Title: Disparities in access to prenatal care services for African immigrant women in Spain.

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BACKGROUND

A feminization of immigration flows has developed in Spain throughout the last decade, and the increase in foreign mothers giving birth there has been studied in various fields [1-4]. It is estimated that more than half of female immigrants are of reproductive age, which means that many of their social and health needs concern reproduction and maternity [5-9].

In 2003, the World Health Organization (WHO) indicated that neonatal morbidity and mortality are reduced in direct proportion to the timing of the first pregnancy visit, which should take place before week 12. There should also be subsequent visits by way of providing adequate prenatal assistance in addition to proper attention during the delivery [10]. This is supported by Villar et al. [11] in a Cochrane revision published in

2001; the revision was based on an evaluation of 10 randomized controlled trials, which compared different prenatal care programs with respect to the number and frequency of visits. The results showed that lowering the number of visits in uncomplicated pregnancies was not associated with an increase in either maternal or neonatal morbidity. After developing their own multicenter study, Villar et al. compared the traditional prenatal care model with one focused on compliance with certain quality indicators (control ultrasound scans and corresponding screenings at each quarter) but fewer visits. However, there were no differences between the two models regarding neonatal results [12]. Other authors likewise found no significant statistical differences regarding maternal or neonatal morbidity with simply increasing the number of visits [13-15].

Delaying the start of prenatal care and the corresponding screenings is associated to a greater degree with maternal and neonatal morbidity and mortality. If a minimum of six prenatal visits is made, simply increasing the number of visits does not correspond to better results [11,12].

Based on international guidelines, the specific Pregnancy Care Protocol (PCP) [16] has been established in Spain. The PCP defines quality indicators of prenatal care according to the latest pregnancy guides [10,11,17].

Several studies have found that the less favorable socioeconomic status of immigrant women and the language barrier influence the utilization and adequacy of prenatal and postpartum care [18-20]. The purpose of the present study was to identify possible health inequalities by comparing the adequacy of antenatal care for uncomplicated pregnancies in African immigrant women (AIW) and native-born women in northern Spain.

METHODS

Design and samples

In this retrospective cohort study, the study population was all the pregnant AIW with uncomplicated pregnancies having delivery dates between January 1, 2007 and December 31, 2010 who attended one of the 41 primary health-care centers in Cantabria, a region in northern Spain. In the Spanish Health Service, the prenatal care of an uncomplicated pregnancy (a pregnancy without established maternal or obstetric risk factors that could increase the risk for maternal or fetal morbidity) is carried out by a primary health-care midwife and general practitioner.

We undertook a search using the computerized clinical databases of the Cantabrian primary health-care centers. The country of origin was subsequently collated with the Civitas system of population information. We found 264 births of 237 pregnant AIW during the study period. Among these births, the first and second pregnancies were identified. Of the 264 births, 27 were second pregnancies. In our data analysis, we included information only about the first pregnancy.

In the case of six pregnant women, follow-up was referred to a gynecologist because of the change in their status from uncomplicated to complicated pregnancy. Since these women were not fully under the care of the primary health-care center, the final study population was reduced to 231 pregnant AIW with uncomplicated pregnancies.

The native-born population sample was obtained by simple random sampling using a 1:3 ratio, stratified by the primary health-care centers of the 231 AIW. Thus, we defined a population of 693 pregnant native-born women. Of the 693 native-born women, 66 were finally excluded because their condition changed to complicated

pregnancy, and they were referred to a gynecologist. Therefore, the final population for the comparative analysis was 627 native-born women with uncomplicated pregnancies.

Measures

The information for each pregnant woman was obtained from the computerized clinical databases of each primary health-care center and hospital birth records.

The adequacy of prenatal care was estimated based on the Kessner Index (KI) [21]. The KI combines three variables: the start of prenatal assistance; the total number of consultations; and the length of the pregnancy. The KI makes an adjustment to the number of consultations considered adequate in the case of pregnancies that finish before the predicted birth date. In the case of a terminated pregnancy, prenatal care was considered adequate if the first consultation was established before week 14 and at least nine visits were made. Prenatal care was considered inadequate if it began after week 28 or fewer than four visits were made. With other cases, the care was considered intermediate.

In addition, we created our Own Index (OI) with reference to seven quality indicators found in current national and international guidelines [16,10,17]: (1) prenatal care before week 12; (2) folic acid supplementation before week 8; (3) ultrasound scan between weeks 11 and 14 according to amenorrhea; (4) ultrasound scan for the screening of fetal malformations between weeks 18 and 20; (5) hepatitis B and HIV screening in the first trimester; (6) gestational diabetes screening between weeks 24 and 28; and (7) at least six prenatal visits being carried out. Prenatal care was considered adequate based on compliance with all the OI indicators. It was considered intermediate if it did not meet one to three indicators and inadequate if four or more indicators were not met.

The current Spanish PCP sets the minimum periodicity of visits as one a month (weeks 6, 10, 14, 20, 24, 28, 32, and 36) until week 36 and fortnightly between weeks 36 and 40. Therefore, by week 28, any pregnant woman having received adequate prenatal care should have made six prenatal visits and undergone the appropriate checks in compliance with all the quality indicators.

In the case of three AIW, there was insufficient information to determine the OI, so these data were labeled as missing. In the case of one of these AIW, it was unclear whether or not gestational diabetes screening had been undertaken; with the other two, it was uncertain whether or not a first or second ultrasound scan had been performed.

The criteria identifying the need for referring pregnant women to a social worker are based on certain characteristics that increase social risk and put them in a position of vulnerability or chronic stress. They include precarious living conditions, such as insufficient income (partner unemployed or being without income support), living in a small or unhealthy habitat, and having an inadequate diet, and potential mistreatment situations or domestic violence.

Analysis

The adequacy of the prenatal care in the AIW as measured according to the KI and OI indexes was categorized as adequate, intermediate, or inadequate. The Odds Ratios (ORs) with their 95% confidence intervals (95%CI) were estimated by unconditional logistic regression adjusted for referral to a social worker (yes/no), age of the woman (as a continuous variable), number of previous pregnancies, and existence of previous adverse reproductive outcomes (yes/no). In addition, tests for OR trends were calculated for the ordinal KI and OI index categories using logistic models that included categorical terms as continuous variables. For these trend tests, we used the

likelihood ratio test. The alpha error was set at 0.05, and all *p* values were bilateral. All statistical analyses were conducted using IBM SPSS Statistics version 19.0.

Approval of the research protocol was obtained from the Clinical Research Ethics Committee of Cantabria before the acquisition of data on October 8, 2010.

RESULTS

The majority of AIW with uncomplicated pregnancies came from countries in North Africa (n=160; 69.3%), particularly Morocco (n=144; 62.3%); other North African countries accounted for 16 AIW (7%). This was followed by sub-Saharan countries (n=71; 30.7%): Nigeria (n=18; 7.8%), Senegal (n=18; 7.8%), Cameroon (n=17; 7.4%), and other (n=18; 7.7%). Table 1 shows the characteristics of the mothers and their newborns according to the country of origin.

Sub-Saharan and North Africans were on average 3 and 3.6 years younger, respectively, than the Spanish native-born women ($p<0.001$). None of the AIW related alcohol consumption ($p<0.001$), and only one sub-Saharan woman was a smoker ($p<0.01$). Because of the existence of social risk factors, 43.9% of North Africans and 55.1% of sub-Saharans were referred to social workers.

Only 21.3 and 25.8% of North Africans were considered to have had adequate prenatal care depending on the index used (KI and OI, respectively). Among the sub-Saharan Africans, these percentages were slightly increased: 22.5 and 30.4% for KI and OI, respectively. In contrast, 75.9% of native-born mothers received adequate prenatal care according to the KI index and 78.3% with OI ($p<0.001$).

Regarding neonatal outcome, the AIW had greater need for a neonatal intensive care unit ($p<0.001$). Preterm births (<37 weeks), low birth weight (<2500

grams), and macrosomic newborns (≥4000 grams) were also higher among the AIW, though in most cases the results were not statistically significant. The Apgar score at 1 minute was on average statistically lower in the Northern Africans than in the native-born women.

Table 2 shows a compliance comparison of the main prenatal care quality indicators in the current Spanish PCP according to country of origin. Among the main prenatal care quality indicators, the most used in the AIW was the screening test for hepatitis B and HIV (96.9 and 93.0%, respectively, of North and sub-Saharan AIW underwent it). Compliance with the other indicators was lower, especially in the case of folic acid supplementation before week 8 (66.2% of North Africans and 63.4% of sub-Saharan AIW did not receive periconceptional supplementation) and starting prenatal care in the first 12 weeks of pregnancy (only 60.6 and 63.4%, respectively, of North and sub-Saharan AIW complied with it). Among native-born women, it should be noted that over 20% also did not start folic acid supplementation before week 8.

Table 3 shows the association between being an immigrant and the risk of intermediate and inadequate prenatal care according to the KI and OI after adjusting for maternal age, number of previous pregnancies, previous adverse reproductive outcomes, and referral to a social worker. Being an immigrant (both North and sub-Saharan African) was statistically significantly associated with worse prenatal care: the adjusted ORs of North Africans being intermediate with respect to the KI and OI were 5.12 and 5.02, respectively. The adjusted ORs for being inadequate were higher: 30.32 and 35.47, respectively, and they showed a very statistically significant dose-response trend (p trend <0.001). The dose-response trend became even more pronounced in the sub-Saharan AIW: the adjusted ORs being intermediate with respect to the KI and OI were 8.32 and 6.57, respectively; the adjusted ORs for being inadequate were 64.43 and 67.93.

DISCUSSION

The KI is a classic prenatal care indicator [21]. Like other published indexes, such as the Adequacy of Parental Care Utilization (APNCU), this index considers only the number of visits during the pregnancy, not their content. In Spain, Delgado-Rodriguez et al. [22] compared the KI with the APNCU index to examine the degree of association between the indexes with respect to the risk of preterm birth. The KI was found to be a greater predictor for preterm birth than the APNCU. Therefore, we chose the former in the present study.

The latest recommendations from international organizations, such as WHO and the National Institute for Health and Care Excellence, place greater importance on other prenatal care quality indicators than the number of visits, though at least six visits is considered optimal [10,17]. Based on these recommendations and to supplement the KI, we created our own index for the present study. Our index assessed not only the number of visits during the pregnancy but also compliance with other prenatal-assistance quality indicators: the first visit before week 12, folic acid supplementation before week 8, and the corresponding blood tests and screenings [11,12].

We found that being an immigrant was the main independent risk factor for worse prenatal care according to both the KI and OI and there was worse compliance with all the quality indicators. Our results are in keeping with those of other recently published studies in Spain [23,24], elsewhere in Europe [25-29], and elsewhere in the world [18-20, 30-34].

Regarding quality indicators for prenatal attention, the lowest compliance for both native-born and immigrant women was for folic acid supplementation before week 8 (periconceptional). Other studies support our findings among all women [35], and

specifically among AIW [36-38]. Optimal folic acid supplementation should start before conception, and there is no evidence of a positive effect beyond the periconceptional period (at least 1 month before conception and at least 8 weeks after conception). Following strong evidence regarding the effect of periconceptional folic acid supplementation in preventing neural tube defects and the risk of certain congenital heart defects [39-42], different health programs have encouraged pregnant women to take folic acid supplements in the periconceptional period [43,16]. From the registries, it was not possible for us to determine the specific proportion of folic acid supplementation before conception. According to published studies, the proportion appears to be low, ranging from 0.9 to 50% among all women [35,44-46]. Regarding preconceptional folic acid intake among immigrants, one study published in Norway reported the dramatically low folic acid preconceptional supplementation of 2% among non-Western immigrant women and 22% among nonimmigrants [46].

Rowe and García [47] in a review of articles published between 1987 and 2002 in the United Kingdom found that immigrant women took longer to begin pregnancy care and made fewer visits than women born in Britain. With our sample, which was similar to that in the British study, we also determined that the start of prenatal care in the first 3 months of pregnancy occurred only in 61.5% of the AIW. In addition, 33.2% of the AIW made fewer than six prenatal visits compared with 1.7% of native-born women.

In our sample of AIW, the most-used quality indicator was the screening test for hepatitis B and HIV. This could be because the women took advantage of their first contact with the health system to undergo these blood tests. Thus, only one visit was needed. Conversely, other diagnostic tests (such as obstetrics or screening for gestational diabetes) take place at set times during the pregnancy and require extra visits on certain dates, which could handicap compliance with the indicator. Gestational

diabetes screening was carried out only in 80.8% of the AIW compared with 99.4% of native-born mothers. As evidenced in a recent meta-analysis, immigrant women from Africa are more likely to develop gestational diabetes mellitus than their native-born peers [9]. Gestational diabetes mellitus is also a known risk factor in delivering macrosomic newborns [48,49]. In our sample, we found that 10.8% of the AIW had macrosomic newborns (≥4000 grams) compared with 5.9% of native-born women (p=0.048). This could be explained by the eating habits and lifestyles (very rich carbohydrate meals and lack of after-meal exercise) that are characteristic of this population; also, 20% of our sample of AIW did not undergo gestational diabetes screening. Our finding supports the need for actions to reinforce gestational diabetes screening in pregnant immigrants.

In retrospective studies based on secondary information (records), a main limitation could be the low quality of that information—either owing to insufficient completion of medical records or a lack of agreement among different records. In our study, the agreement for the country of origin was 100% among all the consulted registers. As noted in the Methods section, we were unable to calculate the OI in only three AIW of the total 231 (1%). We had sufficient information to compute the KI for all the AIW and native-born women.

Another limitation of our prenatal care assessment approach is that carrying out fewer than six consultations is not considered adequate (intermediate) according to our OI criteria. Thus, with our OI, a pregnant woman who properly followed her prenatal care but gave birth before week 28 would be wrongly considered intermediate. In our sample, one AIW gave birth in week 28 and a native-born woman in week 27; the rest had deliveries after week 31. That AIW had missed four prenatal appointments before giving birth in week 28; thus, her prenatal care was considered inadequate based on the KI and intermediate based on our OI. With the native-born woman, the register

showed that on three occasions she did not appear for her programmed controls. Therefore, the prenatal care for this mother who gave birth at week 27 was considered intermediate according to both the KI and our OI. There would therefore appear to be minimal misclassification in our results.

CONCLUSIONS

Prenatal care in the AIW was worse than in the native-born women, and it was also associated with poorer neonatal outcomes.

There was different compliance with the quality prenatal care indicators between the AIW and native-born women. This highlights the need for different health education action for immigrant and native-born women in addition to improving access to health services.

A high proportion of the AIW (over 50% among sub-Saharans) were referred to social workers because of social risk factors. This lends support to the joint role between social workers and midwives toward maximizing adherence to prenatal care in AIW. On a wider level, improving intercultural training in midwives and social workers and using intercultural intermediaries to take AIW to health centers on their first visits, would appear to be appropriate.

Disclosure of interests

None to declare.

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Table 1. Characteristics of the mothers and their newborn, according to country of origin. Cantabria (Spain): African immigrants and native-born Spanish women 2007-2010.

	Spanish (N=627)		North African (N=160)		Moroccan (N= 144)		Sub-Saharan (N=71)	
	n	(%)	n	(%)	n	(%)	n	(%)
Maternal age: Mean [SD][a]	31.3 [4.1]		27.7 [6.0]***		27.6 [6.0]***		28.3 [5.2]***	
≤ 16	0	(0)	1	(0.6)	1	(0.7)	0	(0)
17-34	490	(78.1)	135	(84.4)	124	(86.1)	62	(87.3)
≥ 35	137	(21.9)	24	(15.0)	19	(13.2)	9	(12.7)
Smokers	100	(16.5)[b]	0	(0)***	0	(0)***	1	(1.4)**
Missing values	21	(3.3)	0	(0)	0	(0)	0	(0)
Alcohol	6	(1.0)[b]	0	(0)	0	(0)	0	(0)
Missing values	21	(3.3)	0	(0)	0	(0)	0	(0)
Speak Spanish[c]								
Missing values	--	--	12	(7.5)	12	(8.3)	4	(5.6)
Sufficient	--	--	21	(14.2)[b]	20	(15.2)[b]	14	(20.9)[b]
Insufficient	--	--	127	(85.8)[b]	112	(84.8)[b]	53	(79.1)[b]
Read Spanish[d]								
Missing values	--	--	13	(8.1)	13	(9.0)	4	(5.6)
Sufficient	--	--	9	(6.1)[b]	9	(6.9)[b]	2	(2.9)[b]
Insufficient	--	--	138	(93.9)[b]	122	(93.1)[b]	65	(97.1)[b]
Write Spanish[e]								
Missing values	--	--	13	(8.1)	13	(9.0)	4	(5.6)
Sufficient	--	--	9	(6.1)[b]	9	(6.9)[b]	2	(2.9)[b]
Insufficient	--	--	138	(93.9)[b]	122	(93.1)[b]	65	(97.1)[b]
Referral to Social Worker[f]								
Missing values	0	(0)	3	(1.9)	3	(2.1)	2	(2.8)
No referral	596	(95.1)	88	(56.1)[b]	81	(57.4)[b]	31	(44.9)[b]
Referral	31	(4.9)	69	(43.9)***[b]	60	(42.6)***[b]	38	(55.1)***[b]
Kessner Index(KI)[g]								
Missing values	0	(0)	0	(0)	0	(0)	0	(0)
Adequate	476	(75.9)	34	(21.3)***	33	(22.9)***	16	(22.5)***
Intermediate	144	(23.0)	80	(50.0)***	73	(50.7)***	36	(50.7)***
Inadequate	7	(1.1)	46	(28.7)***	38	(26.4)***	19	(26.8)***
Own Index (OI)[h]								
Missing values	0	(0)	1	(0.6)	1	(0.7)	2	(2.8)
Adequate	491	(78.3)	41	(25.8)***[b]	40	(27.9)***[b]	21	(30.4)***[b]
Intermediate	129	(20.6)	68	(42.8)***[b]	61	(42.7)***[b]	31	(44.9)***[b]
Inadequate	7	(1.1)	50	(31.4)***[b]	42	(29.4)***[b]	17	(24.7)***[b]

Neonatal outcomes:								
Apgar score 1 min.: Mean [SD][a]	8.73 [0.90]		8.53 [1.18]*		8.62 [0.94]		8.70 [0.95]	
Apgar score 5 min.: Mean [SD][a]	9.09 [0.50]		9.14 [0.60]		9.17 [0.54]		9.10 [0.59]	
Preterm Birth	21	(3.3)	11	(6.9)*	9	(6.3)	3	(4.2)
Full term neonate	606	(96.7)	149	(93.1)	135	(93.7)	68	(95.8)
Low Birthweight	21	(3.3)	8	(5.0)	7	(4.9)	3	(4.2)
Normal Birthweight	569	(90.8)	135	(84.4)	122	(84.7)	60	(84.5)
Macrosomic neonate	37	(5.9)	17	(10.6)*	15	(10.4)*	8	(11.3)
Need for neonatal intensive care unit	14	(2.2)	15	(9.4)***	12	(8.3)***	4	(5.6)

[a] Standard Deviation.
[b] % Valid when missing.
[c] Insufficient Oral Spanish language skill.
[d] Insufficient Reading Spanish skills.
[e] Insufficient Writing Spanish skills.
[f] Referral to social worker because of Social Risk factor detection.
[g] Adequate: first visit before week 14 and at least 9 visits before term birth. Inadequate: control begins after week 28 or less than 4 visits in a term birth. Intermediate: rest of combinations.
[h] Adequate: all 7 indicators of the Spanish Health Service pregnancy care protocol met. Inadequate: non-compliance of at least 4 or more indicators. Intermediate: non-compliance of 1-3 indicators.
*p ≥ 0.01 - < 0.05 ** p ≥ 0.001 - < 0.01 *** p < 0.001

Table 2. Compliance of the quality indicators proposed in the current Spanish Health Service pregnancy care protocol. Cantabria (Spain): African immigrants and native-born Spanish women 2007-2010.

	Spanish (N=627)*		North African (N= 160)*		Moroccan (N= 144)*		Sub-Saharan (N= 71)*	
	n	(%)	n	%	n	(%)	n	%
Folic acid supplementation before week 8	499	(79.6)	54	(33.8)	53	(36.8)	26	(36.6)
Prenatal care before week 12	597	(95.2)	97	(60.6)	90	(62.5)	45	(63.4)
1st Ultrasound scan (11-14 weeks)	613	(97.8)	101	(63.9)[a]	94	(66.2)[a]	50	(70.4)
2nd Ultrasound scan (18-20 weeks)	621	(99.0)	120	(76.4)[a]	112	(79.4)[a]	56	(78.9)
Carrying out of Hepatitis B and HIV screening	626	(99.8)	155	(96.9)	140	(97.2)	66	(93.0)
Gestational Diabetes screening (24-28 weeks)	623	(99.4)	129	(80.6)	117	(81.3)	56	(81.2)[a]
At least 6 prenatal visits carried out[b]	596	(98.3)	149	(67.1)	135	(68.1)	68	(66.2)

[a] Valid percentage, without counting missing values.
[b] Number and percentage for prenatal visits for pregnant women at term (excluding pregnancies ending before 37 weeks).
* Comparisons between the native-born and Africans women percentages were statistically significant, p <0.001.

Table 3. Association between the country of origin (native-born vs. immigrant) and lack of prenatal care. Cantabria (Spain): African immigrants and native-born Spanish women 2007-2010.

	Spanish	North African			Moroccan			Sub-Saharan		
	(n=627)	(n=160)	ORa[a]	(95%CI)	(n=144)	ORa[a]	(95%CI)	(n=71)	ORa[a]	(95%CI)
KESSNER INDEX[b]	627	160			144			71		
Adequate	476	34	1	--	33	1	--	16	1	--
Intermediate*	144	80	5.12	(2.52 - 10.37)	73	4.46	(2.13 - 9.31)	36	8.32	(2.85 - 24.32)
Inadequate*	7	46	30.32	(7.28 - 126.18)	38	23.87	(5.46 - 104.42)	19	64.43	(8.92 - 465.48)
p trend			< 0.001			< 0.001			< 0.001	
OWN INDEX[c]	627	159			143			69		
Adequate	491	41	1	--	40	1	--	21	1	--
Intermediate*	129	68	5.02	(2.53 - 9.96)	61	3.86	(1.89 - 7.87)	31	6.57	(2.45 - 17.65)
Inadequate*	7	50	35.47	(6.92 - 181.79)	42	25.30	(4.76 - 134.43)	17	67.93	(5.42 - 851.13)
p trend			< 0.001			< 0.001			< 0.001	

[a] ORa denotes "adjusted" OR for country of origin, maternal age at delivery, previous pregnancies, obstetric history and referral to a social worker.
[b] Adequate: first consultation before week 14 and at least 9 consultations during gestation. Inadequate: start of care after week 28, or less than 4 consultations during gestation. Intermediate: the other combinations.
[c] Adequate: all 7 indicators of the Spanish Health Service pregnancy care protocol met. Inadequate: 4 or more indicators not met. Intermediate: Between 1 and 3 indicators not met. Not-adequate denotes the categories inadequate and intermediate combined.
* OR calculated by multinomial logistic regression, adequate category considered as reference.