the mean age at maternity among Spanish national mothers increased from 30.03 to 33.30 years old.[17]

A range of child and mother characteristics that might be associated with both maternal age at birth and the risk of giving birth to a newborn with LBW were considered. Different control variables grouped according to whether they referred to the newborn such as sex, birth order (1, 2, 3+), gestational age (<37, 37-41, ≥42 weeks),[18] the sociodemographic and socioeconomic characteristics of the mothers, including the level of education (basic, secondary, tertiary), employment status (employed, unemployed, retired, other situation),[19] family situation (married, cohabiting, and single)[20] and migratory origin (whether native or foreign-born)[13] were included

Statistical analysis

To analyze the potential association between maternal age and the likelihood of having a baby with LBW or HBW, first, four distinct multinomial logistic regression models adjusted for maternal age at childbearing, birth characteristics, socioeconomic and demographic characteristics of the mothers, and all the preceding controls plus the interaction between maternal age and mother's origin were estimated. The associations between LBW and HBW with other covariables were established using adequate birth weight as a reference category. The effect estimates were relative risk ratios (RRR) and corresponding 95% confidence intervals (95%CI). In addition, probabilities (average adjusted predictions)

* The 2011 census was conceived as a combined operation between a pre-census file (created by maximizing the use of available administrative records, with the Municipal Register being the basic element of the structure) and survey information (gathered through fieldwork that included a comprehensive Building Census and a sampling survey directed at a relatively high percentage of the population to gather additional characteristics of individuals and households, the Population Survey).

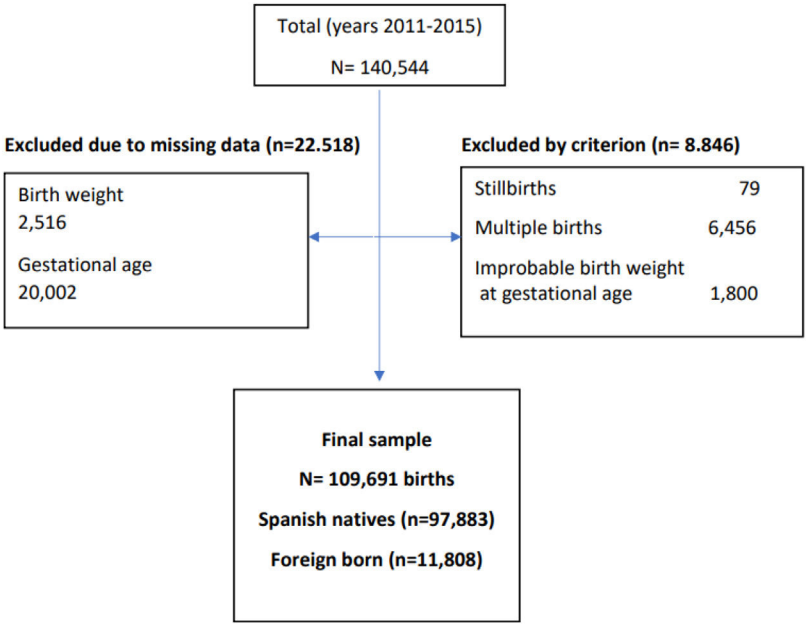

Figure 1. Selection flow and study population.

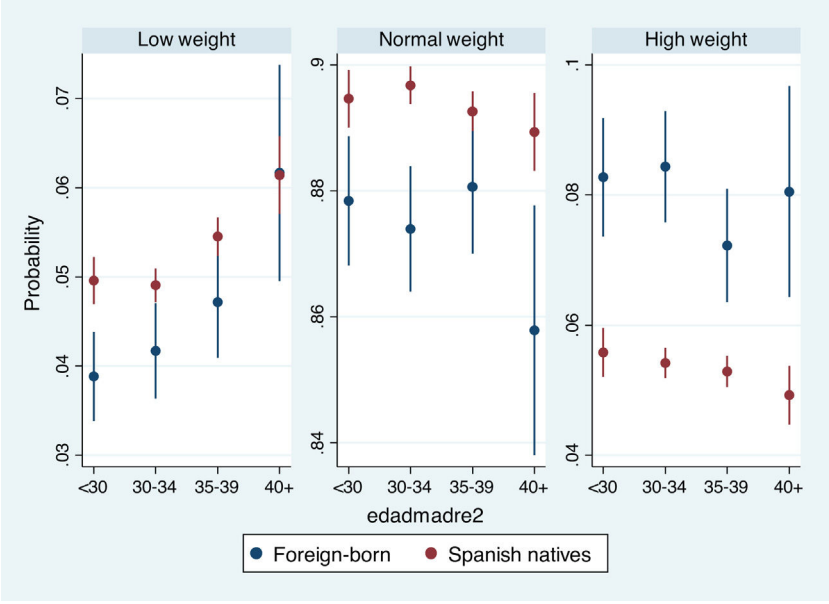

Figure 2. Average adjusted predictions of giving birth to children with low, high, and adequate weight for the origin and the maternal age at birth.

of giving birth to infants with low, high, and adequate weight for the origin and the maternal age at birth have also been estimated o present results more tangibly and intuitively. For each of the three outcomes analyzed the probabilities shown in Figure 2 are the average probabilities predicted by model 4 in table 2 if all women belonged to one of the four age bands and the rest of their characteristics remained as observed in the data. The study was approved by the Confidentiality Committee of the Spanish National Statistical Institute. All analyses were performed using Stata version 17 software (StataCorp LP, College Station, TX, USA).

Results

Table 1 displays the descriptive characteristics of the study population, revealing a reduced prevalence of low-birth-weight births among newborns. The results indicate that mothers aged over 40 had a 6.5% prevalence of LBW in their newborns (95%CI: 6-6.8), whereas those aged under 30 had a prevalence of 5.7% (95%CI: 5.4-5.9%). Among women aged between 35-39, the prevalence was 5% (95%CI: 4.8-5.1) and for those aged between 30-34, it was 4.6% (95%CI: 4.4-4.7). Regarding HBW, there does not appear to be a substantial difference based on maternal age at delivery.

Education level increased significantly with age at maternity. Specifically, mothers who give birth between the ages of 35-39 and over 40 years old had a tertiary education, respectively, 52.2% (95%CI: 51.5-52.9) and 50.9% (95%CI: 49.4-52.4), in contrast to mothers who give birth at a younger age, 15.6% (95%CI: 14.7-16.5%). Overall, mothers were employed and predominantly living with their partners. However, it is observed that among mothers < 30 years old, 23.7% (95%CI: 22.9-24.5) live in non-nuclear households.

Table 1
Socio-demographic characteristics of the pregnant women included in the study.

	Age (years)									
	<30		30-34		35-39		≥40			
Birth results	n	%	n	%	n	%	n	%	Pr.	Tot.
Newborn sex										
Female	10,345	48.1	19,924	48.2	18,058	48.3	4,609	48.6	0.831	52,936
Male	11,181	51.9	21,397	51.8	19,300	51.7	4,877	51.4		56,755
Birth order										
1	15,784	73.3	23,419	56.7	14,396	38.5	3,538	37.3	0.000	57,137
2	4,859	22.6	15,581	37.7	18,976	50.8	4,281	45.1		43,697
3+	883	4.1	2,321	5.6	3,986	10.7	1,667	17.6		8,857
Low birth weight	1,223	5.7	1,901	4.6	1,870	5	612	6.5	0.000	5,606
High birth weight	1,191	5.5	2,323	5.6	1,870	5.8	528	5.6	0.000	5,912
Preterm (<37 weeks)	1,136	5.3	1,851	4.5	1,843	4.9	585	6.2	0.000	5,415
Post term (>41 weeks)	513	2.4	820	2	633	1.7	138	1.5	0.000	2,104
Mother's characteristics										
Education										
Primary	11,108	51.6	9,621	23.3	6,531	17.5	1,976	20.8	0.000	29,236
Secundary	7,051	32.8	13,908	33.7	11,335	30.3	2,680	28.3		34,974
Tertiary	3,367	15.6	17,792	43.1	19,492	52.2	4,830	50.9		45,481
Labour status										
Employed	9,250	43	28,651	69.3	27,602	73.9	6,952	73.3	0.000	72,455
Unemployed	8,096	37.6	9,380	22.7	7,678	20.6	1,958	20.6		27,112
Retired	352	1.6	519	1.3	409	1.1	114	1.2		1,394
Other situation	3,828	17.8	2,771	6.7	1,669	4.5	462	4.9		8,730
Family situation										
Living with couple	13,990	65	31,999	77.4	29,032	77.7	6,766	71.3	0.000	81,787
Living alone	2,431	11.3	4,548	11	4,653	9.8	1,086	11.4		12,718
Cohabitat	5,105	23.7	4,774	11.6	3,673	12.5	1,634	17.2		15,186
Origin										
Native-born	17,687	82.2	37,460	90.7	34,244	91.7	8,492	89.5	0.000	97,883
Foreign-born	3,839	17.8	3,861	9.3	3,114	9.3	994	10.5		11,808
Total	21,526		41,321		37,358		9,486			109,681

This result is primarily due to the high presence of foreign-born mothers (17.8%) in this age band. Consistent with previous research in Spain, immigrant households in the country show relatively complex domestic structures, housing a greater density of domestic, familial, and non-familial relationships. This phenomenon is mainly attributed to the family reunification process and the elevated fertility rates observed in comparison to Spanish couples.[21]

Table 2 shows the results of the estimation of the multinomial logistic regression models. Model 1 indicates that mothers aged ≥40 years (RRR: 1.43; 95%CI: 1.30-1.57), <30 years (RRR: 1.24; 95%CI: 1.15-1.34), and those between 35-39 years (RRR: 1.09; 95%CI: 1.02-1.16) are at a higher risk of giving birth to low-birth-weight infants compared to mothers between the ages of 30-34 years.

Consistent with previous research, the risk of low birth weight is influenced by the sex of the newborn, whereby female infants show a higher risk (RRR: 1.36; 95%CI: 1.28-1.45) compared to male newborns. Furthermore, in relation to the birth order, mothers who give born to a second or third child exhibit a reduced likelihood of delivering newborns with LBW compared to primiparous mothers: RRR: 0.63 (95%CI: 059-0.68) and RRR: 0.63 (95%CI: 055; 0.72), respectively. However, the risk of delivering infants with higher birth weight increases with the second (RRR: 1.58; 95%CI: 1.49-1.67) and the third newborn (RRR: 1.99; 95%CI: 1.82-2.18). Findings related to gestational age align with the expected results, as the growth and subsequent weight of the fetus are inherently connected to the duration of time spent in the uterus during gestational weeks.

Mothers with a higher level of education showed a reduced risk of giving birth to low-birth-weight infants compared to mothers with very low levels of education: RRR: 0.85 (95%CI: 0.78-0.92) and RRR: 0.68 (95%CI: 0.62-0.74), respectively. Furthermore, the risk of LBW increased if mothers were unemployed in comparison to employed mothers (RRR: 1.08; 95%CI: 0.99-1.16). While maternal family status does not imply an association with the risk of low or high birth weight.

According to the origin of the mother, foreign-born mothers had a lower risk of giving birth to low-birth-weight babies (RRR: 0.79; 95%CI: 0.71-0.89); however, they also showed a higher risk of delivering higher birth-weight newborns (RRR: 1.53; 95%CI: 1.42-1.65) compared to native mothers.

Concerning HBW, mothers who give birth at <30 years of age, when adjusted for birth characteristics, are at a greater risk of delivering high-birth-weight babies (RRR: 1.07; 95%CI: 1-1.15). This outcome can be mainly attributed to the presence of immigrant mothers in this age group, as previous studies reported.[22,23] When estimating the effect of the interaction between mothers' origin and mothers' age on LBW and HBW, the results are not statistically significant. This implies that the association between maternal origin and age does not play a significant role in predicting specific birth weight outcomes. Therefore, it would be necessary to consider other factors that may influence it.

Figure 2 displays the probabilities (average adjusted predictions) of giving birth to children with low, high, and normal weight for mothers based on their origin and age at childbirth. Among foreign-born mothers, the probability of giving birth to infants with low weight is lower than that of Spanish natives, except for mothers who give birth at an advanced age (40+), among whom there is no difference. However, the likelihood of foreign-

Table 2
Adjusted multinomial regression models.

		Model 1				Model 2				Model 3				MODEL 4			
		LBW		HBW		LBW		HBW		LBW		HBW		LBW		HBW	
		RRR	95%CI	RRR	95%CI	RRR	95%CI	RRR	95%CI	RRR	95%CI	RRR	95%CI	RRR	95%CI	RRR	95%CI
Mother's age, years	30-34 (ref.)																
	< 30	1.24[c]	1.15-1.34	0.99	0.92-1.06	1.13[b]	1.03-1.23	1.07[b]	1.00-1.15	0.99	0.90-1.09	1.02	0.94-1.10	1.01	0.92-1.12	1.03	0.94-1.12
	35-39	1.09[b]	1.02-1.16	1.03	0.97-1.09	1.13[b]	1.04-1.22	0.94	0.88-1.00	1.17[c]	1.08-1.26	0.95	0.90-1.02	1.17[c]	1.07-1.27	0.97	0.91-1.04
	> 40	1.43[c]	1.30-1.57	1.01	0.91-1.11	1.38[c]	1.23-1.55	0.90[a]	0.82-1.00	1.43[c]	1.27-1.61	0.91	0.83-1.01	1.39[c]	1.23-1.58	0.91	0.81-1.01
Birth order	1 (ref.)																
	2					0.63[c]	0.59-0.68	1.58[c]	1.49-1.67	0.62[c]	0.57-0.66	1.56[c]	1.47-1.65	0.62[c]	0.57-0.66	1.55[c]	1.47-1.65
	3+					0.63[c]	0.55-0.72	1.99[c]	1.82-2.18	0.60[c]	0.53-0.69	1.85[c]	1.69-2.03	0.60[c]	0.53-0.69	1.85[c]	1.69-2.03
Gestational age	> 36 and < 42 (ref.)																
	< 37					51[c]	47.6-54.5			50.7[c]	47.4-50.7			50.7[c]	47.4-54.3		
	41+					0.06[c]	0.01-0.18	3.04[c]	2.69-3.44	0.05[c]	0.01-0.18	3.00[c]	2.65-3.39	0.05[c]	0.01-0.18	3.00[c]	2.65-3.40
Newborn sex	Male (ref.)																
	Female					1.36[c]	1.28-1.45	0.49[c]	0.46-0.52	1.36[c]	1.28-1.46	0.49[c]	0.46-0.52	1.36[c]	1.28-1.45	0.49[c]	0.46-0.52
Education	Primary (ref.)																
	Secondary									0.85[c]	0.78-0.92	1.01	0.94-1.08	0.85[c]	0.78-0.92	1.01	0.94-1.08
	Tertiary									0.68[c]	0.62-0.74	0.97	0.90-1.04	0.68[c]	0.62-0.74	0.97	0.90-1.04
Labour status	Employed																
	Unemployed								1.08[a]	0.99-1.16	0.98	0.92-1.04	1.08[a]	0.99-1.16	0.98	0.92-1.05	
	Retired									0.94	0.71-1.25	1.11	0.89-1.39	0.94	0.71-1.25	1.11	0.89-1.39
	Other situation								1.12[a]	0.99-1.27	0.97	0.88-1.07	1.13[a]	1-1.27	0.97	0.88-1.07	
Family situation	Couple																
	Cohabitat									1.05	0.95-1.15	0.99	0.92-1.07	1.05	0.95-1.16	0.99	0.92-1.07
	Single									1.01	0.92-1.12	0.99	0.91-1.08	1.01	0.92-1.12	0.99	0.91-1.08
Origen	Native-born																
	Foreign-born								0.79[c]	0.71-0.89	1.53[c]	1.42-1.65	0.80[a]	0.65-0.97	1.61[c]	1.42-1.82	
Interaction	Mother's age*origin																
	< 30*foreign-born												0.88	0.67-1.16	0.94	0.78-1.13	
	35-39*foreign-born												1.01	0.76-1.34	0.86	0.71-1.03	
	> 40*foreign-born												1.28	0.88-1.86	1.05	0.80-1.38	

95%CI: 95% confidence interval; HBW: high birth weight; LBW: low birth weight; RRR: relative risk ratio.
[a] $p < 0.05$.
[b] $p < 0.01$.
[c] $p < 0.001$.

born mothers having high birth weight children is higher than among native-born mothers but appears to be largely independent of age. Estimated average adjusted predictions fully confirm the assessed RRR from the adjusted multinomial regression models (Table 2).

Discussion

This study aimed to examine the influence of giving birth at different ages on the birth weight of newborns in Spain. The study yielded two principal findings. First, advanced maternal age (40+) increases the likelihood of LBW infants in comparison to younger mothers. Second, mothers who give birth at a younger age are more likely to have infants with LBW but face a higher risk of delivering babies with HBW. On the one hand, in line with previous studies conducted in Spain[10,12,24] and other countries,[5] the study find that women of advanced age are at a higher risk of giving birth to LBW newborns, even after adjusting for birth characteristics, sociodemographic and socioeconomic status of the mother. Social inequalities experienced by mothers before, during, and after pregnancy are reflected in adverse birth outcomes, including the risk of LBW among newborns.[19,20] A favourable maternal socioeconomic profile not only reduces the likelihood of giving birth to LBW infants but also facilitates enhanced access to information concerning nutrition, health education, and the promotion of healthy lifestyle choices such as maintaining a healthy diet, refraining from smoking, and managing pre-pregnancy weight.[25] In this scenario, the risk of LBW among newborns of mothers who give birth at an advanced age with a favourable socioeconomic status could be attributed to clinical medical factors including hypertensive disorders of pregnancy or high blood pressure during gestation, among other elements.[6] Furthermore, previous maternal health characteristics, such as miscarriages or prior stillbirths, may contribute to this heightened risk.[6]

Regarding HBW, previous research suggested an elevated risk in newborns of mothers with advanced maternal age.[3,5] However, in our study, we have not found this evidence. This could be attributed to their improved access to prenatal care, healthier diet, and lifestyle choices, as well as a higher socioeconomic status in comparison to younger mothers and foreign-born mothers.[26,27]

On the other, mothers who give birth at a younger age (<30) are at greater risk of giving birth both to LBW and HBW babies. First, it has already been shown elsewhere that mothers with limited socio-economic status and lower education[28] typically exhibit adverse birth outcomes. Second, as far as the interpretation of the risk of HBW is concerned, this association may be related to maternal migratory status, as previously reported.[23,29] Major risk factors for HBW include obesity, gestational diabetes mellitus, and gestational weight gain. In addition, other risk factors include familial trait, ethnicity, nutritional intake, maternal birthweight above 4 kg, maternal age, parity, excessive interpregnancy weight gain, previous large for gestational age, post-term pregnancy, male sex, and genetic syndromes.[26,27,30]

Finally, when considering maternal migratory status, a lower risk of giving birth to newborns with LBW is shown. This finding aligns with previous research conducted in Spain[22,29,31] and highlights the phenomenon commonly referred to as the "healthy immigrant paradox". This pattern, widely observed in the international literature[15,32] and within the national Spanish context[31,33,34], suggests that foreign-born mothers show better or at least better-than-expected health and birth outcomes than native-born residents of their host countries, given their socioeconomic characteristics.

Results should be interpreted in the context of certain limitations. First l though some of the main predictors of birth weight, such as birth order, gestational age, and maternal age were used due to dataset limitations, it could be not controlled for other factors such as mothers' previous health information. This limitation arises from the absence of potentially significant information on maternal health behaviours, healthcare utilization, and health conditions within the birth registry. In any case, controlling for educational level implies that, to some extent, health status and healthy culture are being taken into account.

Conclusions

This study highlights the importance of considering the association between maternal age and birth weight outcomes of newborns born to both native and foreign-born mothers. Results contribute to the existing body of research by revealing a positive association between advanced maternal age and low birth weight in newborns among mothers giving birth in Spain.

On one hand, despite advanced maternal age, the increased risk of LBW appears to be more linked to clinical and medical factors than maternal socioeconomic disparities. Consequently, there is a need for enhanced pregnancy monitoring, improved clinical guidance, and enhanced prenatal care services.

On the other, maternal migratory status must be considered when examining the association between age at birth and birth weight outcomes. Findings highlight the necessity of implementing specific maternal and child health policies that address the needs of foreign-born mothers, including access to adequate prenatal care and social support services, as well as accounting for disparities in prenatal care practices. Furthermore, migration-related factors such as stress, lack of social support, and adaptation to a new environment, can influence both maternal well-being and fetal development. Indeed, the absence of perinatal control, coupled with other factors such as gestational diabetes mellitus and weight gain during pregnancy, may partially elucidate the incidence of high birth weight among offspring of immigrant mothers, as previously reported.[26,27]

These findings represent a new and promising field for future research on birth weight disparities among offspring of mothers of different ages and backgrounds. Furthermore, they may contribute to the development of effective strategies aimed at improving perinatal outcomes and promoting maternal and child health in diverse populations.

Availability of databases and material for replication

All methods applied in this study were carried out in concordance with the *Ley Orgánica 3/2018 de Protección de datos personales y garantía de los derechos digitales* (Organic Law 3/2018 on the Protection of personal data and the guarantee of digital rights). This research is not based on experimental protocols, but entirely relies on population-based data obtained through linking Spanish Vital Statistics (2011-2015) and the Population Census (2011). All individual information within the linked dataset has been properly anonymized by the Spanish National Statistics Institute. The research project has been approved by the Confidentiality Committee of Spanish National Statistics Institute.

The database that has been used comes from an individual request to the National Statistical Institute. Therefore, a request can be made to the institute. On the other hand, the code is available upon request to the corresponding author.

What is known about the topic?

Spain is characterized by low fertility rates and delayed childbirth. Despite this, there has been limited research exploring the relationship between advanced maternal age and the risk of adverse birth weight outcomes among native and foreign-born mothers. Previous research suggests an increased risk of low birth weight among native and foreign-born mothers of advanced age giving birth in Spain.

What does this study add to the literature?

The study's results confirm, on one hand, a positive association between advanced maternal age and the probability of low birth weight in newborns. Conversely, they indicate an elevated risk for high birth weight in infants when considering the maternal migratory status of mothers aged below 30 years.

What are the implications of the results?

Maternal age has implications for birth weight outcomes. Our results highlight the importance of enhanced monitoring during pregnancy, improved clinical guidance, and ensuring access to high-quality prenatal care services for mothers giving birth in Spain.

Editor in charge

Mercedes Carrasco Portiño.

Transparency declaration

The corresponding author on behalf of the other authors guarantee the accuracy, transparency and honesty of the data and information contained in the study, that no relevant information has been omitted and that all discrepancies between authors have been adequately resolved and described.

Authorship contributions

C. Dello Iacono conceived the research question and aims. C. Dello Iacono and M. Requena performed the statistical analysis. C. Dello Iacono and M. Stanek wrote the first draft of the paper. C. Dello Iacono and M. Requena wrote the second draft of the paper which was thoroughly revised by M. Stanek. The final version has been reviewed by all authors who approved its submission.

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Conflicts of interest

None.

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