

## ANTENATAL CARE DIFFERENCES IN BRAZILIAN URBAN AND RURAL AREAS: A CROSS-SECTIONAL POPULATION-BASED STUDY

DIFERENÇAS NA ATENÇÃO PRÉ-NATAL NAS ÁREAS URBANAS E RURAIS DO BRASIL:  
ESTUDO TRANSVERSAL DE BASE POPULACIONAL

DIFERENCIAS EN LA ATENCIÓN PRENATAL BRINDADA EN ÁREAS URBANAS Y RURALES DE BRASIL:  
ESTUDIO TRANSVERSAL BASADO EN LA POBLACIÓN

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### ABSTRACT

This study aimed at comparing antenatal care provided in Brazilian urban and rural contexts. A cross-sectional population-based survey was conducted grounded in the 2006 Children and Women's Health and Demography National Survey (in Portuguese, PNDS) data with a sample of 588 women. Stata version 9.0 was used for data analysis, using chi-square test and significance level at 5% ( $p < 0.05$ ). Chi-square test was applied to verify prevalence differences between pregnant woman living in Brazilian rural and urban areas regarding socioeconomic and demographic situation and the antenatal care protocols of the Antenatal and Birth Humanization Program (in Portuguese, PHPN). Results revealed significant differences depending on the level of education ( $p=0.0071$ ), gross household income ( $p=0.0001$ ), private health insurance coverage ( $p=0.0023$ ), syphilis testing ( $p=0.0293$ ), hepatitis testing ( $p=0.0424$ ), being offered toxoplasmosis ( $p=0.0452$ ) and HIV ( $p=0.0132$ ) tests. Best results were obtained among pregnant women living in urban areas. The rates of prevention of nutritional deficiencies, tetanus vaccination and number of antenatal visits were unsatisfactory in both areas. This study pointed out that the quality of antenatal care provided is deficient and that the antenatal care delivered in rural areas is even less adequate.

**Keywords:** Women's Health; Prenatal Care; Health Inequalities; Quantitative Analysis.

### RESUMO

Com este artigo, objetivou-se comparar a assistência pré-natal realizada nos contextos urbano e rural brasileiros. Mediante delineamento transversal, de base populacional, foram utilizados dados de uma subamostra – 588 mulheres – retirada do universo amostral da Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher (PNDS) de 2006. Foram analisadas as variáveis demográficas, socioeconômicas e de saúde referentes a procedimentos de assistência pré-natal preconizados pelo Programa de Humanização do Pré-natal e Nascimento (PHPN). Para o tratamento e a análise dos dados, utilizou-se o software Stata, versão 9.0, com o emprego do teste qui-quadrado e nível de significância de 5% ( $p < 0,05$ ). Os resultados revelaram diferenças significativas entre os contextos urbano e rural brasileiros no que se refere à escolaridade ( $p=0,0071$ ) e à renda domiciliar bruta ( $p=0,0001$ ) das gestantes; à posse de plano ou convênio de saúde ( $p=0,0023$ ); à realização de teste para sífilis ( $p=0,0293$ ); e à hepatite B ( $p=0,0424$ ); à oferta para teste de HIV/aids ( $p=0,0132$ ) e toxoplasmose ( $p=0,0452$ ). Os melhores resultados foram sinalizados para as gestantes domiciliadas em zona urbana. Identificou-se acesso insatisfatório, em ambos os locais de residência, a procedimentos para a prevenção de deficiências nutricionais, vacinação antitetânica e número de consultas de pré-natal preconizado. Apontou no estudo, portanto, que a qualidade da assistência pré-natal ofertada em ambas as situações de domicílio apresentou-se comprometida em alguns aspectos e a assistência pré-natal dispensada na área rural mostrou-se ainda menos adequada.

**Palavras-chave:** Saúde da Mulher; Cuidado Pré-Natal; Desigualdades em Saúde; Análise Quantitativa.

### RESUMEN

El presente artículo tiene como objetivo hacer una comparación entre la atención prenatal en áreas urbanas y rurales de Brasil. Se trata de un estudio transversal para el cual se utilizaron datos de una sub-muestra – 588 mujeres – tomada del universo – muestra definida por la Investigación Nacional de Demografía y Salud de la Niñez y la Mujer – PNDS 2006. Se analizaron variables demográficas, socioeconómicas y sanitarias referentes a los procedimientos de atención prenatal señalados por el Programa de Humanización del Prenatal y Nacimiento – PHPN. Para tratamiento y análisis de los datos se utilizó el software Stata versión 9.0, empleando la prueba chi-cuadrado con un nivel de significancia de 5% ( $p < 0,05$ ). Los resultados revelaron diferencias significativas entre los contextos urbano y rural brasileños en lo que se refiere a: escolaridad ( $p=0,0071$ ) e ingreso domiciliario bruto ( $p=0,0001$ ) de las embarazadas; afiliadas a un plan o convenio de salud ( $p=0,0023$ ); realización de la prueba para sífilis ( $p=0,0293$ ) e hepatitis B ( $p=0,0424$ ); oferta para pruebas de VIH/ SIDA ( $p=0,0132$ ) y toxoplasmosis ( $p=0,0452$ ). Aunque los mejores resultados fueron obtenidos por las embarazadas de las zonas urbanas, se identificó, en ambos casos, acceso insatisfactorio a procedimientos para la prevención de deficiencias nutricionales, vacunación antitetánica y número de consultas prenatales.

*El estudio señaló, por tanto, que la calidad de la atención prenatal en ambas situaciones de domicilio está comprometida en algunos aspectos y que aquella de la zona rural es todavía menos adecuada.*

**Palabras clave:** Salud de la Mujer; Atención Prenatal; Desigualdades en la Salud; Análisis Cuantitativo.

## INTRODUCTION

Health is a state that has multi-dimensional determinants and limitations; health inequalities are also due to multi-dimensional causes observed between social groups with different socioeconomic and demographic conditions<sup>1</sup>.

Aiming at the reduction of social inequalities worldwide, the United Nations, with the participation and commitment of its member states, proposed, in 2000, the Millennium Development Goals which set eight development goals for the millennium. Among these, goal number five – “Improve maternal health” – whose goals are to reduce by three quarters maternal mortality rates and achieve universal access to reproductive health, both closely related to the quality of care provided to women during pregnancy, childbirth and puerperium<sup>2</sup>.

Concerning pregnancy, a quality of antenatal care is an effective action for the early detection and treatment of complications, helping to reduce risk for the mother and the conceptus. Access to quality antenatal and postpartum care is fundamental to the promotion of maternal and neonatal health as well as to the reduction of pregnancy-related morbidity and mortality rates<sup>3,4</sup>.

Therefore, in 2000, aiming at ensuring improved access, coverage and quality of antenatal care, childbirth and postpartum period for mother and new-born, the Brazilian Department of Health developed the Antenatal and Birth Humanization Program (in Portuguese, PHPN)<sup>5</sup>, which defines a package of new health actions that should be provided by antenatal care<sup>6</sup>. The Program recommends the following procedures: first antenatal consultation within the first four months of pregnancy; access to at least six antenatal visits; access to at least one visit during puerperium, up to 42 days after delivery/birth; access to laboratory tests – ABO-Rh, VDRL, fasting glucose, urine, haemoglobin and haematocrit; access to HIV testing; access to tetanus vaccination (first dose or shot booster); access to educational activities; pregnancy risk assessment and access to specialist services for high-risk pregnancies.

In Brazil, despite advances in antenatal care coverage, the quality of care is still not satisfactory, given the incidence of congenital syphilis – an estimated 12 cases per 1,000 live births in the Unified Health System (in Portuguese, SUS) in 2002 –, hypertensive disorders – the most frequent cause of maternal death – and cases of women who do not have access to the minimum package recommended by the PHPN<sup>6</sup>.

Since the creation of the PHPN, most studies on the evaluation of antenatal care investigate the program’s coverage, indicators or similar variables – such as number of visits, capture of

pregnant women and the procedures performed<sup>7-17</sup>. Other studies investigating equity in antenatal care, highlight regional, socioeconomic inequalities.<sup>10,14,18-21</sup> There are few national-level studies assessing antenatal care and adopting, as an analytical category, place of residence, i.e. urban and rural area, and how such factor can influence the delivery of basic health services to the population.

A World Health Organization study aiming at comparatively assessing the state of antenatal care among developing countries revealed that disparities in access to and use of these services have a close connection with the place of residence, educational attainment and income distribution<sup>22</sup>. According to the same organization, the biggest discrepancy in the access to specialized antenatal care is detected among rich and poor women and between urban and rural areas<sup>23</sup>.

In Brazil, the rural population access to health care is still a big challenge to the SUS<sup>24</sup>. Data of the 1996 National Demographic and Children’s and Women’s Health Survey (PNDS) detected gaps in the effectiveness of health care programs in rural areas: approximately 14% of women that gave birth in the five years preceding the survey did not have any antenatal visit; 9% of these women lived in urban areas and 32% in rural areas<sup>25</sup>.

Given this scenario the present study aimed at performing a comparative evaluation of the antenatal care provided in Brazilian urban and rural settings; the research parameter was the performance of procedures (process indicators) recommended by the PHPN in order to identify possible inequalities between the different settings, according to the quality and effectiveness of care provided. It starts from the premise that the antenatal care offered in a rural context is less adequate than that offered in an urban one, i.e., the access of pregnant women living in rural areas to the set of actions recommended by the PHPN is still limited. The data analysed was provided by the PNDS-2006.

## MATERIAL AND METHODOLOGY

This is a quantitative population-based cross-sectional research that availed itself of the database of the PNDS-2006 available at the site of the Brazilian Department of Health<sup>26</sup>.

### METHODOLOGICAL AND ETHICAL ASPECTS OF THE PNDS-2006

The PNDS-2006<sup>25</sup> is part of a worldwide research program, the *Demographic and Health Survey* (DHS), based on a national

sample that aims at drawing a profile of the female population of childbearing age and children under 5 years in Brazil.

It was carried out from November 2006 to May 2007 and it is a cross-sectional study whose sampling universe was defined through a probability sample of households obtained via two selection stages: selection of census tracts and the private households assigned to them.<sup>4</sup>

A sample of sections was obtained by simple random cluster sampling, forming ten sampling strata defined by combining the five Brazilian macro regions and their urban and rural contexts, in order to obtain a representative sample of the population. It should be explained that the number of selected sectors in each stratum was defined to ensure a minimum number of interviews that would allow a minimum blood sampling number in children according to the incidence rate of vitamin A deficiency<sup>26</sup>. A minimum number of interviews – for each stratum – was obtained by considering samples from large populations and by using an approximation to simple random sampling error of 5%. Households were selected by inverse sampling, since there was no prior information on the selected household having or not at least one eligible woman of childbearing age – between 15 and 49 years of age; 12 households per sector were randomly selected.

Questionnaires were applied in 14,617 households, of which 13,056 had at least one qualified woman interviewed; data was obtained on a total of 15,575 qualified women.

Data was collected through household survey by the application of a structured questionnaire comprising the following instruments:

- a. domiciliary record: it provided the identification of the municipality and place of residence; record of all household members; degree of kinship to head of household; gender; identification of the spouses of the residents, as well as mother and father, age, educational level, presence of women between 15 to 49 years of age and children born from January 2001. It contains questions related to housing characteristics like water source used, number of rooms, main material used in the construction of the walls, floor and roof and durable goods possession.
- b. women's questionnaire: it collects information on the respondent's characteristics, reproductive history, contraception, access to medication, pregnancies and childbirth, breast-feeding, vaccination, health and nutrition, conjugality and sexual activity, family planning, characteristics of the spouse, work and anthropometric measurements.

The information provided by the questionnaires were complemented by the child's health card and the contraceptive packaging to evaluate the information stated or even improve its quality. Anthropometric data such as the children's

and the women's height and weight and the women's waist circumference was obtained through direct measurements, as recommended by the World Health Organization. Blood samples were collected for vitamin A dosing, diagnosis of hemoglobinopathies and analysis of iodine content in the domestic table salt used in the households studied.

The PNDS-2006 was approved *ad referendum* by the Research Ethics Committee of the Centre for Reference and Training in STD/AIDS of the Department of Health of São Paulo. Approval was granted the October 3, 2005 by the same Committee.<sup>26</sup>

## METHODOLOGICAL ASPECTS

Data from a subsample of the PNDS-2006 database was analysed. In order to conduct a survey of the latest information on the antenatal care being provided to the respondents and in an attempt to reduce a possible recall bias, only the answers of those who reported being pregnant at the time of questionnaire application – 588 women – were considered.

Antenatal care evaluation was grounded on the performance of basic procedures recommended by the PHPN. The variables used were: 1) early capturing of pregnant women and first antenatal visit within 120 days of gestation; 2) blood and ABO-Rh type, haemoglobin/haematocrits count, fasting glucose collected in category blood test; 3) urinalysis; 4) hepatitis B serology (HBsAg); 5) HIV serology 6) Venereal Disease Research Laboratory test; 7) toxoplasmosis test (IgM); 8) tetanus immunization; 9) body mass measurement; 10) height measurement; 11) blood pressure measurement; 12) ferrous sulphate prescription; 13) folic acid prescription. Furthermore, demographic and socioeconomic variables were selected, namely skin colour, age group, educational level, level of income, ownership of a private health insurance and facility where antenatal care was performed.

Data was processed through Stata – Statistical and Data Analysis Software – version 9.0. A descriptive analysis with measures of central tendency and dispersion of socioeconomic and demographic variables was performed; it was followed by a univariate statistical analysis, in which the chi-square test was used to check for prevalence differences in: a) socioeconomic and demographic factors and b) performance of basic antenatal care procedures comparing the ratios between different settings (living in a rural or urban area). The level of significance used to assess differences in parameters was 5%.

## RESULTS

Once the households were selected, 15,575 women, aged 15-49 years, participated in the study. After selecting the variable "current pregnancy", the study population consisted of 588 women, aged between 15 and 43 years old and with an

average of 6.9 months of pregnancy at the time of interview, of whom 379 (78.3%) resided in urban areas and 209 (21.6%) in rural areas.

Pregnant women, in both areas, were mostly not white and aged between 18 and 34 years old. Urban women studied in average two years more than those living in rural areas – respectively, 8.8 and 6.8 years (data from PNDS-2006 database<sup>25</sup>, not shown). It was observed that women residing in urban areas had between five and eleven years of schooling, while those in rural areas had up to eight years of study (Table 1). Such differences were not, however, statistically significant.

As for the gross household income, for the group of urban women it was in average 1,062 reais as opposed to the 517 reais (data from PNDS-2006 database<sup>25</sup>, not shown), for those residing in rural areas. Only 22% of the women living in rural areas had income exceeding 2.3 minimum wages (it corresponds to 800 reais; subjects therefore do not fit in the best tertile of gross household income), compared to approximately 39% of residents in the urban area (Table 1). The minimum wage was 350 reais at the time of the PNDS conclusion<sup>27</sup>.

Of those women living in urban areas, 17% claimed to have health insurance, as opposed to 7.8% of those in the rural areas. Moreover, in both places, over 80% had antenatal care at the SUS (Table 1).

Concerning the PHPN protocols, 25% of pregnant women living in urban areas had six or more visits up the time of the interview, compared with 19% of those residents in the rural area; there was not, however, statistical difference. The mean gestational age at first visit was 3.7 months for the urban area and 2.6 months for the rural area (data from PNDS-2006, not shown<sup>25</sup>). In terms of percentages, a large proportion of pregnant women was captured early (91.7% in urban areas vs. 91.8% in rural areas), had urinalysis (89% in urban areas vs. 86% in rural areas) and blood testing (93% in urban areas vs. 91.7% in rural areas). There were no significant differences between urban/rural accesses to these procedures. Regarding complementary tests, it was observed that a low percentage of pregnant women living in rural areas reported being tested for syphilis – VDRL (52%), for hepatitis B serology – HBsAg (52%) and has been offered HIV testing (68%) and toxoplasmosis serology (57%). If compared with those in the urban area, these percentages present statistically significant differences ( $p < 0.05$ ) that favours the urban area much to the detriment of the rural area. In the former region, however, the coverage percentage of these procedures (syphilis, hepatitis B and toxoplasmosis tests) is below 80%. Moreover, less than half of pregnant women in both areas, reported having been immunized against tetanus (current pregnancy), so there was no significant differences between the different household locations (Table 2).

Table 1 - Distribution of pregnant women in urban and rural areas according to demographic and socioeconomic factors. PNDS, 2006

Variables	Urban Area		Rural Area		P-value
	n°	%	n°	%	
<b>Skin colour</b>					
white	126	33,6	68	32,9	0,52
non white	249	66,4	139	67,1	
<b>Age (in completed years)</b>					
<18	36	9,5	16	7,7	0,45
18 – 24	153	40,4	90	43	
25 – 34	164	43,2	81	38,8	
35 – 44	26	6,9	22	10,5	
<b>Schooling</b>					
Up to 4 years of study	62	16,6	81	39,3	< 0,01
5-8 years of study	138	36,9	69	33,5	
9-11 years of study	143	38,2	55	26,7	
12 years and +	31	8,3	1	0,5	
<b>Gross household income</b>					
1ª tertile (12 a 350 reais)	94	30,4	70	44,0	< 0,01
2ª tertile (360 a 780 reais)	95	30,7	54	34	
3ª tertile (800 a 10.000 reais)	120	38,8	35	22	
<b>Private Health Insurance</b>					
yes	66	17,4	16	7,7	< 0,01
no	313	82,6	192	92,3	
<b>Antenatal at the SUS</b>					
yes	264	80,2	148	87,1	0,17
no	65	19,8	22	12,9	

Source: PNDS 2006.<sup>25</sup>

Table 2 - Distribution of pregnant women according to early capture, complementary tests performed and tetanus immunization per area – PNDS, 2006

Variables	Urban		Rural		P-value
	n°	%	n°	%	
<b>Early uptake</b>					
yes	299	91,7	156	91,8	0,07
no	27	8,3	14	8,2	
<b>Number of visits</b>					
Less than 6	247	75,3	137	80,6	0,62
Equal or more than 6	81	24,7	33	19,4	
<b>Blood test</b>					
yes	306	93,3	155	91,7	0,20
no	22	6,7	14	8,3	

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Table 2 - Distribution of pregnant women according to early capture, complementary tests performed and tetanus immunization per area – PNDS, 2006

Variables	Urban		Rural		P-value
	n°	%	n°	%	
<b>Urinalysis</b>					
yes	294	89,4	147	86,5	0,56
no	35	10,6	23	13,5	
<b>VDRL test</b>					
yes	230	74,4	81	51,9	0,03
no	79	25,6	75	48,1	
<b>Sorologia HBsAg</b>					
Sim	233	74,9	80	52	0,04
Não	78	25,1	74	48	
<b>Teste para HIV</b>					
Sim	273	84	114	67,9	0,01
Não	52	16	54	32,1	
<b>Sorologia toxoplasmose (IgM)</b>					
Sim	221	73,9	91	56,5	0,04
Não	78	26,1	70	43,5	
<b>Imunização antitetânica</b>					
Sim	159	42,5	73	35,1	0,09
Não	215	57,5	135	64,9	

Source: PNDS 2006.<sup>25</sup>

As for the procedures for the assessment of nutritional status and pregnancy risk, the research observed that, in both areas, a large percentage of pregnant women – over 95% – was measured for body mass and blood pressure diagnosis but no significant differences were detected between them (Table 3). However, height measurement, another low complexity procedure, presented occurrence rate below 75% in both settings – urban and rural – with no significant differences.

Additionally, the study revealed that the percentage of pregnant women prescribed ferrous sulphate was approximately 60% in urban areas and 54% in rural areas; the rate is even lower for folic acid supplementation – approximately 45% in urban area and 33% in rural areas (Table 4); differences were not significant in statistical terms.

## DISCUSSION

As reported by Reis<sup>28</sup> despite the differences between Brazilian urban and rural areas are decreasing, they are still quite significant with regard to access to some basic goods and services. The socio-demographic and economic characteristics of the women surveyed revealed distinct differences with regard

to educational attainment, gross household income, private health insurance coverage and the provision of antenatal care, depending on the place of residence.

Table 3 - Distribution of pregnant women according to the evaluation of nutritional state and risk of pregnancy per area – PNDS, 2006

Variables	Urban		Rural		P-value
	n°	%	n°	%	
<b>Body mass measurement</b>					
yes	316	96,1	163	95,9	0,58
no	13	3,9	7	4,1	
<b>Height measurement</b>					
yes	240	73,9	113	66,9	0,58
no	85	26,1	56	33,1	
<b>Blood pressure measurement</b>					
yes	317	96,3	166	97,7	0,27
no	12	3,7	4	2,3	

Source: PNDS 2006.<sup>25</sup>

Table 4 - Distribution of pregnant women according to access to prevention and treatment of nutritional disorders during pregnancy, per area – PNDS 2006

Variables	Urban		Rural		P-value
	n°	%	n°	%	
<b>Doctor prescribed ferrous sulphate</b>					
yes	226	59,6	113	54,1	0,32
no	153	40,4	96	45,9	
<b>Doctor prescribed folic acid</b>					
yes	170	44,9	69	33	0,09
no	209	55,1	140	67	

Fonte: PNDS 2006.<sup>25</sup>

Considering that access to basic services – such as health and education – in rural areas is limited, a higher proportion of women with a low educational attainment is expected in this area. The study results reveal that the educational level of women living in urban areas is higher than those living in rural areas; such results were confirmed by the National Survey by Household Sample<sup>29</sup> which calculated an average of 7.4 years of schooling for women in urban areas, as opposed to 4.5 years for rural residents; low educational attainment can interfere with health, since the population's self-care ability can be influenced by it<sup>30</sup>; such results can have an impact on the pregnant women's health. A previous study carried out in Caxias do Sul, revealed that the mother's educational level influences how soon they seek an antenatal care service and the number of antenatal appointments<sup>30</sup>.

The present research ascertained the unequal distribution of gross household income among the participants living in the different settings; such inequality affects negatively the quality of life and health of the population, since the access to basic goods and services in Brazil still depends almost exclusively on the level of income of its members<sup>29</sup>; the low purchasing power of the families of women living in rural areas can explain the differences in results regarding the ownership of a private health insurance. According to Albuquerque *et al.*<sup>31</sup>, the latter is higher among residents in urban areas and in states with a higher income and supply of formal employment as well as health services; the authors report also that most beneficiaries live in the country's most populated and more industrialized municipalities.

The PNDS-1996 revealed that 73% of pregnant urban women and 46% of pregnant rural women started antenatal care in the first trimester of pregnancy<sup>25</sup>; on the other hand the PNDS-2006, analysed in this study, showed significant increase in the service coverage in both areas; a high number of women surveyed initiated antenatal care in the first trimester of pregnancy. The sample analysed revealed lower average waiting time for admission into antenatal care in rural areas, indicating that women were captured earlier into their pregnancy, which is essential for early detection of high-risk pregnancies and an early intervention in events potentially risky for mother and conceptus<sup>3,4</sup>.

Regarding the percentage of antenatal appointments, it cannot be stated that the minimum of six visits recommended by the PHPN is not being met, since the participants' gestation period was not completed by the time the research was concluded.

Adopting as a parameter the minimum package of actions recommended by PHPN, the data collected indicates some significant discrepancies concerning complementary tests; the study points out that complementary testing fell short and the women living in the rural area were the most affected. Although study subjects had on-going pregnancies, results for "syphilis and hepatitis B screening" and "HIV and toxoplasmosis tests offered" should be considered, since such tests are scheduled in the first doctor's appointment, i.e. in the first trimester of pregnancy. Early detection of infectious diseases leads to treatment and contributes to the mitigation of the risk of vertical transmission of HIV and congenital syphilis, among other diseases, as well as prevents harm to the conceptus<sup>32</sup>.

It is a matter of concern the unsatisfactory rate of pregnant women that took the tests, both in urban and in rural areas, indicating gaps in prevention and control of diseases. The values found in the rural area may be linked to the mothers' low educational level, to unskilled health professionals, to the lack of inputs for testing and even problems related to primary health care coverage, like the deficit in family health teams, community health agents and specialist appointments<sup>9</sup>.

Another significant result – possibly associated with the above issues – refers to the large proportion of women who reported not having received tetanus immunization in both regions. Vaccination of pregnant women is linked to hygienic birth practices: using sterile equipment for cord cutting and umbilical cord clamping and dressing the umbilical cord stump are crucial procedures for the prevention of neonatal tetanus<sup>3</sup>. The values presented do not expose the ills of antenatal assistance; they can be explained by the fact that most women had been vaccinated less than five years of the current pregnancy, and a shot booster was not needed.

As for the prescription of iron and folic acid supplements, the differences between urban and rural areas showed no statistical significance. Low ratios found in urban and rural strata could be explained by the health professional neglect of important nutritional prophylaxis during pregnancy, particularly prescription of folate. The supplementation of this vitamin before and during pregnancy prevents congenital malformations; neural tube defects (NCDs) are among the most important epidemiologically<sup>33</sup> and, although its origin is admittedly multifactorial, studies confirmed that folic acid supplementation during pregnancy is a primary preventive measure. Borrelli *et al.*<sup>33</sup> found that the lack of folic acid supplementation among mothers who had children with NCDs was due to unplanned pregnancies and ignorance of its importance; among those who took folic acid its intake happened after the 28<sup>th</sup> day of pregnancy, therefore, outside recommended time period.

As a result, it is necessary to increase activities to inform the population about the importance of folic acid supplementation during pregnancy; there is a need as well for better qualified health professionals responsible for monitoring pregnant women, especially nurses, who play an important educational role in antenatal nursing visits.

Some limitations of this study should be addressed: the PNDS-2006 database did not provide all the variables recommended by the PHPN for antenatal care, such as those relating to the implementation of educational actions; it was not possible, therefore, to assess other vital elements for a broader analysis of the quality of this care. The use of secondary data can be another limiting factor, given the difficulty of assessing its reliability and accuracy. Another issue relates to the cross-sectional design for which correlation does not imply causation.

## CONCLUSION

The present study aimed at evaluating antenatal care provided at different health care units to pregnant women living in urban and rural areas. Bearing in mind that differences between these social, demographic and economic contexts, the results reveal that the antenatal care provided in rural areas is

less adequate than the one provided in an urban context, regarding access to procedures recommended by the PHPN and the less favourable social and economic situation of women residing in a rural area.

As for the socioeconomic and demographic variables, the results revealed important differences between the different settings with regard to the research participants' education, gross household income and ownership of a private health insurance; better results were observed in the urban context.

Regarding antenatal care evaluation, the results indicated the deficiencies of the service provided, considering the significant amount of women who did not have access to the recommended procedures in both areas. Inadequate care was credited, primarily, to restricted access to complementary tests for the diagnosis of HIV, syphilis, toxoplasmosis and hepatitis B, indicating possible failure in the prevention and control of infectious diseases as well as nutritional deficiencies; the authors demonstrated that pregnant women in rural areas are more exposed to injuries resulting from such inadequacy.

Despite limitations, this study highlighted health inequalities related to household situation; disparities persist between Brazilian urban and rural spaces with direct consequences to health and quality of life of pregnant women and the conceptus. In this sense, it is important to rethink public policies and antenatal care programs by implementing measures that redirect health actions in order to mitigate spatial inequalities, i.e. by adopting different approaches to the rural reality.

It is of the utmost importance also to train health professionals working in antenatal care in urban areas, since the results showed that the quality of care provided there, according to data analysed, is below expectations.

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