

Article

# Influence of Family Income Level on Obstetric and Perinatal Outcomes in Spain

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**Abstract:** For pregnant women, having a low family income status is associated with late prenatal attendance and an increased risk of adverse outcomes during pregnancy, delivery, and immediately after delivery. However, the influence of the socioeconomic level on maternal and child health may be minimal as long as the health system model is able to neutralise health inequity. For this reason, the objective of this study is to determine the relationship between the socioeconomic level assessed through monthly household income and obstetric and perinatal outcomes in the Spanish Health System, where midwives play a relevant role. To meet this objective, a cross-sectional observational study aimed at women who have been mothers between 2013 and 2018 in Spain was developed. The final study population was 5942 women. No statistically significant differences with linear trend were found between income level and obstetric and perinatal outcomes after the adjustment by confounding factors (pregnancy composite morbidity,  $p = 0.447$ ; delivery composite morbidity,  $p = 0.590$ ; perinatal composite morbidity,  $p = 0.082$ ; postpartum composite morbidity,  $p = 0.407$ ). The main conclusion is that, in the current Spanish health system, household income as an indicator of socioeconomic status is not related to perinatal outcomes after the adjustment by confounding factors. These results are likely due to the public model of our health system that serves all citizens on equal footing, although other social and individual factors may have influenced these results.

**Keywords:** socioeconomic; public health; perinatal outcomes; Spain

## 1. Introduction

The socioeconomic state (SES) is a measure of an individual's position in the hierarchical structure of the population. The three most common indicators of socioeconomic status are family income, educational level, and occupation. Additional measures relate to neighbourhood income, family, race/ethnicity, and possession of property [1,2]. The socioeconomic status is a reliable predictor of health-related differences. In socioeconomically less-favoured groups, medical care is often inadequate, and users tend to have worse physical and mental health than those who are more favoured [1,3]. Individuals with low SES experience increased exposure to stress and, in the case of women, this may lead to worse living conditions, unemployment, having limited access to food, and an increase in the likelihood of being a single mother and suffering from situations of violence [1,4]. In short, SES is one of the most important factors in relation to health outcomes [3].

In pregnant women, having a low SES is associated with late prenatal attendance [4,5] and increased risk of adverse outcomes during pregnancy such as abortion, preeclampsia, eclampsia, and gestational diabetes [3]. In addition, educational level, income and occupation are independently associated with poor birth performance, including outcomes such as low-weight newborns (NB) [2] and preterm births [1,6]. The weight of the NB at birth is an indicator of foetal growth, that is related to the maternal health status before and during pregnancy. It is also an indicator of NB health and is related to the child's development and survival [1]. Low weight is associated with high rates of respiratory problems and poor cognitive development during the baby stage and childhood. In later life stages, the consequences include an increased risk of type 2 diabetes, hypertension, and cardiovascular problems. In relation to preterm births, the risk of neurological disabilities in children and long-term medical complications such as respiratory, gastrointestinal, cardiovascular, and immune problems increase [1].

It is undeniable that the socioeconomic status of the mother influences obstetric and perinatal outcomes. However, the influence of the SES on maternal and child health may be minimal as long as the health system model is able to neutralise health inequalities. The onset of life in the most optimal conditions for newborns belonging to vulnerable communities may help break the vicious cycle of poverty and reduce social inequalities related to health [7].

The studies carried out in Spain on this subject are ancient, and no recent studies developed in a context similar to the Spanish one have been found. Our National Health System [8] is underpinned by the provisions made by public authorities that serve all citizens on an equal footing [9]. In addition, usual pregnancy and birth management is part of the midwives' healthcare responsibilities within our National Health System. For this reason, the objective of this study is to determine the relationship between the socioeconomic level assessed through monthly household income and obstetric and perinatal complications in the Spanish Health System.

## 2. Material and Methods

### 2.1. Study Design and Selection of Study Subjects

The cross-sectional observational study was aimed at women who had been pregnant between 2013 and 2018 in Spain.

The participants were women over the age of 18, who understood Spanish and who agreed to fill in the questionnaire. Women younger than 18 were excluded, as legal authorisation would be required from their parents or legal tutors to be able to fill in the questionnaire. In addition, those women who could not access the online questionnaire were also excluded.

### 2.2. Data Collection

Before filling in the online questionnaire, the participants had to read the information sheet about the purpose of the study and give their consent to participate. After this, they were provided with the necessary information to be able to complete the questionnaire. Participants could voluntarily provide an email address or phone number through which they would be contacted in case any additional information related to the study was needed.

### 2.3. Management and Analysis

For the sample size estimation, the maximum modelling criterion that requires 10 events for each independent variable to be included in the multivariate model has been used [10]. The criterion used to estimate the sample size is the prevalence of low birth weight (<2500 g), located in our population at around 6% [11]. Considering a minimum of 15 independent variables, a minimum of 90 women with low-weight newborns would be required, representing a minimum total population of 1500 women under study within this scenario.

For the data collection, an anonymous online questionnaire was designed with 63 items (57 yes/no questions and 6 multiple answer questions) on sociodemographic variables and complications

during pregnancy (i.e., gestational diabetes or intrahepatic cholestasis), delivery (i.e., cephalopelvic disproportion or induction delivery), and maternal-foetal variables (i.e., breastfeeding at discharge or hospital readmission). The questionnaire was disseminated among the Spanish lactation and postpartum support associations and groups, and those responsible for these groups were in charge of disseminating it among their members.

The variables included in the study were:

The main independent variable was the level of family income, declared by the women and categorised in: <1000 euros per month, between 1000 and 2000 euros, between 2000 and 3000 euros, between 3000 and 4000 euros, and >4000 euros. During data collection, the measuring instrument of the National Statistics Institute of Spain (INE, for its acronym in Spanish) was used as a reference, as it offers data on monthly income per home in sections of 500 euros. However, when performing the data analysis, presenting them in sections of 1000 euros was preferred, so as to group data and improve the statistical power of the analysis.

The independent adjustment variables were maternal age, method of conception, body mass index, nationality, attendance to maternal education, type of birth centre, level of education, tobacco consumption, number of children, number of births.

The dependent variables were complications during pregnancy (preterm birth, twin pregnancy, preeclampsia during pregnancy, insulin-controlled gestational diabetes, hyperthyroidism, hypothyroidism, anaemia, intrahepatic cholestasis, risk of preterm birth, deep vein thrombosis, oligohydramnios), complications during delivery (altered foetal heart rate (FHR) during delivery, stained amniotic fluid (AF), vaginal bleeding, non-progression of delivery, cephalopelvic disproportion, intrapartum fever, induced delivery, end of delivery, episiotomy, tearing) and postpartum maternal-foetal complications (low weight (2500 grams), macrosomia (>4000 grams), skin-to-skin contact after birth, maternal breastfeeding at discharge, newborn admission (NB), postpartum-related maternal surgery, maternal admission into intensive care unit, maternal readmission).

In addition, four “composite” morbidity variables were created and considered main outcomes variables: Pregnancy (including preeclampsia during pregnancy, diet-controlled gestational diabetes, insulin-controlled gestational diabetes, hyperthyroidism, hypothyroidism, oligohydramnios, polyhydramnios, anaemia, intrahepatic cholestasis, risk of preterm birth, deep vein thrombosis), Delivery (including altered foetal heart rate (FHR) during delivery, stained amniotic fluid (AF), vaginal bleeding, uterine rupture, non-progression of delivery, cephalopelvic disproportion, intrapartum fever, induced delivery, type of delivery, episiotomy, severe tearing (type III–IV)), Perinatal (including skin-to-skin contact at birth, maternal breastfeeding at discharge, low weight (<2500 grams), macrosomia (>4000 grams), and newborn admission), and Postpartum (including birth-related maternal postpartum surgery, maternal admission to intensive care unit, and maternal readmission).

First, a descriptive analysis was performed using absolute and relative frequencies for the categorical variables. A bivariate analysis through binary logistic regression was then performed between the main sociodemographic and clinical characteristics, pregnancy, childbirth and foetal complications and the level of family income, using the Pearson’s chi-squared test. Then, the Crude Odds Ratios (OR) and Adjusted Odds Ratios (AOR) were calculated with their respective 95% confidence intervals (95% CI) to determine the relationship between income level and pregnancy, delivery, and foetal complications. All analyses were performed using the SPSS v24.0 statistical package.

#### *2.4. Ethics and Ethical Consideration*

This study has received the approval of the Ethics and Clinical Research Committee of Alcázar de San Juan, Spain, with protocol number 92-C.

### **3. Results**

The final study population was 5942 women. Of these, 5.7% (338) had a mean household income of less than 1000 euros, 33.2% (1974) between 1000 and 2000 euros, 34.1% (2028) between 2001 and

3000 euros, 18.9% (1124) between 3001 and 4000 euros, and 8.0% (478) more than 4000 euros. In 58 cases (0.97%), BMI was not recorded and in 12 cases, newborn weight was not collected. A bivariate analysis was then performed to determine the sociodemographic characteristics related to the economic income level (Table 1). In this regard, a linear relationship was found between higher family income and older maternal age, higher number of children, higher educational level, and use of private medicine ( $p < 0.001$ ). In contrast, a linear relationship was found between lower-income and higher BMI figures as well as a smoking habit in the pregestational phase ( $p < 0.001$ ). As for nationality, we can point out that the largest presence of the immigrant population is found in the lowest step of family income (20.1%).

In the next step, a multivariate analysis was carried out by means of binary logistic regression, where all the variables on complications during pregnancy and childbirth and foetal complications that could potentially be related to the income level were incorporated. This analysis looked at some statistical relationships but did not show a clear linear trend between economic income and the assessed outcomes. Only a declining trend with respect to family income was observed in the prematurity and vaginal bleeding variable, that varied from 8.6% and 7.7% in women with incomes below 1000 euros to 6.1% and 4.4% in women with incomes above 4000 euros, respectively. However, no statistical differences were observed when performing multivariate analyses (Table 2). As for complications during childbirth (Table 3) and maternal-foetal complication (Table 4), no significant differences in relation to the income level were found.

**Table 1.** Sociodemographic and obstetric characteristics of the women according to their income level.

Variable	Income Level (euros)						p Value *
	Total n = 5942	<1000 n = 338 n (%)	1000–2000 n = 1974 n (%)	2001–3000 n = 2028 n (%)	3001–4000 n = 1124 n (%)	>4000 n = 478 n (%)	
Maternal age							<0.001
<25 years	152	36 (10.7)	83 (4.2)	27 (1.3)	4 (0.4)	2 (0.4)	
25–35	3488	201 (59.5)	1259 (63.8)	1220 (60.2)	566 (50.4)	222 (46.4)	
>35 years	2322	101 (29.9)	632 (32.0)	781 (38.5)	554 (49.3)	254 (53.1)	
Educational level							<0.001
No studies	8	1 (0.3)	4 (0.2)	2 (0.1)	0 (0.0)	1 (0.2)	
Primary	108	30 (8.9)	55 (2.8)	16 (0.8)	5 (0.4)	2 (0.4)	
Secondary	1624	174 (51.5)	835 (42.3)	454 (22.4)	128 (11.4)	33 (6.9)	
University	4202	133 (39.3)	1080 (54.7)	1556 (76.7)	991 (88.2)	387 (92.5)	
Method of conception							0.003
Spontaneous	5317	310 (91.7)	1794 (90.9)	1801 (88.8)	992 (88.3)	420 (87.9)	
Insemination	139	11 (3.3)	51 (2.6)	47 (2.3)	23 (2.0)	7 (1.5)	
IVF	486	17 (5.0)	129 (6.5)	180 (8.9)	109 (9.7)	51 (10.7)	
Nationality							<0.001
Spanish	5572	270 (79.9)	1839 (93.2)	1941 (95.7)	1075 (95.6)	447 (93.5)	
Foreign	370	68 (20.1)	135 (6.8)	87 (4.3)	49 (4.4)	31 (6.5)	
BMI							
Normoweight	1621	82 (24.6)	472 (24.2)	575 (28.6)	334 (29.9)	158 (33.5)	
Overweight	2721	139 (41.6)	891 (45.6)	532 (47.6)	235 (47.6)	235 (49.8)	
Obesity	1542	113 (33.8)	589 (30.2)	509 (25.3)	252 (22.5)	79 (16.7)	
Missing	58	4	22	20	6	6	
Maternal education attendance							<0.001
No	1359	98 (29.0)	459 (23.3)	392 (19.3)	275 (24.5)	135 (28.2)	
Yes	5942	240 (71.0)	1515 (76.6)	1636 (80.7)	849 (75.5)	343 (71.8)	
Type of centre							<0.001
Public hosp.	4641	277 (82.0)	1646 (83.7)	1594 (78.8)	798 (71.1)	326 (68.5)	
Private hosp.	1176	47 (13.9)	286 (14.5)	394 (19.5)	308 (27.5)	141 (29.6)	
Birth centre	110	14 (4.1)	35 (1.8)	36 (1.8)	16 (1.4)	9 (1.9)	
At home	15	0 (0.0)	7 (0.4)	4 (0.2)	2 (0.2)	2 (0.4)	
Pregestational smoking habit							<0.001
No	4557	208 (61.5)	1423 (72.1)	1585 (78.2)	934 (83.1)	407 (85.1)	
Yes	1385	130 (38.5)	551 (27.9)	443 (21.8)	190 (16.9)	71 (14.9)	

Table 1. Cont.

Variable	Income Level (euros)						p Value *
	Total n = 5942	<1000 n = 338 n (%)	1000–2000 n = 1974 n (%)	2001–3000 n = 2028 n (%)	3001–4000 n = 1124 n (%)	>4000 n = 478 n (%)	
No of pregnancies							<0.001
One	3161	217 (64.2)	1091 (55.3)	1114 (54.9)	530 (47.2)	209 (43.7)	
Two	1983	75 (22.2)	639 (32.4)	658 (32.4)	431 (38.3)	180 (37.7)	
Three	540	31 (9.2)	173 (8.8)	169 (8.3)	109 (9.7)	58 (12.1)	
Four	171	12 (3.6)	51 (2.6)	49 (2.4)	38 (3.4)	21 (4.4)	
Five or more	87	3 (0.9)	20 (1.0)	38 (1.9)	16 (1.4)	10 (2.1)	
No of deliveries							<0.001
None	1309	76 (22.5)	437(22.1)	441 (21.7)	247 (22.0)	108 (22.6)	
One	3008	196 (58.0)	1033 (52.3)	1048 (51.7)	526 (46.8)	205 (42.9)	
Two	1421	51 (15.1)	452 (22.9)	482 (23.8)	305 (27.1)	131 (27.4)	
Three	175	13 (3.8)	47 (2.4)	47 (2.3)	38 (3.4)	30 (6.3)	
Four	524	1 (0.3)	4 (0.2)	9 (0.4)	6 (0.5)	4 (0.8)	
Five or more	5	1 (0.3)	1 (0.1)	1 (0.0)	2 (0.2)	0 (0.0)	

\* Pearson's  $\chi^2$  test.

Table 2. Complications during pregnancy according to income level.

Variable	Income Level (euros)						p-Value Tendency
	Total n = 5942	<1000 n = 338 n (%)	1000–2000 n = 1974 n (%)	2001–3000 n = 2028 n (%)	3001–4000 n = 1124 n (%)	>4000 n = 478 n (%)	
Prematurity							0.684
>37	5530	309 (91.4)	1835 (93.0)	1886 (93.0)	1051 (93.5)	449 (93.9)	
<37	412	29 (8.6)	139 (7.0)	142 (7.0)	73 (6.5)	29(6.1)	
OR 95% CI		1 (ref.)	0.81 (0.53–1.23)	0.81 (0.52–1.22)	0.80 (0.53–1.22)	0.74 (0.47–1.16)	
<sup>a</sup> AOR 95% CI		1 (ref.)	0.90 (0.58–1.41)	0.91 (0.58–1.43)	0.86 (0.52–1.41)	0.67 (0.38–1.20)	
Twin pregnancy							0.087
No	5797	329 (97.3)	1933 (97.9)	1978 (97.5)	1100 (97.9)	457 (95.6)	
Yes	145	9 (2.7)	41 (2.1)	50 (2.5)	24 (2.1)	21 (4.4)	
OR 95% CI		1 (ref.)	0.78 (0.37–1.61)	0.92 (0.45–1.90)	0.80 (0.37–1.73)	1.68 (0.76–3.72)	
<sup>b</sup> AOR 95% CI		1 (ref.)	0.79 (0.36–1.72)	0.91 (0.42–1.97)	0.74 80.32–1.72)	1.64 (0.69–3.87)	
Hypertensive state							0.510
No	5534	302 (89.3)	1827 (92.6)	1894 (93.4)	1062 (94.5)	449 (93.9)	
Yes	408	36 (10.7)	147 (7.4)	134 (6.6)	62 (5.5)	29 (6.1)	

Table 2. Cont.

Variable	Income Level (euros)						p-Value Tendency
	Total n = 5942	<1000 n = 338 n (%)	1000–2000 n = 1974 n (%)	2001–3000 n = 2028 n (%)	3001–4000 n = 1124 n (%)	>4000 n = 478 n (%)	
OR 95% CI		1 (ref.)	0.68 (0.46–0.99)	0.59 (0.40–0.87)	0.49 (0.32–0.75)	0.54 (0.33–0.90)	
<sup>c</sup> AOR 95% CI		1 (ref.)	0.74 (0.49–1.12)	0.74 (0.49–1.13)	0.65 (0.41–1.04)	0.77 (0.44–1.35)	
Insulin-cont. gestational diabetes							0.579
No	5792	330 (97.6)	1930 (97.8)	1975 (97.4)	1094 (97.3)	463 (96.9)	
Yes	150	8 (2.4)	44 (2.2)	53 (2.6)	30 (2.7)	15 (3.1)	
OR 95% CI		1 (ref.)	0.94 (0.44–2.02)	1.11 (0.52–2.35)	1.13 (0.51–2.49)	1.13 (0.51–2.49)	
<sup>b</sup> AOR 95% CI		1 (ref.)	0.88 (0.40–1.91)	1.12 (0.51–2.45)	1.15 (0.49–2.66)	1.46 (0.58–3.66)	
Hyperthyroidism							0.374
No	5657	217 (93.8)	1857 (94.1)	1944 (95.9)	1083 (96.4)	456 (95.4)	
Yes	285	21 (6.2)	117 (5.9)	84 (4.1)	41 (3.6)	22 (4.6)	
OR 95% CI		1 (ref.)	0.95 (0.60–1.54)	0.65 (0.40–1.07)	0.57 (0.33–0.98)	0.73 (0.39–1.35)	
<sup>b</sup> AOR 95% CI		1 (ref.)	0.99 (0.61–1.62)	0.78 (0.46–1.30)	0.78 (0.46–1.30)	0.76 (0.43–1.34)	
Hypothyroidism							0.492
No	5155	306 (90.5)	1715 (86.9)	1743(85.9)	978 (87.0)	413 (86.4)	
Yes	787	32 (9.5)	259 (13.1)	285 (14.1)	146 (13.0)	65 (13.6)	
OR 95% CI		1 (ref.)	1.44 (0.98–2.13)	1.56 (1.06–2.30)	1.43 (0.95–2.14)	1.51 (0.96–2.36)	
<sup>b</sup> AOR 95% CI		1 (ref.)	1.36 (0.91–2.03)	1.36 (0.91–2.04)	1.21 (0.79–1.86)	1.29 (0.80–2.07)	
Anaemia							0.554
No	3597	205 (60.7)	1187 (60.1)	1257 (62.0)	666 (59.3)	262 (59.0)	
Yes	2345	133 (39.3)	787 (39.9)	771 (38.0)	458 (40.7)	196 (41.0)	
OR 95% CI		1 (ref.)	1.02 (0.81–1.29)	0.95 (0.75–1.20)	1.06 (0.83–1.36)	1.07 (0.81–1.42)	
<sup>b</sup> AOR 95% CI		1 (ref.)	0.98 (0.77–1.25)	0.91 (0.71–1.17)	1.02 (0.78–1.33)	1.03 (0.76–1.39)	
Intrahepatic cholestasis							0.918
No	5869	333 (98.5)	1948 (98.7)	2007 (99.0)	1111 (98.8)	470 (98.3)	
Yes	73	5 (1.5)	26 (1.3)	21 (1.0)	13 (1.2)	8 (1.7)	
OR 95% CI		1 (ref.)	0.89 (0.34–2.33)	0.70 (0.26–1.86)	0.78 (0.28–2.20)	1.13 (0.37–3.50)	
<sup>b</sup> AOR 95% CI		1 (ref.)	1.03 (0.39–2.77)	0.88 (0.31–2.47)	0.97 (0.32–2.93)	1.31 (0.40–4.36)	
Risk of preterm birth							0.674
No	5452	307 (90.8)	1800 (91.2)	1869 (92.2)	1031 (91.7)	445 (93.1)	
Yes	490	31 (9.2)	174 (8.8)	159 (7.8)	93 (8.3)	33 (6.9)	
OR 95% CI		1 (ref.)	0.96 (0.64–1.43)	0.84 (0.56–1.27)	0.89 (0.58–1.37)	0.73 (0.44–1.25)	

Table 2. Cont.

Variable	Income Level (euros)						p-Value Tendency
	Total n = 5942	<1000 n = 338 n (%)	1000–2000 n = 1974 n (%)	2001–3000 n = 2028 n (%)	3001–4000 n = 1124 n (%)	>4000 n = 478 n (%)	
<sup>b</sup> AOR 95% CI		1 (ref.)	1.21 (0.79–1.85)	1.18 (0.76–1.83)	1.27 (0.80–2.03)	0.97 (0.56–1.69)	
Deep vein thrombosis							0.593
No	5865	333 (95.5)	1943 (98.4)	2005 (98.9)	1113 (99.0)	471 (98.5)	
Yes	77	5 (1.5)	31 (1.6)	23 (1.1)	11 (1.0)	7 (1.5)	
OR 95% CI		1 (ref.)	1.06 (0.41–2.75)	0.76 (0.29–2.02)	0.66 (0.23–1.91)	0.99 (0.31–3.15)	
<sup>b</sup> AOR 95% CI		1 (ref.)	0.95 (0.36–2.52)	0.69 (0.25–1.91)	0.55 (0.18–1.70)	0.83 (0.25–2.81)	
Oligohydramnios							0.938
No	5716	325 (96.2)	1896 (96.0)	1952 (96.3)	1080 (96.1)	463 (96.9)	
Yes	226	13 (3.8)	78 (4.0)	76 (3.7)	44 (3.9)	15 (3.1)	
OR 95% CI		1 (ref.)	1.03 (0.57–1.87)	0.97 (0.53–1.77)	1.02 (0.54–1.91)	0.81 (0.38–1.73)	
<sup>b</sup> AOR 95% CI		1 (ref.)	1.18 (0.64–2.18)	1.20 (0.64–2.26)	1.29 (0.66–2.55)	1.06 (0.48–2.34)	
Polyhydramnios							0.268
No	5426	301 (89.1)	1789 (90.6)	1844 (90.9)	1049 (93.3)	443 (92.7)	
Yes	516	37 (10.9)	185 (9.4)	184 (9.1)	75 (6.7)	35 (7.3)	
OR 95% CI		1 (ref.)	0.84 (0.58–1.22)	0.81 (0.56–1.18)	0.58 (0.38–0.88)	0.64 (0.40–1.04)	
<sup>b</sup> AOR 95% CI		1 (ref.)	0.87 (0.59–1.29)	0.91 (0.61–1.37)	0.68 (0.43–1.06)	0.78 (0.46–1.30)	
Pregnancy composite morbidity							0.447
No	2240	135 (39.9)	725 (36.7)	779 (38.4)	434 (38.6)	167 (34.9)	
Yes	3702	203 (60.1)	1249 (63.3)	1249 (61.6)	690 (61.4)	311 (65.1)	
OR 95% CI		1 (ref.)	1.15 (0.91–1.45)	1.07 (0.84–1.35)	1.06 (0.83–1.36)	1.24 (0.93–1.65)	
<sup>b</sup> AOR 95% CI		1 (ref.)	1.14 (0.89–1.45)	1.08 (0.85–1.39)	1.09 (0.83–1.41)	1.28 (0.95–1.74)	

<sup>a</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit and complications during pregnancy. <sup>b</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity and method of conception. <sup>c</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception and smoking habit.

Table 3. Complications during delivery according to income level.

Variable	Income Level (euros)						p-Value Tendency
	Total n = 5942	<1000 n = 338 n (%)	1000–2000 n = 1974 n (%)	2001–3000 n = 2028 n (%)	3001–4000 n = 1124 n (%)	>4000 n = 478 n (%)	
Alterations FHR							0.378
No	5210	303 (89.6)	1717 (87.0)	1767 (87.1)	996 (88.6)	427 (89.3)	
Yes	732	35 (10.4)	257 (13.0)	261 (12.9)	128 (11.4)	51 (10.7)	

Table 3. Cont.

Variable	Income Level (euros)						p-Value Tendency
	Total n = 5942	<1000 n = 338 n (%)	1000–2000 n = 1974 n (%)	2001–3000 n = 2028 n (%)	3001–4000 n = 1124 n (%)	>4000 n = 478 n (%)	
OR 95% CI		1 (ref.)	1.30 (0.89–1.88)	1.28 (0.88–1.86)	1.11 (0.75–1.66)	1.03 (0.66–1.63)	
<sup>a</sup> AOR 95% CI		1 (ref.)	1.44 (0.98–2.12)	1.51 (1.02–2.24)	1.45 (0.95–2.22)	1.45 (0.89–2.35)	
Stained AF							0.677
No	5576	323 (95.6)	1847 (96.6)	1897 (93.5)	1060 (94.3)	449 (93.9)	
Yes	366	15 (4.4)	127 (6.4)	131 (6.5)	64 (5.7)	29 (6.1)	
OR 95% CI		1 (ref.)	1.48 (0.86–2.56)	1.49 (0.86–2.57)	1.30 (0.73–2.31)	1.39 (0.73–2.64)	
<sup>a</sup> AOR 95% CI		1 (ref.)	1.45 (0.83–2.54)	1.46 (0.83–2.59)	1.35 (0.73–2.46)	1.59 (0.82–3.12)	
Vaginal bleeding							0.140
No	5631	312 (92.3)	1856 (94.0)	1933 (95.3)	1073 (95.5)	457 (95.6)	
Yes	311	26 (7.7)	118 (6.0)	95 (4.7)	51 (4.5)	21 (4.4)	
OR 95% CI		1 (ref.)	0.76 (0.49–1.19)	0.59 (0.38–0.93)	0.57 (0.35–0.93)	0.55 (0.31–0.99)	
<sup>b</sup> AOR 95% CI		1 (ref.)	0.77 (0.48–1.30)	0.59 (0.37–0.97)	0.58 (0.34–0.99)	0.57 (0.31–1.08)	
Uterine rupture							0.564
No	5905	333 (98.5)	1960 (99.3)	2019 (99.6)	1119 (99.6)	464 (99.2)	
Yes	37	5 (1.5)	14 (0.7)	9 (0.4)	5 (0.4)	4 (0.8)	
OR 95% CI		1 (ref.)	0.48 (0.17–1.33)	0.30 (0.10–0.89)	0.30 (0.09–1.03)	0.56 (0.15–2.10)	
<sup>c</sup> AOR 95% CI		1 (ref.)	0.55 (0.19–1.65)	0.40 (0.12–1.35)	0.40 (0.10–1.61)	0.72 (1.16–3.21)	
Non-progression of delivery							0.709
No	4801	268 (79.3)	1574 (79.7)	1625 (80.1)	927 (82.5)	407 (85.1)	
Yes	1141	70 (20.7)	400 (20.3)	403 (19.9)	197 (17.5)	71 (14.9)	
OR 95% CI		1 (ref.)	0.97 (0.73–1.29)	0.95 (0.72–1.26)	0.82 (0.60–1.10)	0.67 (0.46–0.96)	
<sup>c</sup> AOR 95% CI		1 (ref.)	1.08 (0.79–1.47)	1.09 (0.80–1.49)	1.03 (0.74–1.45)	0.90 (0.60–1.33)	
Cephalopelvic disproportion							0.091
No	5028	294 (87.0)	1640 (83.1)	1726 (85.1)	951 (84.6)	417 (87.2)	
Yes	914	44 (13.0)	334 (16.9)	302 (14.9)	173 (15.4)	61 (12.8)	
OR 95% CI		1 (ref.)	1.36 (0.97–1.91)	1.17 (0.83–1.64)	1.22 (0.85–1.74)	0.98 (0.65–1.48)	
<sup>c</sup> AOR 95% CI		1 (ref.)	1.46 (1.03–2.08)	1.34 (0.93–1.92)	1.62 (1.10–2.37)	1.38 (0.88–2.15)	
Fever							0.002
No	5621	327 (96.7)	1832 (92.8)	1918 (94.6)	1087 (96.7)	457 (95.6)	
Yes	321	11 (3.3)	142 (7.2)	110 (5.4)	37 (3.3)	21 (4.4)	
OR 95% CI		1 (ref.)	2.30 (1.23–4.30)	1.71 (0.91–3.20)	1.01 (0.51–2.01)	1.37 (0.65–2.87)	
<sup>b</sup> AOR 95% CI		1 (ref.)	2.65 (1.36–5.17)	2.05 (1.03–4.05)	1.34 (0.64–2.81)	2.09 (0.94–4.65)	
Induced delivery							0.963
No	3764	212 (62.7)	1234 (62.5)	1281 (63.2)	726 (64.6)	311 (65.1)	
Yes	2178	126 (37.3)	740 (37.5)	747 (36.8)	398 (35.4)	167 (34.9)	
OR 95% CI		1 (ref.)	1.01 (0.80–1.28)	0.98 (0.77–1.25)	0.92 (0.72–1.19)	0.90 (0.68–1.21)	

Table 3. Cont.

Variable	Income Level (euros)						p-Value Tendency
	Total n = 5942	<1000 n = 338 n (%)	1000–2000 n = 1974 n (%)	2001–3000 n = 2028 n (%)	3001–4000 n = 1124 n (%)	>4000 n = 478 n (%)	
<sup>d</sup> AOR 95% CI		1 (ref.)	1.06 (0.82–1.36)	1.03 (0.80–1.33)	1.01 (0.74–1.37)	1.01 (0.74–1.37)	0.462
Mode of delivery							
Vaginal	4531	256 (75.7)	1500 (76.0)	1559 (76.9)	852 (75.8)	364 (76.2)	
Caesarean	1411	82 (24.3)	474 (24.0)	469 (23.1)	272 (24.2)	114 (23.8)	
OR 95% CI		1 (ref.)	0.99 (0.75–1.29)	0.94 (0.72–1.23)	1.00 (0.75–1.32)	0.98 (0.71–1.35)	
<sup>e</sup> AOR 95% CI		1 (ref.)	1.20 (0.89–1.61)	1.20 (0.89–1.63)	1.25 (0.97–1.86)	1.26 (0.87–1.82)	0.222
Episiotomy							
No	4002	229 (67.8)	1345 (68.1)	1366 (67.4)	747 (66.5)	315 (65.9)	
Yes	1940	109 (32.2)	629 (31.9)	662 (32.6)	377 (33.5)	163 (34.1)	
OR 95% CI		1 (ref.)	0.98 (0.77–1.26)	1.02 (0.80–1.30)	1.06 (0.82–1.37)	1.09 (0.81–1.46)	
<sup>f</sup> AOR 95% CI		1 (ref.)	1.10 (0.84–1.44)	1.12 (0.85–1.48)	1.29 (0.96–1.73)	1.30 (0.94–1.82)	0.567
III-IV tearing							
No	5864	331 (97.9)	1851 (98.8)	1998 (98.5)	1113 (99.0)	471 (98.5)	
Yes	78	7 (2.1)	23 (1.2)	30 (1.5)	11 (1.0)	7 (1.5)	
OR 95% CI		1 (ref.)	0.56 (0.24–1.31)	0.71 (0.31–1.63)	0.47 (0.18–1.22)	0.47 (0.18–1.22)	
<sup>g</sup> AOR 95% CI		1 (ref.)	0.65 (0.27–1.59)	0.89 (0.36–2.19)	0.60 (0.21–1.67)	1.04 (0.33–3.27)	0.590
Delivery composite morbidity							
No	2159	120 (35.5)	671 (34.0)	749 (36.9)	434 (38.6)	185 (38.7)	
Yes	3783	218 (64.5)	1303 (66.0)	1279 (63.1)	609 (61.4)	293 (61.3)	
OR 95% CI		1 (ref.)	1.07 (0.84–1.36)	0.94 (0.74–1.20)	0.88 (0.68–1.13)	0.87 (0.65–1.16)	
<sup>a</sup> AOR 95% CI		1 (ref.)	1.21 (0.93–1.57)	1.12 (0.86–1.46)	1.16 (0.87–1.53)	1.19 (0.87–1.65)	

<sup>a</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, induced delivery, regional analgesia and complications during pregnancy. <sup>b</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, induced delivery, regional analgesia, complications during pregnancy, previous caesarean, type of delivery, episiotomy and severe tearing. <sup>c</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, induced delivery, regional analgesia, complications during pregnancy, previous caesarean, type of delivery and newborn weight. <sup>d</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, previous caesarean, complications during pregnancy and newborn weight. <sup>e</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, previous caesarean, complications during pregnancy, analgesia regional, induced delivery and newborn weight. <sup>f</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, induced delivery, regional analgesia, complications during pregnancy, previous caesarean, type of delivery, newborn weight and severe tearing. <sup>g</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, induced delivery, regional analgesia, complications during pregnancy, previous caesarean, type of delivery, newborn weight and episiotomy.

**Table 4.** Postpartum maternal-foetal complications according to income level.

Variable	Income Level (euros)						<i>p</i> -Value Tendency
	Total n = 5942	<1000 n = 338 n (%)	1000–2000 n = 1974 n (%)	2001–3000 n = 2028 n (%)	3001–4000 n = 1124 n (%)	>4000 n = 478 n (%)	
Skin-to-skin contact							0.522
No	1314	94 (27.8)	459 (23.3)	450 (22.2)	222 (19.8)	89 (18.6)	
Yes	4628	244 (72.2)	1515 (76.7)	1578 (77.8)	902 (80.2)	389 (81.4)	
OR IC 95		1 (ref.)	1.27 (0.98–1.75)	1.35 (1.04–1.75)	1.57 (1.04–1.75)	1.57 (1.18–2.07)	
<sup>a</sup> AOR 95% CI		1 (ref.)	1.15 (0.85–1.54)	1.13 (0.84–1.54)	1.18 (0.85–1.64)	1.41 (0.95–2.08)	
Onset of exclusive maternal breastfeeding at discharge							0.635
No	1207	78 (23.1)	398 (20.2)	425 (21.0)	211 (18.8)	95 (19.9)	
Yes	4735	260 (76.9)	1576 (79.8)	1603 (79.0)	913 (81.2)	383 (80.1)	
OR 95% CI		1 (ref.)	1.18 (0.90–1.56)	1.13 (0.86–1.49)	1.29 (0.86–1.70)	1.21 (0.86–1.70)	
<sup>a</sup> AOR 95% CI		1 (ref.)	1.03 (0.76–1.39)	0.92 (0.68–1.24)	0.92 (0.66–1.27)	0.89 (0.61–1.29)	
Low weight							0.845
No	5552	314 (93.2)	1838 (93.3)	1894 (93.6)	1059 (94.4)	447 (93.5)	
Yes	378	23 (6.8)	132 (6.7)	129 (6.4)	63 (5.6)	31 (6.5)	
Missing	12	1	4	5	2	0	
OR 95% CI		1 (ref.)	0.98 (0.62–1.55)	0.93 (0.59–1.47)	0.81 (0.50–1.33)	0.95 (0.54–1.66)	
<sup>b</sup> AOR 95% CI		1 (ref.)	1.33 (0.75–2.36)	1.33 (0.74–2.39)	1.33 (0.74–2.39)	1.28 (0.68–2.41)	
Macrosomia							0.163
No	5658	317 (94.1)	1887 (95.8)	1928 (95.3)	1074 (95.7)	452 (94.6)	
Yes	272	20 (5.9)	83 (4.2)	95 (4.7)	48 (4.3)	26 (5.4)	
Missing	12	1	4	5	2	0	
OR 95% CI		1 (ref.)	0.70 (0.42–1.15)	0.78 (0.48–1.28)	0.71 (0.50–1.66)	0.91 (0.50–1.66)	
<sup>b</sup> AOR 95% CI		1 (ref.)	0.58 (0.34–1.00)	0.73 (0.43–1.25)	0.61 (0.34–1.11)	0.85 (0.44–1.64)	
NB admission							0.268
No	5190	283 (83.7)	1725 (87.4)	1764 (87.0)	1002 (89.1)	416 (87.0)	
Yes	752	55 (16.3)	249 (12.6)	264 (13.0)	122 (10.9)	62 (13.0)	
OR 95% CI		1 (ref.)	0.74 (0.54–1.02)	0.77 (0.56–1.06)	0.63 (0.44–0.88)	0.77 (0.52–1.14)	
<sup>c</sup> AOR 95% CI		1 (ref.)	0.80 (0.56–1.15)	0.96 (0.66–1.39)	0.83 (0.55–1.24)	1.05 (0.66–1.67)	
Perinatal composite morbidity							0.082
No	4637	240 (71.2)	1554 (78.9)	1573 (77.8)	897 (79.9)	373 (78.0)	
Yes	1293	97 (28.8)	416 (21.1)	450 (22.2)	225 (20.1)	105 (22.0)	
Missing	12	1	4	5	2	0	
OR 95% CI		1 (ref.)	0.66 (0.51–0.86)	0.71 (0.55–0.92)	0.62 (0.47–0.82)	0.70 (0.51–0.96)	

Table 4. Cont.

Variable	Income Level (euros)						<i>p</i> -Value Tendency
	Total n = 5942	<1000 n = 338 n (%)	1000–2000 n = 1974 n (%)	2001–3000 n = 2028 n (%)	3001–4000 n = 1124 n (%)	>4000 n = 478 n (%)	
<sup>d</sup> AOR 95% CI		1 (ref.)	0.72 (0.55–0.95)	0.86 (0.55–1.14)	0.77 (0.57–1.05)	0.82 (0.58–1.16)	
Hospital readmission							0.141
No	5823	329 (97.3)	1838 (93.3)	1894 (93.6)	1059 (94.4)	447 (93.5)	
Yes	119	9 (2.7)	40 (2.0)	50 (2.5)	11 (1.0)	9 (2.0)	
OR 95% CI		1 (ref.)	0.76 (0.36–1.57)	0.92 (0.45–1.90)	0.36 (0.15–0.88)	0.70 (0.28–1.79)	
<sup>e</sup> AOR 95% CI		1 (ref.)	0.79 (0.37–1.69)	1.01 (0.47–2.16)	0.43 (0.17–1.08)	0.81 (0.30–2.17)	
ICU admission							0.709
No	5831	329 (97.3)	1935 (98.0)	1995 (98.4)	1101 (98.0)	471 (98.5)	
Yes	111	9 (2.7)	39 (2.0)	33 (1.6)	23 (2.0)	7 (1.5)	
OR 95% CI		1 (ref.)	0.74 (0.35–1.54)	0.61 (0.29–1.28)	0.76 (0.35–1.67)	0.54 (0.20–1.47)	
<sup>e</sup> AOR 95% CI		1 (ref.)	0.81 (0.37–1.76)	0.74 (0.33–1.65)	1.05 (0.45–2.46)	0.68 (0.24–1.99)	
Postpartum surgery							0.384
No	5727	324 (95.9)	1907 (96.6)	1943 (95.8)	1088 (96.8)	465 (97.3)	
Yes	215	14 (4.1)	67 (3.4)	85 (4.2)	36 (3.2)	13 (2.7)	
OR 95% CI		1 (ref.)	0.81 (0.45–1.46)	1.01 (0.56–1.80)	0.76 (0.41–1.44)	0.64 (0.30–1.40)	
<sup>e</sup> AOR 95% CI		1 (ref.)	0.98 (0.52–1.83)	1.31 (0.69–2.46)	1.95 (0.53–2.10)	0.84 (0.36–1.92)	
Postpartum composite morbidity							0.407
No	5551	311 (92.0)	1848 (93.6)	1880 (92.7)	1061 (94.4)	451 (94.4)	
Yes	391	27 (8.0)	126 (6.4)	148 (7.3)	63 (5.6)	27 (5.6)	
OR 95% CI		1 (ref.)	0.79 (0.51–1.21)	0.91 (0.5–39)	0.68 (0.43–1.09)	0.69 (0.40–1.20)	
<sup>e</sup> AOR 95% CI		1 (ref.)	0.89 (0.56–1.41)	1.13 (0.71–1.80)	0.92 (0.55–1.53)	0.89 (0.49–1.61)	

<sup>a</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, newborn weight, pregnancy composite morbidity, delivery composite morbidity and newborn admission. <sup>b</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, pregnancy composite morbidity and delivery composite morbidity. <sup>c</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, newborn weight, pregnancy composite morbidity and delivery composite morbidity. <sup>d</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, pregnancy composite morbidity and delivery composite morbidity. <sup>e</sup> Adjusted by: maternal age, educational level, nationality, BMI, nulliparity, twin pregnancy, method of conception, smoking habit, maternal education attendance, prematurity, newborn weight, pregnancy composite morbidity, delivery composite morbidity, episiotomy and severe tearing.

#### 4. Discussion

The relationship between health status and socioeconomic level has been extensively studied and corroborated in multiple studies, but when analysing the relationship between economic income level and obstetric and perinatal results, the literature is scarcer. The results obtained in this study show no significant differences in women assisted by the Spanish Health System regarding obstetric and perinatal outcomes and socioeconomic level, unlike other studies. However, economic income may be considered an indicator of pregnancy outcome as the bivariate analysis showed an association with certain morbidity outcomes. This lack of differences is consistent with an Iranian study by Dolatian et al. [12], in which they did not find a significant relationship between socioeconomic factors and preterm birth. It is also in agreement with the Spanish study by García-Tizón [13], where it is concluded that these mothers do not have an excessive risk of maternal or perinatal mortality and that they are less likely to have low birth weight newborns. However, there are abundant studies associating low socioeconomic status with an increase in maternal and foetal complications [14–18] such as preeclampsia [3], gestational diabetes, preterm delivery [3,14,16], caesarean section, and postpartum bleeding [3]. As for the newborn, the most common complications are low weight [14] and prematurity [3,16–18].

Health systems can be responsible for, at least partly, the worst obstetric outcomes associated with low socioeconomic levels, even within a basic public health service [16], as health care may contribute to different health outcomes, for example in cancer mortality rates, reflecting social inequalities regarding access and quality of care [19].

Another factor that may have contributed to the fact that higher income levels do not have an influence on greater maternal morbidity may be attributed to adequate professional performance and midwives training, as these figures are responsible for pregnancy and birth management in our National Health System. There is evidence of better outcomes in models where midwives develop a relevant role regarding care, than in those models where healthcare assistance is exclusively managed by other professionals [20]. However, in this study, there were no data on the degree of participation of mothers in prenatal control and the tests performed (ultrasound and laboratory tests). So, it cannot be assured that the lack of relationship between morbidity and economic income may be attributed to the role of the Spanish Health System and the professionals involved.

As for perinatal outcomes, more research should be devoted to identifying possible population-based risk factors [21]. This would help determine the factors associated with worse obstetric outcomes, which would lead to highlighting social support problems for socioeconomically vulnerable mothers and families [16].

In the Spanish context, data on obstetric and perinatal outcomes were analysed between 2007 and 2015, that is, in the context of the socioeconomic crisis that took place during that period. The study by Teran et al. shows that, during these years, the prevalence of underweight newborns increased in all socioeconomic categories [21]. Likewise, other authors have also pointed to the negative effect of the socioeconomic context [22,23] on maternal and perinatal health. In more recent studies such as the one by García-Tizón performed in 2017 [13] and this present study, these differences in socioeconomic level are not found. There are no universal measures for social disadvantage, so researchers use a wide variety of indicators such as maternal occupation, education, income level, housing conditions, lack of access to health care, and in particular, prenatal care among others [21].

This study shows that mothers in economically disadvantaged groups are more likely to have a high body mass index (BMI) [24] and smoking habit during pregnancy, and both are risk factors when it comes to getting worse obstetric and perinatal outcomes [25]. By contrast, mothers with higher income level [6] are older and often use assisted reproductive techniques [26], which have been described as risk factors for complications during pregnancy, childbirth, and for the newborn [27,28]. However, this risk has not been found in this study, which may be due to better medical care, although it may also be due to factors yet to be determined.

### Strengths and Limitations

The main limitation of the study is the information bias, though it was intended to be mitigated through the design of a questionnaire that could be easy to read and intelligible regardless of the participant's educational level. Selection bias is also possible given that women without internet access were not included in the study. The confusion bias inherent to observational studies may be present, but in order to limit its influence, multivariate analysis techniques have been developed. Another limitation is that only pregnant women whose pregnancies have resulted in the viable foetus have been included, and those whose pregnancy resulted in abortion or miscarriage have been excluded. On the other hand, there may be a selection bias as the distribution of the questionnaire was done through postpartum and breastfeeding support associations. These mothers could receive better healthcare for their newborns, which might as well justify the lack of relationship between economic income and morbidity. However, breastfeeding is a process that follows pregnancy and delivery, that is conditioned by many factors, and that affects all the study groups in a similar way according to their economic income.

The main strength of the study is its large sample size and the scarcity of studies linking the family socioeconomic status and obstetric and perinatal outcomes in a public health system context, as most have been conducted in countries with private health systems.

### 5. Conclusions

Therefore, the main conclusion of this study is that, in the current Spanish health system, family income as an indicator of the socioeconomic level is not related with perinatal outcomes after the adjustment by confounding factors. These results can be mainly due to the public model of our health system that serves all citizens on equal footing. However, these results may also be attributed to other factors that were not considered in the present study such as the degree of involvement of mothers in their self-care process, social support networks, and family characteristics among others.

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