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Sources of influence on pregnant women's preferred mode of delivery in Buenos Aires, Argentina

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Abstract

Background—Understanding influences on women's preferred delivery mode is vital for planning interventions to reduce cesarean section rates and for ensuring that women receive correct information. Our objectives were to: determine if sources of information influencing a pregnant woman's preferred delivery mode and knowledge of cesarean section indications differ by socio-demographic characteristics; to conduct a factor analysis of items related to information sources influencing this preference; and to determine if knowledge differs by information sources influencing this preference or their underlying latent constructs.

Methods—Data from a prospective cohort study conducted in Buenos Aires was analyzed. Healthy nulliparous women aged 18-35, at >32 weeks of gestation and with live, singleton

pregnancies participated. The primary research questions were evaluated using Chi-square tests, factor analysis, logistic regression, and generalized estimating equations.

Results—A total of 382 women participated in the study. Women of lower socio-economic status were more influenced by people, magazines and TV/movies in their mode of delivery preferences, and had poorer knowledge of cesarean section indications. Sources of influence for preferred delivery mode and factors derived in factor analysis were not associated with knowledge level when considered individually or together, or when adjusted for socio-demographic characteristics, or when accounting for clustering by hospital sector (public or private).

Conclusions—Higher socio-economic status is associated with being less influenced by people and with better knowledge of indications for cesarean sections. Knowledge of cesarean indications was not associated with the source of information about mode of delivery preferences.

Keywords

cesarean section; knowledge; information sources; self-efficacy; preference

Introduction

Cesarean rates are increasing worldwide,¹ including rates of cesarean section for maternal request.² In Argentina, the cesarean section rate is approximately 35.2%,³ exceeding the 10% cut point above which the World Health Organization found no association with reduced maternal and neonatal mortality.⁴ To combat these trends, a better understanding of how preferences for a particular delivery mode are formed and how a decision is ultimately made is necessary. A pregnant woman's preference and decision for delivery mode can be examined through Bandura's Social Cognitive Theory and self-efficacy framework,^{5,6} which posits that increasing knowledge promotes self-efficacy. Further, according to these theories, socio-demographics play a strong role in determining preferences and decisions related to childbirth, as they can affect self-efficacy and normative beliefs.⁷

Knowledge related to childbirth is gained from a variety of sources, including family and friends, health care providers, childbirth classes, and media sources.⁸⁻¹³ However, these sources vary in information quality and potential biases^{12,14} and effect on preferred and actual mode of delivery (ex: promoting cesarean section or vaginal delivery).^{8,11,15} Notably, the importance of information quality is highlighted by the link between higher knowledge (or perceived knowledge) regarding childbirth/delivery modes and more positive views of vaginal delivery and reduced preference for cesarean section.^{6,12,16,17} In Argentina, a prior qualitative study found important differences in sources of information used by women depending on in which health care sector (public or private) she received prenatal care;¹⁸ further, the demographics of the women vary greatly between sectors. The public sector, financed by the Ministry of Health, serves patients (generally of low socio-economic status and lower education level) at no cost, whereas the private sector provides medical care to individuals with high socio-economic status and higher education levels through varying insurance types. The social security sector (here included in the public sector) is financed by trust funds which employers and employees pay into to receive health care at different institutions.¹⁹

In summary, knowledge related to and preference for a mode of delivery stems, in part, from the complex interplay between the quality of information provided by various sources and socio-demographic characteristics.¹⁹ Therefore, the purpose of this study is to:

1. describe the associations between the people and information sources that influence a pregnant woman's preferred delivery mode and socio-demographic characteristics;
2. describe the associations between correct knowledge of indications for cesarean section and socio-demographic characteristics;
3. conduct an exploratory factor analysis to determine interrelationships between the different people and information sources that influence a pregnant woman's preferred delivery mode; and
4. evaluate the association between knowledge and the different people and information sources that influence a pregnant woman's preferred delivery mode utilizing results from the factor analysis.

Methods

We analyzed data from the study “Women's preferences and mode of delivery in public and private hospitals: a prospective cohort study” conducted in Buenos Aires, Argentina.¹⁹ Nulliparous women aged 18-35 years, with a singleton pregnancy >32 weeks gestation with a live fetus, receiving prenatal care and planning to deliver at participating hospitals were eligible to participate. Women with an indication for cesarean section, pre-existing major disease or pregnancies complications, or whose pregnancies resulted from assisted reproductive technology were excluded. Two public and 3 private hospitals participated.

Following a qualitative phase and pilot study, a quantitative survey was conducted from October 2010-September 2011. Women were surveyed by trained interviewers regarding their preferred delivery mode, demographic characteristics, sources of influence on their preferred delivery mode, and knowledge of indications for cesarean section; additionally, they completed a discrete choice experiment. The interviewers additionally collected follow-up data from hospital delivery records, including actual delivery mode, gestational age at delivery, indication for cesarean section, initiation of labor, and neonatal data. For women delivering in a non-participating hospital, self-reported data was recorded (N=66). Despite less than 10% preferring cesarean section when surveyed, 34.7% of public and 40.0% of private patients ultimately delivered by cesarean section.¹⁹

For the current analysis, socio-demographic characteristics of interest were categorized as follows: age (19, 20-29, 30), education (some/complete elementary school, some/complete high school, some/complete tertiary/university), marital status (married/stable partner, no partner), and work status (employed, unemployed). Hospital sector (public, private) was also included as a clustering factor.

People potentially influencing women's preferred delivery mode included the women's doctor/midwife, spouse/partner, mother, and friends. Additional sources influencing

women's preferred delivery mode analyzed included the internet, television/videos, magazines, books, and prenatal courses. For each item, participants were asked “[t]o what degree are you influenced by the following people/information sources to prefer vaginal delivery/cesarean section?” Participants ranked each item according to the following 4-point scale: influences a lot, influences very much, influences a little, or influences none. Participants responding “not applicable” for a particular item were combined with the group “influences none.” In bivariate analyses and logistic regression models, potential sources of influence were dichotomized as: strongly influencing (influences a lot or very much) or not influencing (influences a little or not at all; not applicable) preferred delivery mode.

Additionally, women were asked “in which of these situations do you think it is necessary to perform a cesarean section?” Evidence-based absolute indications for cesarean section (or indications for which a cesarean section would be the default/necessary) included: “the baby is sideways or transverse,” a woman has had 2 or more previous cesarean sections,²⁰ and the woman has active vaginal herpes at birth;²¹ conversely, situations not considered absolute indications for cesarean section were (or indications for which a cesarean section is not automatically the default mode of delivery/necessary based on that indication alone): the woman had 1 previous cesarean section,²² “the baby hasn't been born and it is past the due date,”²³ and “the baby has the cord around its neck.”²⁴ The women's responses were then evaluated against the evidence-based correct responses and each woman received an overall knowledge score between 0 and 6 (1 point for each correct response). Finally, women were categorized as having excellent (5-6 points), moderate (3-4 points), or poor knowledge (0-2). In logistic regression models, women with excellent knowledge were compared to women with moderate and poor knowledge (single reference group).

Statistical Analysis

Socio-demographic characteristics of participants were reported. Next, the association between sources influencing women's preferred delivery mode (strongly influencing versus not influencing) and socio-demographic characteristics was examined, with the proportion of women indicating a source strongly influencing preference presented by socio-demographic characteristics. Next, the association between knowledge level and socio-demographic characteristics was examined. The χ^2 test was used to test these bivariate associations.

Exploratory factor analysis was conducted to examine the relationships between the sources influencing women's preferred mode of delivery to identify sources which grouped into distinct latent constructs. The interitem correlation matrix was constructed, and items too highly correlated (> 0.80) were removed to prevent redundancy.²⁵ Items representing each source of influence were fitted using principal axis factoring utilizing the correlation matrix and rotated using oblique varimax rotation to allow for correlation between factors. Factor extraction was based on Eigenvalues (>1 extracted)²⁶ and items with primary factor loadings of 0.4 onto a single factor were retained. Identified factors were characterized by a conceptually clear underlying theme.²⁷

Finally, the associations between knowledge (excellent versus moderate/poor) and sources of influence (utilizing factors identified in factor analysis in addition to items not loading onto

any factor) was examined. First, each bivariate relationship was evaluated using logistic regression by calculating crude odds ratios (ORs) and 95% confidence intervals (CIs). Next, adjusted ORs (aORs) and 95% CIs were calculated using several modeling strategies. Utilizing multiple logistic regression, in Model 1, all factors and sources of influence not incorporated into a factor were included and in Model 2, socio-demographic characteristics were added. For Model 3, a generalized estimating equation (GEE) using the exchangeable matrix (chosen for lowest QIC) was used to account for clustering by sector (public or private) with all variables from Model 2 included.

Analyses were carried out using SAS 9.3 (SAS Institute, Cary, NC) statistical software. All statistical tests are two-tailed, with p-value ≤ 0.05 considered significant.

Ethical Approvals

The original study protocol and informed consent documents were approved by the Ethics Committees of participating hospitals, the Ethics Committee of the Ministry of Health of the Province of Buenos Aires, Argentina, and the Tulane Institutional Review Board (IRB). An independent ethics committee in Buenos Aires and the Tulane IRB also approved the current study.

Results

Socio-demographic characteristics of participants

382 pregnant women participated (Table 1), 183 (47.9%) from the private and 199 (52.1%) from the public sector. 16.8% of women were ≤ 19 , 51.8% were 20-29, and 31.4% were ≥ 30 years old; slightly less than half of the women were employed (47.9%). Education levels for most women were either some/complete high school (47.7%) or some/complete university/tertiary (45.1%). About 8.0% of women in the public sector and 6.0% of women in the private sector preferred cesarean section.

Association between sources influencing preferred delivery mode and socio-demographic characteristics

Regarding persons influencing a woman's preferred delivery mode, women were most influenced by their doctor/midwife (53.8% a lot/very much) and least influenced by their friends (19.7%; Table 1). In general, when comparing influence by socio-demographic characteristics, private sector and employed women were less likely to be strongly influenced by people; additionally, with increasing age and education, the women were less likely to be strongly influenced, although results were not significant for all people's influence. Wide variation in the extent of influence of the mother ($p < 0.001$) and friends ($p < 0.01$) was seen for all socio-demographic characteristics ($p < 0.001$). Socio-demographic characteristics did not impact whether a woman was influenced by her spouse, while only education and work status impacted whether a woman was strongly influenced by her doctor/midwife.

When comparing media sources of influence, prenatal courses were the most influential (42.2% women strongly influenced). The other media sources investigated were overall less

influential than people (Table 2). The influence of television/movies followed the same pattern found for people influencing preferred delivery mode, with younger, less educated, unemployed, and women in the public sector more strongly influenced ($p < 0.01$). Comparable results were also found for magazines, although the result was only significant for employment status and sector ($p < 0.05$). The influence of the internet, book, and prenatal classes was not statistically significantly associated with socio-demographic characteristics.

Association between knowledge and socio-demographic characteristics

About 13.9% of women had excellent, 63.9% moderate, and 36.9% poor knowledge of indications for cesarean section (Table 3). Older, more educated, employed, and private sector women had better knowledge ($p < 0.01$).

Factor analysis of items related to sources of influence

Interitem correlations ranged from 17-49%. Exploratory factor analysis of items related to sources of influence resulted in a two factor solution (Table 4). Three items (influence of friends, prenatal classes, and television/movies) did not meet prespecified criteria (loaded on multiple factors) and were thus not retained. The two identified factors were named “people other than friends” (including doctor/midwife, spouse, and mother) and “written media” (internet, books, magazines). The two factors were somewhat correlated (27%) and explained 61.9% of the total variance.

Association between sources influencing a woman's preferred delivery mode and knowledge

In the logistic regression analysis, no significant associations were found between knowledge level and sources of influence when sources were considered individually or together (Model 1) or when also taking into account socio-demographic characteristics (Model 2). No associations were found when accounting for clustering by sector (Table 5).

Discussion

In Buenos Aires, women's preference for a mode of delivery was most strongly influenced by their doctor/midwife, followed by their spouse and mother, with prenatal courses being the only non-person source exerting a strong influence. Socio-demographic factors played a strong role in determining the extent of influence, with younger women and women of lower socio-economic status (less education, receiving care in the public sector) reporting being more strongly influenced by both people and certain media sources (magazines and TV/movies). Overall, women had moderate knowledge of indications for cesarean section; generally, younger women and women of lower socio-economic status (less education, receiving care in the public sector) had poorer knowledge, though there was variation by indication. The sources of information which influenced a woman's preference did not greatly impact knowledge.

Our results expand upon the prior qualitative study conducted in Argentina, which found that women identified family and friends (but not partners) as important information sources contributing to their decision for a delivery mode, though some differences between sectors

were noted, as private sector women identified a wider variety of sources (books, internet, and videos) while public sector women gave more importance to television.¹⁸ In our quantitative analysis, doctor/midwife, partner/spouse, and mother were the most influential people, while pre-natal classes were the most influential media source.

Comparing our results to research in other countries, variation in the influence of sources of information is evident. A qualitative study conducted in Brazil found that the most influential information sources were family and physicians, with friends, magazines, television, internet, and prenatal courses having less influence.¹⁰ In the US, pregnancy/birth information sources most often identified by first time mothers as most important were (in descending order): books, friends or relatives, doctor/midwife, internet, and childbirth education classes.⁸ Further, for choice of delivery mode, friends', relatives', and coworkers' birth stories, childbirth classes, and books were influential for most women, while internet, health care providers, and medical journals were important only to a minority of women.⁹ As a whole, these results suggest that the importance and level of influence of information sources varies across populations; however, comparisons are complicated by differences in questions used to elicit information.

The influence of health care professionals is particularly pertinent due to their unique role in the decision-making process for determining mode of delivery,²⁸ with important differences between sectors, both in our Argentine sample and samples from other countries. For example, in the public sector, we found that delivery mode preference was more likely to be influenced by the physician, in line with results from the qualitative study in which women in the public sector viewed mode of delivery not as a choice but as a medical decision.¹⁸ Similarly, in Brazil, though women in the public sector expressed strong preferences, physicians were viewed as the ultimate decision-maker for delivery mode.¹⁰ The deference to physicians may reflect an imbalanced patient-provider power dynamic due to cultural and socio-economic differences.¹² Regarding the private sector in Argentina, women in our study were less influenced by their physician, while in the qualitative study women considered the choice a mutual decision with their provider. In contrast, in Brazil, studies suggest that private sector women are strongly influenced by their physicians.¹² Differences between studies may be due in part to the varying populations and health care systems studied and reflect the complexity of the delivery mode decision.

Overall, we found that most women had moderate knowledge (determined by ability to correctly identify cesarean section indication), and, as expected, differing levels of knowledge by socio-demographic characteristics. Previous studies have shown that women have varying knowledge related to different aspects of delivery mode.^{6,16} However, comparing across studies is difficult as different knowledge measures were used in each study, making it impossible to know whether variations are due to differences in the questions or in the populations.

Finally, we found that no source of influence significantly impacted knowledge. This lack of association could reflect the imperfect measures used to describe these complex constructs or the greater importance of other factors (including socio-demographic characteristics). Nonetheless, as posited by the Social Cognitive Theory, research has shown that delivery

mode preference is amenable to intervention aimed at increasing knowledge and by extension self-efficacy.^{13,29} Interventions successfully targeting preferred delivery mode evaluated through randomized controlled trials include a behavioral-cognitive skills intervention which significantly reduced request for cesarean section (10% versus 48%; $p=0.002$),³⁰ an intervention based on the beliefs, attitudes, subjective norms and enabling factors (BASNEF) model,¹³ and an intervention targeting couples, which improved knowledge and lowered cesarean rates.²⁹ However, exceptions exist, as some women choose sources specifically to support their preferences, and may or may not refine their preference based on new information.⁹

Our study had some limitations. Because few women preferred cesarean section, preferred delivery mode could not be used as an independent variable. Our knowledge measure had important limitations. In our sample of healthy women, knowledge of absolute/not absolute indications for cesarean section is potentially not the most relevant measure of knowledge of delivery modes. Additionally, though we utilized evidence-based best practices, classifying indications as absolute/not absolute is challenging, particularly for not absolute indications for which appropriate mode of delivery will vary based on other factors (example: co-morbidities) and standard medical practice in a particular setting. Given the limitations of using existing data to address unique study questions, this proxy for medical knowledge nonetheless provides important insight previously lacking in this population which can be built upon in future studies. Due to sample size limitations, we collapsed categories of level of influence on preference of information sources, potentially losing information (in particular, the combination of those not using/having sources and those not influenced by those sources). All participants were nulliparous and were recruited in Buenos Aires City or Province, limiting generalizability. As self-efficacy was not measured, we were unable to evaluate the effect of knowledge on decision self-efficacy. Finally, despite utilizing appropriate statistical methods, the difficulty in adequately capturing the complex interrelationships between sources of information influencing preferred delivery mode, knowledge, and socio-demographic characteristics limits our ability to draw firm conclusions.

In conclusion, persons and information sources influencing nulliparous women's preferred delivery mode and knowledge level of cesarean section indications differs by socio-demographic characteristics, though sources influencing this preference had little impact on knowledge. As cesarean section rates continue to rise, efforts are being made to reduce unnecessary cesarean sections. Understanding influences on preferred delivery mode is vital for planning interventions and ensuring women are provided with correct information to make this decision.

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Table 1
People who strongly influenced (a lot/very much) low risk nulliparous pregnant women's preferred mode of delivery, by sociodemographic factors, Buenos Aires, Argentina, 2010-11 (N=382)

	Doctor/Midwife n (%)	Spouse n (%)	Mother n (%)	Friends n (%)	Total n (%)
Age					
19	39 (61.9)	37 (57.8)	49 (76.6)	22 (34.4)	64 (16.8)
20-29	117 (54.2)	105 (48.6)	90 (41.5)	38 (17.6)	222 (58.1)
30	43 (47.3)	36 (40.0) ^c	23 (25.0) ^c	13 (14.4) ^b	96 (25.1)
Education					
Some/complete elementary	25 (73.5)	20 (58.8)	26 (74.3)	12 (35.3)	35 (9.2)
Some/complete high School	90 (52.3)	85 (49.1)	87 (50.3)	40 (23.1)	174 (45.7)
Some/complete university/tertiary	83 (50.9) ^a	72 (44.4)	48 (29.3) ^c	21 (13.0) ^b	172 (45.1)
Work					
Employed	81 (46.8)	73 (42.4)	55 (31.6)	18 (10.4)	181 (47.9)
Unemployed	115 (59.6) ^a	102 (52.6)	106 (54.4) ^c	54 (28.0) ^c	197 (52.1)
Sector					
Public	114 (57.9)	100 (50.5)	114 (57.3)	51 (25.9)	199 (52.1)
Private	85 (49.1)	78 (45.3)	48 (27.6) ^c	22 (12.7) ^b	183 (47.9)
TOTAL	199 (53.8)	178 (48.1)	162 (43.4)	73 (19.7)	

^a p<0.05

^b p<0.01

^c p<0.001

The table footnotes only refer to statistically significant difference; the absence of footnote denotes a non-statistically significant difference. Total column is simple column percents. For other columns, percent was calculated using the number of participants strongly influenced by a source (n) divided by the number of participants within that socio-demographic group (n from total column for that row [unless missing data]).

Table 2
Information sources that strongly influenced (a lot/very much) low risk nulliparous pregnant women's preferred mode of delivery, by sociodemographic factors, Buenos Aires, Argentina, 2010-11 (N=382)

	Internet n (%)	Magazines n (%)	Books n (%)	TV/Movies n (%)	Prenatal class n (%)	Total n (%)
Age						
19	12 (18.8)	17 (26.6)	12 (20.0)	22 (34.4)	28 (43.8)	64 (17.8)
20-29	41 (18.8)	46 (21.2)	55 (27.5)	56 (25.9)	91 (41.7)	222 (58.1)
30	16 (17.4)	15 (16.5)	24 (27.6)	11 (12.0) ^b	39 (42.4)	96 (25.1)
Education						
Some/complete elementary	8 (22.9)	10 (28.6)	8 (23.5)	20 (58.8)	13 (37.1)	35 (9.2)
Some/complete high School	28 (16.1)	41 (23.6)	38 (22.9)	46 (26.6)	68 (39.1)	174 (45.7)
Some/complete university/tertiary	33 (20.1)	26 (16.1)	44 (30.1)	23 (14.0) ^c	76 (46.3)	172 (45.1)
Work						
Employed	29 (16.6)	28 (16.1)	41 (25.9)	27 (15.4)	75 (42.9)	181 (47.9)
Unemployed	40 (20.5)	48 (24.7) ^a	50 (27.0)	61 (31.6) ^c	80 (41.0)	197 (52.1)
Sector						
Public	38 (19.1)	51 (25.8)	51 (26.4)	65 (33.0)	75 (37.7)	199 (52.1)
Private	31 (17.7)	27 (15.5) ^a	40 (26.0)	24 (13.7) ^c	83 (47.4)	183 (47.9)
TOTAL	69 (18.4)	78 (21.0)	91 (26.2)	89 (23.9)	158 (42.2)	

^a p<0.05

^b p<0.01

^c p<0.001

The table footnotes only refer to statistically significant difference; the absence of footnote denotes a non-statistically significant difference. Total column is simple column percents. For other columns, percent was calculated using the number of participants strongly influenced by a source (n) divided by the number of participants within that socio-demographic group (n from total column for that row [unless missing data]).

Table 3
Correct knowledge of indications for cesarean sections among low risk nulliparous pregnant women, by socio-demographic characteristics, Buenos Aires, Argentina, 2010-11 (N=382)

	Overall Knowledge n (%)		
	Excellent	Moderate	Poor
<i>Age^a</i>			
19	6 (9.4)	36 (56.3)	22 (34.4)
20-29	26 (11.7)	147 (66.2)	49 (22.1)
30	21 (21.9)	61 (63.5)	14 (14.6)
<i>Education^a</i>			
Some/complete elementary	5 (14.3)	22 (62.9)	8 (22.9)
Some/complete high school	15 (8.6)	109 (62.6)	50 (28.7)
Some/complete university/tertiary	33 (19.2)	112 (65.1)	27 (15.7)
<i>Work^a</i>			
Employed	33 (18.2)	115 (63.5)	33 (18.2)
Unemployed	17 (8.6)	128 (65.0)	52 (26.4)
<i>Sector^b</i>			
Public	15 (7.5)	116 (63.4)	56 (28.1)
Private	38 (20.8)	128 (64.3)	71 (38.8)
TOTAL	53 (13.9)	244 (63.9)	141 (36.9)

^a p<0.01

^b p<0.001

The table footnotes only refer to statistically significant difference; the absence of footnote denotes a non-statistically significant difference. Percents calculated are row percents.

Table 4
Factor structure matrix rotated on the oblique varimax criterion (N=341)

Variable	Factor 1: People	Factor 2: Written/online media	Communality coefficient (h ²)
Doctor/midwife	0.77	0.30	0.60
Spouse	0.82	0.23	0.67
Mother	0.78	0.24	0.61
Internet	0.22	0.72	0.51
Magazines	0.40	0.77	0.63
Books	0.17	0.82	0.68
% of variance	42.7	19.2	61.9

Note: Coefficients > |.40| are italicized and retained for that factor. Percentage variance is postrotation. The eigenvalue of the third (unretained) factor was 0.70.

Table 5
Sources of influence associated with knowledge level among low risk nulliparous pregnant women, Buenos Aires, Argentina, 2010-11

Variable	Crude OR	Adjusted OR (Model 1)	Adjusted OR (Model 2)	Adjusted OR (Model 3)
Factor 1	1.01 (0.74, 1.37)	1.04 (0.73, 1.49)	0.96 (0.64, 1.44)	0.97 (0.90, 1.04)
Factor 2	0.96 (0.71, 1.29)	0.93 (0.65, 1.32)	0.91 (0.62, 1.34)	0.93 (0.67, 1.29)
Friends	0.73 (0.33, 1.62)	0.76 (0.31, 1.83)	0.80 (0.30, 2.14)	0.90 (0.50, 1.61)
TV/movies	0.61 (0.29, 1.31)	0.67 (0.29, 1.55)	0.67 (0.25, 1.78)	0.65 (0.39, 1.10)
Prenatal courses	1.38 (0.77, 2.47)	1.46 (0.72, 3.00)	1.14 (0.53, 2.43)	1.11 (0.93, 1.31)

Model 1: All listed sources/factors included

Model 2: variables included in Model 1+ sociodemographic characteristics (age, education, employment status)

Model 3: variables included in Model 3, accounting for clustering by hospital sector