

Inadequate prenatal care and maternal country of birth: a retrospective study of southeast Spain

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ABSTRACT

Objective: To quantify the association between the maternal country of birth and inadequacy in the use of prenatal care, and to identify factors that might explain this association.

Study design: A retrospective case series was carried out in a public hospital in southern Spain, including 6873 women who delivered between 2005 and 2007. The maternal country of birth was categorised into four regional groups: Spain, Maghreb (north-west Africa), Eastern Europe and Others (non-Spain), while the use of prenatal care was quantified according to a modified Kotelchuck index: APNCU-1M and APNCU 2M. The effect of country of birth on inadequate prenatal care was analysed using a multiple logistic regression model designed to accommodate factors such as age, parity, previous miscarriages, and pre-gestational and gestational risks. Likelihood ratio tests were performed to assess any interactions.

Results: A significant association was found between maternal country of birth and inadequate prenatal care regardless of the index used. Under APNCU 1-M the strength of association was strongest for Eastern European origin (odds ratio (OR) 6.17, 95% confidence interval (CI) 5.2–7.32), followed by the Maghreb (OR: 5.58, 95% CI: 4.69–6.64). These associations remained virtually unchanged after adjusting for potential confounders. Interactions were observed between age and parity, with the highest risk of inadequacy seen among the Eastern European childbearing women over 34 years of age having 1–2 previous children (OR: 7.63, 95% CI: 3.65–15.92).

Conclusion: Prenatal health care initiatives would benefit from the study of a larger number of variables to address the differences between different groups of women. We recommend the widespread use of standardised indices for the study of prenatal care utilisation.

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1. Introduction

Despite the advantages of prenatal care for maternal and perinatal health [1,2], a substantial proportion of pregnant women does not make proper use of this type of health care. In general, figures seem to be more favourable for Europe than for the US [3,4], although a delay in access to prenatal care (after the first trimester of pregnancy) is relatively common among pregnant women in Europe [4]. In Spain, delayed access is estimated to be below 10% [4,5].

The maternal country of birth has been associated with delayed initiation of prenatal care and a low number of visits in

immigrant-receiving countries [6–8]. Though health care in Spain is guaranteed by law to all pregnant women, immigrant women reportedly make poor use of prenatal care services as compared to native citizens [9]. This situation is the cause of greater concern in view of the fact that recent years have seen an increase in maternal mortality and more cases of perinatal deaths among foreign women [10,11]. One study reported that a lesser number of visits to the doctor/health care centre does not increase the risk of maternal death, regardless of income [12], but Spanish researchers reporting adverse outcomes suggest that a low level of health care received may underlie a high proportion of maternal deaths [10]. Furthermore, given the current foreign population in Spain of 10.5%, it is known that women born outside the country have a decisive role in the rise in birth rates observed in the last decade [13].

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Table 1
Modified indices Kotelchuck defined in terms of timing of prenatal visits, ratio between actual and expected visits and difference between actual and expected visits, adjusted for gestation length.

APNCU-1M	Gestation (weeks)	Number actual/number expected prenatal visits	Number actual – number expected prenatal visits	APNCU-2M	Gestation (weeks)	Number actual/number expected prenatal visits	Number actual – number expected prenatal visits
Adequate plus	16 or less	≥1.10	≥2	Adequate plus	16 or less	≥1.1	≥2
Adequate	16 or less	0.80–1.09	<2	Adequate	16 or less	0.80–1.09	<2 or number actual visits ≥9
Intermediate	16 or less	0.50–0.79		Inadequate	Less o more 16	<0.80	
Inadequate	More 16	<0.50		Missing	No data		
Missing	No data						

Europe embraces enormous diversity, and unfortunately, there is scarce use of standardised indexes to quantify the use of prenatal care according to a woman’s race/ethnicity (R/E) or nationality (N) [8,9,14]. For example, the Adequacy of Prenatal Care Utilization index (APNCU), developed by Kotelchuck, has only been applied in the USA to date [6,7,15]. The Netherlands has devised an index derived from the APNCU, adapted to their national context [16], but hardly allowing for comparison of results from other European countries and the USA. Moreover, findings cannot be extrapolated to the European context due to differences both in the categories of R/E-N and in the healthcare systems.

The present study was designed to overcome the above limitations. Our objective was to assess the association between maternal country of birth and inadequate use of prenatal care, measured using standardised indexes, and to identify some of the factors which may explain this association.

2. Materials and methods

2.1. Study design and population

A retrospective analysis was performed on a series of women who received care in the Poniente of Almería Hospital (southeastern Spain) with a diagnosis of “Birth” upon their discharge from hospital between 2005 and 2007. This centre forms part of the Andalusian Health Service, which provides universal care, free of charge, for everyone regardless of their R/E-N, maternal country of birth and income level. The hospital is located in a rural area where a modern agricultural economy is broadly developed; the local foreign population of 19.5% is largely employed in agricultural sectors and is seen to have a high fertility rate [17].

2.2. Data source

Information was extracted from the computerised register of births by the Obstetrics and Gynaecology Service, and was treated confidentially following the principles of bioethics in human research and the Organic Law 15/1999 of data protection in Spain. The study was approved by the Hospital Ethics and Research Committee.

2.3. Description of variables and measurements

The variables obtained were: (1) socio-demographics: maternal age (≤19, 20–34, ≥35); parity not including the current pregnancy (0, 1–2, ≥3); miscarriages (0, 1, ≥2); and maternal country of birth (collected by inspection of official identification documents) under one of four groups: Spain, Maghreb (Morocco, Algeria and Tunisia), Eastern Europe (Romania, Bulgaria, Hungary, Czech Republic, Russia, Lithuania, Belarus) and Others (Argentina, Ecuador, Colombia, Guinea Bissau, Senegal, Nigeria, England, Germany, France, China); (2) variables related to pregnancy monitoring: gestational age at the first visit (week completed, calculated

according to first day of last menstrual period, or/and by ultrasound calculated by the obstetric care provider); number of visits (primary care and specialised); gestational age at delivery (completed weeks); and (3) morbidity during pregnancy, which in turn was broken down to specify: (a) pre-gestational risk factors: poor obstetric precedents, previous sterility, previous gynaecological surgery, digestive, renal, cardiac, haematological, renal or tumorous illnesses, sexually transmitted diseases, hepatitis, syphilis, drug use; or (b) gestational risk factors: gestational diabetes, threat of premature birth, toxæmia, eclampsia, hyperemesis, vaginal haemorrhages, oligohydramnios, hydramnios, multiple pregnancy, or premature membrane break.

To measure the adequacy of prenatal care, we introduced two changes into the Kotelchuck index to come up with APNCU-1M and APNCU-2M, which are described in detail elsewhere [15] (Table 1).

2.4. Epidemiological and statistical analysis

As seen in the causal diagram shown in Fig. 1, the maternal country of birth was considered as an exposure variable, and inadequate use of prenatal care as the outcome (according to the two indices used). Firstly, the strength of association between each group of countries and inadequacy was assessed by calculating the relevant crude odds ratios (ORc), taking Spain as the reference. In order to restrict the extent to which the above associations could be explained by factors such as age, parity, previous miscarriages and pre-gestational and gestational risk factors, a multiple logistic regression model was drawn up, where these factors were entered along with country of birth. Given that the identification of risk factors during pregnancy may not be causally associated with the adequacy of care, but rather a consequence of the care, the previous analysis was repeated in the subgroup of women without risk factors detected during pregnancy.

Finally, by using the likelihood ratio test, an assessment was made of the presence of interactions between maternal country of birth and the other independent variables, with $p < 0.01$. It was verified that there were statistically significant interactions between maternal country of birth and both age and parity. In order to adequately model these interactions, and taking into

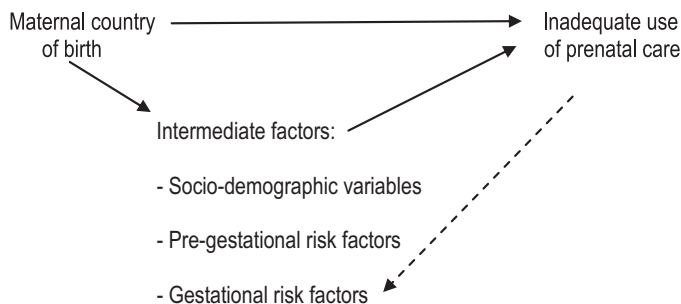


Fig. 1. Directed acyclic graphic representing the causal model between maternal country of birth and inadequate prenatal care.

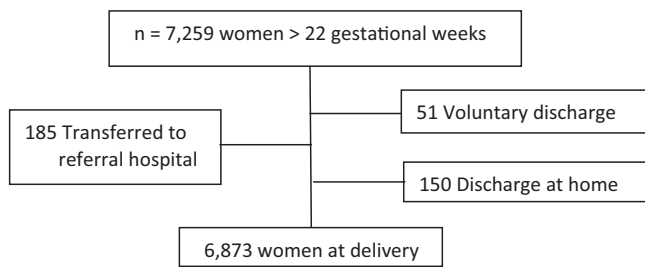


Fig. 2. Total sample.

account that the number of multiparous women among those aged under 20 was very low, we opted to develop another variable combining age and parity, with the exception of young pregnant women, which was considered as the one reference category. The interaction of this new variable with maternal country of birth also produced a statistically significant result, so that the odds ratios obtained were adjusted in line with the effect of maternal country on inadequacy of care for each of the categories in light of this new variable. For all the odds ratio estimates made, corresponding confidence intervals of 95% were obtained. Statistical analyses were carried out using the STATA programme, version 10.0.

3. Results

The final sample consisted of 6873 women who gave birth at the hospital between 1 January 2005 and 31 December 2007 (Fig. 2). The main maternal countries of birth were Spain (58%), Morocco (39%), Romania (28%) and Russia (9%). Table 2 shows the distribution of the remaining study variables for maternal origin group. The highest percentage of Spanish-born mothers was less than 20 years old (51.84%, $p < 0.001$), with two or more previous abortions (41.7%, $p < 0.001$), and the presence of pre-pregnancy and gestational factors (64.6% and 61.5% respectively, $p < 0.001$). Multiparous women were more frequent among the Maghreb women (19.9%, $p < 0.001$), who also gave birth later (39 weeks, $p = 0.005$). The Maghreb mothers used prenatal care less often, while those from Eastern Europe did so at a later date ($p < 0.001$; Table 3).

The percentage of inadequate prenatal care was much higher among women born outside Spain, regardless of whether the APNCU-1M or APNCU-2M index was used. Yet with APNCU-2M the differences were smaller, and a significant increase in the percentage of inadequate use among Spanish women was observed (Table 4).

Table 5 shows the crude and adjusted odds ratios (OR) for each maternal country of birth for inadequate use, as measured by APNCU-1M. The crude analysis shows that all groups other than Spanish natives present values clearly above unity, while those from eastern European countries are particularly high (OR: 6.17, 95% CI: 5.20–7.32). Adjusting for intermediate factors, the corresponding odds ratio values drop slightly for the three groups of countries (other than Spain). Excluding the women with risk factors detected during pregnancy, the association patterns described remained practically unchanged. When inadequate use was measured using the APNCU-2M index as the dependent variable, the association patterns were similar, although their magnitude tended to decrease (data not shown).

Finally, Table 6 offers the OR values adjusted for the two large groups of foreign pregnant women (from Maghreb and Eastern Europe) in each of the strata signalled by the combination of age and parity categories. With regard to women from Maghreb, the strongest association with inadequacy (values above 6) was found for nulliparous women aged 20, whereas among women under 20 the association was weak and not statistically significant (OR: 1.7, 95% CI: 0.94–2.95). In women from eastern European countries, the highest values (above 7) were obtained among those with one or two children, while the weakest associations (between 2 and 3) occurred for women with more than two children. The different pattern of associations obtained among women from Maghreb and the East is particularly noteworthy in the older group with regard to parity.

4. Comment

In this study, foreign women presented a clearly greater inadequate use of prenatal care in comparison with Spanish women, regardless of the index used. These findings are consistent with the vast body of evidence available from both the USA and

Table 2
Distribution of characteristics of women by maternal country of birth. Birth cohort Hospital de Poniente 2005–2007.

	Spain		Maghreb ^a		Eastern Europe ^b		Other non-Spain born ^c		Total	χ^2	p
	n	%	n	%	n	%	n	%			
Age	3986	58	1146	16.67	1184	17.23	557	8.1	6873		
≤19	239	51.84	80	17.35	102	22.13	40	8.68	461	857.10	<0.001
20–34	3141	57.88	870	16.03	1005	18.52	411	7.57	5427		
≥35	606	61.52	196	19.9	77	7.82	106	10.76	985		
Parity											
0	1861	56.51	495	15.03	709	21.53	228	6.92	3293	321.72	<0.001
1–2	1993	62.77	507	15.97	434	13.67	241	7.59	3175		
≥3	132	32.59	144	35.56	41	10.12	88	21.73	6873		
Miscarriage											
0	3181	60.33	938	17.79	758	14.38	396	14.38	5273	193.91	<0.001
1	614	53.77	158	13.84	269	23.56	101	8.84	1142		
≥2	191	41.7	50	10.92	157	34.28	60	13.1	458		
Pregestational factor risk											
Yes	380	64.63	57	9.69	87	14.8	64	10.88	588	33.11	<0.001
No	3602	57.37	1087	17.31	1096	17.46	493	7.85	6278		
Gestational factor risk											
Yes	1207	61.58	307	15.66	276	14.08	170	8.67	1960	25.77	<0.001
No	2775	56.56	837	17.06	907	18.49	387	7.89	4906		

^a Morocco (n = 1136); Algeria (n = 8); Tunisia (n = 2).

^b Romania (n = 809); Russia (n = 258); Bulgaria (n = 54).

^c Argentina (n = 75); Guinea Bissau (n = 64); Senegal (n = 64); Ecuador (n = 55); Colombia (n = 42); Nigeria (n = 37); China (n = 12).

Table 3
Distribution of variables related to prenatal care by maternal country of birth. Birth cohort Hospital de Poniente 2005–2007.

	Spain			Maghreb			Eastern Europe			Other non-Spain born			Total		p
	n	Mean and range	SD	n	Mean and range	SD	n	Mean and range	SD	n	Mean and range	SD	N	Mean and range	
Gestational age at first visit	3719	11.67 [3–41]	4.17	1037	15.87 [3–42]	8.33	1111	16.03 [5–42]	7.83	507	14.38 [3–40]	6.69	6374	13.33 [3–42]	<0.001
Number of prenatal visits	3727	8.12 [0–14]	1.95	1042	6.95 [0–14]	2.83	1114	7.21 [0–13]	2.81	509	7.76 [0–14]	2.34	6392	7.74 [0–14]	<0.001
Gestational age at delivery	3986	38.88 [22–42]	1.72	1146	39.01 [22–43]	1.2	1183	38.98 [22–42]	1.67	557	38.73 [22–42]	1.87	6872	38.91 [22–42]	0.005

Europe that indicates a similar trend for women born outside their country of residence to under-use and delay use of prenatal care [6–9]. Noteworthy exceptions in Europe would appear to be Finland and Sweden, perhaps due to the existence of intense integration policies for immigrant communities [14,18].

Although worse perinatal outcomes have been reported for foreign women [9,19] this phenomenon cannot consistently be attributed to lower health care utilisation. A recent review concluded that a small number of prenatal visits (4–6) compared with standard care (up to 14 visits) is associated with increased perinatal mortality, but not with maternal mortality, prematurity, low birth weight or number of caesarean sections [12].

The strength of association we describe between inadequate use and foreign origin is greater than that obtained by Frisbie et al. [7], or confirmed by Sarnquist et al. in California [6]. In the study of Frisbie et al., the strength of association clearly decreased after adjusting for the perception of barriers to care, as well as for socio-demographic, economic, financial and gestational morbidity variables [7]; yet in our study the adjusted strength of association was practically the same as for the crude odds ratios. It is important to stress that in Spain there are no financial barriers to access health care services available for all pregnant women regardless of their administrative situation, and that working women are entitled to time off to attend antenatal care sessions without any pay reduction. Hence, it would be beneficial to further investigate the influence of other factors.

Women coming from Eastern Europe (most of them Romanian) presented the worst results in terms of inadequate use. In the United Kingdom, for instance, a lack of trust on the part of pregnant Romanian women regarding prenatal care services offered by national centres has been described as a risk factor for under-use [20]. In the same setting, it was found that Muslim women attend fewer prenatal consultations than British nationals, perhaps because they feel their cultural values are not respected when being examined by male professionals [20].

The effect of maternal country of birth on inadequate use varies according to the woman's age and parity. Thus, the high risk for women from eastern European countries is increased when these women have one or two children, while that associated with women from the Maghreb is particularly high in nulliparous women. It is not easy to explain such differences, although it might be that the women from Eastern Europe had already started their reproductive cycle prior to residing in Spain, and were unaware of how the health system operates with respect to prenatal care. On the other hand, among Maghreb women it is possible that cultural, religious and even educational aspects affect nulliparous women to a greater degree. The absence of information on such matters in hospital records is the main limitation of our study. Socio-demographic factors would need to be researched far more extensively, in addition to structural factors affecting the organisation of services, psycho-social factors, and the women's own perceptions of barriers to health care access.

We must take into account that inadequate prenatal care is a proxy for mid-level health, with important implications for maternal or perinatal mortality. The epidemiological framework and design of our study, however, do not allow us to draw conclusions regarding a causal relationship between maternal country of birth and inadequate prenatal care. That is, interpretation of these results calls for some caution.

With respect to the sample population studied, comprising 71% of the total births registered in the hospital's catchment area, we should address the matter of representativeness. A woman may choose to go to an alternative hospital for three main reasons: opting for private medical care (which, given the lower level of economic resources among immigrants, would mostly affect Spanish women); choosing another third-tier public hospital

Table 4

Distribution of deliveries by maternal country of birth and prenatal care by APNCU-1M and APNCU-2M. Birth cohort Hospital de Poniente 2005–2007.

	Inadequate		Intermediate		Adequate		Adequate Plus		Missing		Total n	χ^2	p
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)			
APNCU-1M												697.8	<0.001
Spain	287	(7)	457	(11)	2013	(5)	970	(24)	259	(6)	3986		
Maghreb	346	(30)	151	(13)	388	(34)	157	(13)	104	(9)	1146		
Eastern Europe	383	(32)	110	(9)	418	(35)	203	(17)	70	(5)	1184		
Other non-Spain born	124	(22)	46	(8)	225	(40)	114	(20)	48	(9)	557		
APNCU-2M												286.17	<0.001
Spain	620	(15)	–	–	2137	(54)	970	(24)	259	(6)	3986		
Maghreb	390	(34)	–	–	495	(43)	157	(13)	104	(9)	1146		
Eastern Europe	356	(30)	–	–	555	(47)	203	(17)	70	(6)	1184		
Other non-Spain born	106	(19)	–	–	289	(52)	114	(20)	48	(9)	557		

Table 5

Crude and adjusted odds ratios for Inadequate Prenatal Care by APNCU-1M and maternal country of birth.

	OR c	95% CI	OR aj ^a	95% CI	OR aj ^b	95% CI
Spain	1	Reference	1	Reference	1	Reference
Maghreb	5.6	4.69–6.64	5	4.17–5.95	4.4	3.20–5.99
Eastern Europe	6.2	5.20–7.32	6.1	5.09–7.26	6.8	5.40–8.10
Other non-Spain born	3.8	2.96–4.79	3.2	2.96–4.79	3	2.28–4.06

^a Adjusted according to age, parity, previous miscarriages, pre-gestational and gestational factors.^b In women with no gestational risk factors (n=4906).**Table 6**

Adjusted odds ratios for the association between Inadequate Prenatal Care and age × parity for maternal country of birth.

Age	Parity	Maghreb		Eastern Europe	
		OR ^a	95% CI	OR ^a	95% CI
<20 years old	0, 1–2, >2	1.7	0.94–2.95	3.8	2.32–6.32
20–34 years old	0	7	5.14–9.62	7	5.23–9.34
20–34 years old	1–2	5.4	3.99–7.30	7.6	5.63–10.23
20–34 years old	>2	3	1.46–6.17	2.6	1.08–6.38
>34 years old	0	6.3	1.99–19.75	5.6	1.53–20.34
>34 years old	1–2	3.2	1.60–6.26	7.7	3.65–15.92
>34 years old	>2	5	2.32–10.82	2.3	0.59–9.33

^a Reference Spanish <20 years old with any parity.

because of belonging to a high risk group (this occurred in just 4.9% of the pregnancies monitored between 2005 and 2007 at Poniente Hospital); or a change of residence.

The lack of prenatal care records at the regional or national level makes it difficult to use reference populations that are independent of the health centre's catchment area, which would prevent the introduction of selection bias.

With regard to the quality of hospital records, the percentage of missing data is low (less than 10%). As recommended, we used the maternal country of birth rather than maternal origin, ethnicity, nationality or immigrant status, to allow international comparisons of migration and perinatal health [21]; nonetheless, this simplification (necessitated by the lack of other information) no doubt conceals considerable underlying heterogeneity. Indeed, the differences established could not be explained by the variables analysed. Ascertaining that the frequency of inadequate use associated with different countries varies according to some of these variables justifies the need for a more in-depth study, based on primary information, to investigate social, economic and cultural variables.

The use of a standardised inadequate utilisation index, according to the number of visits recommended by the American Congress of Obstetricians and Gynaecologists, is also a matter of some debate [22]. Delvaux and Buekens, in a wide-ranging study on the European level, define inadequate use of prenatal care as being zero, one or two visits during pregnancy or a first visit after week 15 [23]. On the other hand, the PERISTAT project group

believes that the gestational age at the first visit could be less vulnerable to political differences between countries with respect to recommendations for the optimal number of prenatal care visits [24]. As different indexes will lead to different association patterns, the adoption of specific criteria adapted to the reality of each country or region should be standard practice, in our opinion. We believe that the APNCU indexes are currently the best option.

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