



ORIGINAL RESEARCH

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## PREVALENCE OF LATE INITIATION OF PRENATAL CARE. ASSOCIATION WITH THE SOCIOECONOMIC LEVEL OF THE PREGNANT WOMAN. CROSS-SECTIONAL STUDY. BUCARAMANGA, COLOMBIA, 2014-2015

Prevalencia de inicio tardío de la atención prenatal. Asociación con el nivel socioeconómico de la gestante. Estudio de corte transversal. Bucaramanga, Colombia, 2014-2015

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### ABSTRACT

**Objective:** To describe the prevalence of late initiation of prenatal care and assess its association with the socioeconomic level of the pregnant woman.

**Materials and methods:** Cross-sectional study. Pregnant women from the urban area of Bucaramanga were included using sampling based on proportional affixation quotas according to the socioeconomic classification of the neighbourhood where they lived. Late initiation was considered to occur when prenatal care was started at 12 weeks or more of gestation. The association between late initiation and socioeconomic bracket was assessed,

controlling by sociodemographic and clinical variables of the pregnant woman, and a multivariate log-binomial regression model was developed to estimate prevalence ratios and their 95% confidence intervals (95% CI).

**Results:** Overall, 391 pregnant women between 18 and 43 years of age (median 23) were included. Median for schooling was 11 years, with a range between 0 and 25 years. Late initiation was found in 29.7% (95% CI: 25.2-34.5) of the women. Association was found with low income brackets (prevalence ratio [PR] = 1.57; 95% CI: 1.08-2.56), no affiliation to social security at the start of pregnancy (PR = 2.73; 95% CI: 2.04-3.67), and low schooling (PR = 1.46; 95% CI: 1.02-2.16), and age between 18 and 24 years (PR = 1.53; 95% CI: 1.12-1.70). Remembering the date of the last menstruation (PR = 0.48; 95% CI: 0.32-0.71) and being in a stable relationship (PR = 0.82; 95% CI: 0.64-0.98) were protective factors.

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**Conclusions:** Late initiation of prenatal care is found to occur in approximately one out of every three pregnant women. Late initiation is associated with living in a low socioeconomic bracket. Early identification of pregnant women in this population affected by health inequity must be improved.

**Key words:** prenatal care, pregnant women, gestational age, healthcare, socioeconomic factors, social security, Colombia.

## RESUMEN

**Objetivo:** describir la prevalencia del inicio tardío de la atención prenatal y evaluar su asociación con el estrato socioeconómico donde habita la gestante.

**Materiales y métodos:** estudio de corte transversal. Se incluyeron gestantes procedentes del área urbana de Bucaramanga, seleccionadas por muestreo por cuotas con afijación proporcional por estrato socioeconómico, según la clasificación socioeconómica del barrio donde habitan. Se consideró inicio tardío haber comenzado atención prenatal (APN) a las 12 semanas o más de gestación. Se evaluó asociación del inicio tardío con el estrato socioeconómico, controlando por variables sociodemográficas y clínicas de la gestante, y se elaboró un modelo de regresión log-binomial multivariada para estimar las razones de prevalencia con sus intervalos de confianza del 95 % (IC 95 %).

**Resultados:** se incluyeron 391 gestantes, con edades entre 18 y 43 años, mediana 23 años; respecto a la escolaridad la mediana fue de 11 años con un rango entre 0 y 25 años. El inicio tardío se dio en el 29,7 % (IC 95 %: 25,2-34,5) de las gestantes. Estuvo asociado con estrato bajo; razón de prevalencias ([RP] = 1,57; IC 95 %: 1,08-2,56), falta de afiliación a la seguridad social al inicio del embarazo (RP = 2,73; IC 95 %: 2,04-3,67), la baja escolaridad (RP = 1,46; IC 95 %: 1,02-2,16) y la edad entre 18 y 24 años. Fueron factores protectores el recordar la fecha de la última regla (RP = 0,48; IC 95 %: 0,32-0,71) y tener pareja estable (RP = 0,82; IC 95 %: 0,64-0,98).

**Conclusiones:** cerca de una de cada tres gestantes inicia tarde su APN. El inicio tardío está asociado con vivir en estrato socioeconómico bajo. Se requiere mejorar la captación temprana de las gestantes en esta población que presenta condiciones de inequidad en salud.

**Palabras clave:** atención prenatal, mujeres embarazadas, edad gestacional, atención en salud, factores socioeconómicos, seguridad social, Colombia.

## INTRODUCTION

Prenatal care is a program of scheduled visits for pregnant women in order to prevent and detect complications of pregnancy, childbirth and puerperium, and provide early treatment (1). For this reason, it is part of universal policies and programs and is driven by guidelines, protocols and evaluation measurements. In order to accomplish the goals of early detection of risks and diseases that may affect mother and child, including infections, nutrition disorders, dental problems and biopsychosocial issues, pregnant women must join the program as soon as possible. The earlier the care is provided, the greater the opportunity to prevent, identify and address problems that might affect the health of the mother and that of her child. Some guidelines recommend joining the program before ten weeks of gestation (1), while others recommend initiation before 14 weeks (2). Early initiation of prenatal care is considered a predictor of adherence to the program (3). In Colombia, late initiation of prenatal care was reported in 60% of maternal deaths occurring during the period between 2004-2009 (4); consequently, evidence shows that late initiation of prenatal care entails a higher probability of negative outcomes for the mother and the baby (5).

Several international studies have identified mother-related factors associated with late initiation of prenatal care, including not being in a stable relationship, (6) low education level, unwanted pregnancy, lack of health insurance or a regular care institution, being younger than 20 or older than

35, multiparity, unemployment, living in socially depressed areas or having a low level of income (6-14). In this regard, some authors recommend identifying, for each particular context, the specific issues affecting pregnant women in order to guide intervention strategies (15). Health authorities, decision-makers and healthcare service providers must be informed about factors associated with late initiation of antenatal care, so that strategies can be devised for attracting pregnant women to the program early on.

There is a paucity of studies in Colombia regarding access to prenatal control and associated factors (16-25). In terms of the association between timely initiation and socioeconomic conditions, local information available has limitations in terms of the type of population included, consisting mainly of pregnant women from low socioeconomic brackets (17, 18), and the type of proxy variable used for assessing socioeconomic conditions, for example, the inability to pay for transportation to attend prenatal visits (19), the low income of the mother (16), and the economic condition of the household (20). On the other hand, this association has not been shown consistently (16-18), and this is compounded by the fact that the cutoff point to consider late initiation is widely variable (17, 18, 21). Consequently, knowledge about the relationship between late initiation of prenatal care and economic factors is still limited.

Therefore, the primary objective of this study was to examine the prevalence of late initiation of prenatal care, and the secondary objective was to evaluate the association between late initiation and socioeconomic bracket.

## MATERIALS AND METHODS

*Design and population.* Analytical cross-sectional study that included pregnant women over 18 years of age, living in the urban area of Bucaramanga, coming from all income brackets, who were seen in public and private healthcare institutions between June 2014 and December 2015 and who gave their consent to participate in the study. Sensory or

communication impairment that prevented the participants from answering survey questions was considered the exclusion criterion.

*Sample size and sampling.* The study hypothesis was that pregnant women who live in areas classified as low socioeconomic brackets are at a higher risk of late initiation of prenatal care. In order to detect this association, a sample size was calculated in accordance with the recommendations by G. Liu (26), using the *Statcal* routine of the *Epi-info7* software (27), with a figure of potential eligible cases of 13,521 (live births during 2014), a 95% reliability and a power of 80% to detect a 50% proportion of late initiation of prenatal care, and 1.1 due to design effect. With these conditions, the calculated sample size was 411 pregnant woman, allowing to find a difference in the proportion of late initiation of 30% between exposed (lower brackets) and non-exposed (high brackets) women to late initiation of prenatal care. Quota sampling was used, with proportional representation by socioeconomic brackets, from 1 to 6, in accordance with the classification provided by the Planning Bureau of Bucaramanga. In order to estimate the proportion of pregnant women to include by bracket, the proportion of deliveries in each of the brackets in 2013 was considered, based on the statistics of the Affiliation Registry System (RUAF). These statistics showed that 21.8% of the births came from bracket 1; 20.2% came from bracket 2; 25.6% from bracket 3; 18.6% from bracket 4; 8.5% from bracket 5; and 5.3% from bracket 6. Based on these proportions, the sample for collection was distributed as follows: bracket 1, 90 pregnant women; bracket 2, 83; bracket 3, 105; bracket 4, 76; bracket 5, 35; bracket 6, 22 women.

*Procedure.* Contact with the pregnant women was made in public and private healthcare institutions where they attended for laboratory tests, ultrasound scans or consultations with the health professionals in charge of prenatal care. The women were asked to sign an informed consent in order to participate. The data collection tool was administered to the women who agreed to participate. The tool con-

sisted of a structured questionnaire prepared by the researchers, with closed, standardised questions designed to assess sociodemographic, gynaecological and obstetric, insurance, and prenatal care considerations. Before starting the research, a pilot test of the tool as well as of the data collection process was conducted with 30 pregnant women of all income brackets, and the necessary adjustments were made. A physician and a nurse experienced in population studies were entrusted with the data collection process. They received training and followed a standardised process to approach the pregnant women, give the informed consent and conduct interviews. They were supported in their role by one of the researchers in charge of ensuring process and data quality. Enrolment of the women in the research was ended when the sample size for each bracket was reached.

*Data management.* Completed surveys were labeled with an identification code in order to ensure the confidentiality of the information. The collected data were stored in an Epidata® database and analysed using the Stata14® software package.

*Measured variables.* The measured variables were: a) the pregnant woman: age, education, marital status, having a paid job, gynaecological and obstetrical history, health services, and place of residence; b) healthcare services: type of affiliation to the General Social Security System (SGSSS) at the time of pregnancy, attendance to family planning programs, and preconception consultation; c) place of residence: housing bracket; d) the baby's father: whether he was living with the pregnant woman on the date of prenatal care initiation.

The dependent variable was late initiation of prenatal care, defined as initiation after 12 weeks of gestation. The independent variable of interest was the socioeconomic bracket reported by the woman according to the socioeconomic classification of her neighbourhood provided by the Municipal Planning Bureau (28). Socioeconomic brackets are governed by the social stratification created in Colombia by Law 142 of 1994. According to the National

Statistics Department (DANE), socioeconomic stratification is a classification of residential property that divides the population into six brackets of similar social and economic characteristics based on the physical characteristics of the dwelling and its surroundings. The purpose of such a classification is to focus public policy, mainly with the aim of charging differential rates for utilities and permit the allocation of subsidies (29). Stratification in itself is considered a way to approach the hierarchical socioeconomic distinction between poverty and wealth which divides the population into six brackets from 1 to 6, where 1 is low-low, 2 is low, 3 is lower middle, 4 is middle, 5 is upper middle, and 6 is high. Brackets 1, 2 and 3 are beneficiaries of government subsidies; brackets 5 and 6 contribute; and bracket 4 is neither beneficiary nor contributor (30).

*Analysis.* A description of the variables according to their measurement scale was initially done. Variables measured on a continuous ratio scale were described in terms of central trend and scatter, mean, standard deviation (SD) or median and interquartile range (IQR), depending on whether or not they showed a normal distribution on the Shapiro-Wilks test. Variables measured on ordinal and nominal scales were described using absolute and relative frequency tables and 95% confidence interval (CI). The proportion of late initiation of prenatal care was calculated by bracket and in two categories: low (1, 2 and 3) and high (4, 5 and 6). Late initiation of prenatal care was shown to behave similarly in brackets 1, 2 and 3, but showed a different behaviour in brackets 4, 5 and 6. Therefore, they were grouped in two brackets designated as low (1, 2 and 3) and high (4, 5 and 6).

A bivariate analysis was performed between late initiation and socioeconomic bracket, and the raw prevalence ratio (PR) was calculated with its 95% confidence interval (95% CI) and controlled for other potentially confounding variables. Those that modified raw PR by more than 10% and where the probability of type 1 error ( $p$ ) was lower than

0.2 were introduced in a log-binomial regression model in order to estimate the adjusted prevalence ratio and their respective 95% CI (31, 32). All the calculations were done using the Stata14 software package, and differences were considered significant if confidence intervals did not include unit (1) or *p* values were under 0.05.

*Ethical considerations.* Both the research protocol as well as the informed consent were endorsed by the Ethics Committees of the participating centres. All the pregnant women were given an informed consent before enrolment in the study.

## RESULTS

Of 425 pregnant women asked to participate, 391 were included in the research, for a non-response proportion of 8% (34 women). Their reasons for not participating were time limitations for the interview or lack of interest in the study.

The median age of the participants was 25 years (range 18 to 43); the median level of schooling was 11 years (range 0 to 25 years); and the median gestational age at the time of the interview was 27 weeks (range 4 to 41 weeks).

In a total of 116 of the 391 participants (29.7%) (95% CI: 25.2%-34.5%) initiation of prenatal care was late. The following were the prevalences of late initiation by socioeconomic bracket: bracket 1: 32/84 (38.1%), bracket 2: 30/75 (40%), bracket 3: 35/96 (36.5%), bracket 4: 16/71 (22.5%), bracket 5: 3/47 (6.4%), and bracket 6: 1/18 (5.6%). This shows that there was an inverse gradient between the prevalence of late initiation and the socioeconomic bracket. Thus, among pregnant women in the low brackets (1 to 3), there were 96 cases of late initiation among 256 women, for a prevalence = 37.5% (95% CI: 31.5-43.7), while there were 20 cases of late initiation among 135 women in the high brackets (4 to 6), for a prevalence = 14.8% (95% CI: 9.3-21.9), and a raw prevalence ratio (PR) of 2.53 (95% CI: 1.64-3.91). Other risk factors associated with late initiation in the bivariate analysis were age, less than 12 years of schooling, and

non-affiliation to the SGSSS. In contrast, being in a stable relationship and remembering the date of the last menstruation were protective factors against late initiation of antenatal care (Table 1).

The use of the multivariate log-binomial regression model for the analysis showed that late initiation of prenatal care was associated with low socioeconomic bracket, lack of affiliation to social security, low schooling, and age between 18 and 24 years as risk factors. In contrast, remembering the date of the last menstruation and being in a stable relationship at the time of prenatal care behaved as protective factors (Table 2).

## DISCUSSION

This study found a prevalence of late initiation of prenatal care of 29.7%. It also found an association between late initiation and living in a low socioeconomic bracket, lack of affiliation to social security at the time of pregnancy, low schooling, age between 18 and 24 years, remembering the date of the last menstruation, and being in a stable relationship during prenatal care, the latter as protective factors.

When comparing the prevalence of late initiation of prenatal care found in this study with the one reported by other authors in other countries, this prevalence was higher than the one found by Corbett in New Zealand (17%, with initiation at 18 weeks of gestation or later) (6), by Beeckman (10.8%, after 12 weeks) (9), and Fobelest (6.1%, after 14 weeks of pregnancy) in Belgium (8), by Heredia in Mexico (16.8% after 14 weeks of gestation) (13), and by Sinyange in Zambia (19%, after 14 weeks) (7). However, it is lower than the one reported in Myanmar by Aung (56.6%, 16 weeks of pregnancy) (14), in the United Kingdom by Creswell (37.5%, after 12 weeks of gestation) (11), and in Ethiopia by Zegeye (73.8%, after 12 weeks of gestation) (10).

Compared to the findings of other studies conducted in Colombia, Miranda (16), Briceño (22) and Castillo (24) reported the prevalence of late initiation using a cut-off point of 14 weeks.

**Table 1.**  
**Factors associated with late initiation of prenatal care. Bucaramanga, 2014-2015. Bivariate analysis.**

Characteristics of the pregnant woman	Late initiations (n = 116)	Early initiation (n = 275)	PR (95% CI)
	n (%)	n (%)	
Age			
18-24 years	70(60.3)	104 (37.2)	1.90 (1.39-2.60)*
25-43 years	46(39.7)	171 (62.2)	
Schooling			
Less than 12 years	88 (75.9)	144 (52.4)	2.15 (1.49-3.13)*
12 years and more	28(24.1)	131 (47.6)	
Has a paid job			
Yes	34 (29.3)	140 (50.9)	0.52 (0.37-0.73)*
No	82(70.7)	135 (40.1)	
Is in a stable relationship			
Yes	89 (76.7)	236 (85.8)	0.67 (0.48-0.94)*
No	27(23.3)	39 (14.2)	
Socioeconomic bracket			
Low (1, 2 and 3)	96 (82.8)	160 (58.2)	2.53 (1.64-3.91)*
High (4, 5 and 6)	20 (17.2)	115 (41.8)	
Frist pregnancy:			
Yes	48(41.4)	136 (49.5)	0.79 (0.58-1.07)
No	68(58.6)	139 (50.5)	
Remembers date of last menstruation			
Yes	99 (85.3)	258 (93.8)	0.55 (0.38-0.81)*
No	17(14.7)	17 (6.2)	
Lack of affiliation to the SGSSS			
Yes	34 (29.3)	13 (4.7)	3.03 (2.34-18.0)*
No	82(70.7)	262 (95.3)	
Affiliation to the contributive regime	50 (43.1)	169 (61.5)	0.48 (0.30-0.76)*
To another regime or no affiliation	66(56.9)	106 (38.5)	
Attended family planning during the year before the pregnancy			
Yes	39 (33.6)	147 (53.5)	0.59 (0.44-0.81)*
No	77(76.4)	128 (46.5)	
Attended a preconception consultation			
Yes	7 (6.0)	31 (11.3)	0.60 (0.30-1.19)
No	109(94.0)	244 (88.7)	

n: number of pregnant women.

PR: prevalence ratio.

95% CI: 95% confidence interval.

\* Statistically significant association.

SGSSS: General Social Security System in Health.

**Table 2.**  
**Factors associated with late initiation of prenatal care. Bucaramanga, 2014-2015.**  
**Multivariate model.**

Characteristics of the pregnant woman	aPR	95% CI:
Living in low (1-3) vs. high bracket (4-6)	1.57	1.08-2.56
Lack of affiliation to social security	2.73	2.04-3.67
Low schooling (< 12 years vs. 12 or more )	1.46	1.06-2.16
Age (between 18-24 years vs. 25-43)	1.53	1.12-1.70
Remembering the date of last menstruation	0.48	0.32-0.71
Living with the baby's father	0.72	0.54-0.93

aPR: adjusted prevalence ratio.

95% CI: 95% confidence interval.

Adjustment goodness of the model: Pearson Ji2 99.03 and Prob > chi2 = 0.4802.

The proportion of late initiation found in our study is higher than the one found by Miranda in Sincelejo (15.1%) (16), and by Briceño at a national level (25.3%) in users of the contributive insurance health regime (22). In contrast, it is lower than the one reported at a national level in users of the subsidised insurance health regime (52%) (22), and by Castillo et al., in 13 municipalities of the Department of Bolivar (36.7%)(24). Comparison of our results with the prevalence of late initiation found in prior studies conducted in the city, our results are lower than those reported by Ortiz *et al.* (50%, initiation after 12 weeks of gestation) (18) in teen-age pregnant girls in the public sector, and by Ruiz, (67.2%) in pregnant women in different income brackets and different types of insurance (21), and higher than the 19% found by Moya for late initiation (17).

In terms of factors associated with late initiation of antenatal control, our findings regarding socioeconomic level are consistent with those of researchers outside Colombia, such as Corbett (6), Heredia (13), Beckam (9), and Fobes (8), who also reported this association: the lower the socioeconomic conditions, the higher the probability of initiating perinatal care late in gestation. In Colombia, none of the prior studies that looked into the factors associated with late initiation of prenatal

care included pregnant women in all socioeconomic brackets and only included low income population (16, 22, 24), which could be considered as a surrogate of the low socioeconomic bracket.

It is also worth highlighting that the strongest association was found with the lack of health insurance. In this regard, our findings are consistent with the reports of different authors who have looked into prenatal care, such as Rodríguez (19), Briceño (22), Castillo (24) and Vecino (25) who found that affiliation to health insurance is associated with antenatal access and attendance. These results reinforce the knowledge available in the field of health systems in the sense that having insurance is an enabler of access and use of the services (33, 34).

On the other hand, being in a stable relationship reduces the probability of late initiation of prenatal care. Contrary to our findings, an association between a stable relationship and late initiation has been reported by other authors (6, 7).

Remembering the date of the last menstruation as a protective factor against late initiation might reflect the absence of irregularities that might prompt the woman to seek early medical assistance in order to rule out pregnancy

The strengths of this study include the use of a multivariate analysis model that allowed to reject the hypothesis of no association between

low socioeconomic bracket and late initiation of prenatal care, adjusting for other factors. Moreover, standardisation of the tools and data collection processes reinforced the quality, validity and reproducibility of the data.

Some weaknesses of the study need to be considered when interpreting or generalising the results. To start with, weaknesses inherent to non-probabilistic sampling, which does not allow generalisation. On the other hand, living in areas classified in the low socioeconomic brackets does not necessarily reflect individual socioeconomic levels of all the residents clustered under the same socioeconomic bracket in Colombia (35).

The results of this study highlight a challenge for the local health system because, within the framework of the Comprehensive Healthcare Policy (PAIS), the new Comprehensive Perinatal Maternal Care Route (RIA) includes the initiation of prenatal care before 10 weeks of gestation as one of the performance milestones.

## CONCLUSIONS

This study showed late initiation of prenatal care in approximately one out of every three pregnant women. It also demonstrated the hypothesis that late initiation is associated with the low socioeconomic bracket. This finding suggests inequities in timely initiation of prenatal care among the poorer populations. The implications of these results point to the need to improve induced demand strategies in order to increase early attendance to prenatal care visits among women coming from the lower socioeconomic levels of the population.

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