High incidence of low birth weight children among adolescent mothers in Brazil

By Humberto Corrêa and Glaucia dos Santos Marcondes *

* Universidade Estadual de Campinas (UNICAMP) - Núcleo de Estudos de População (NEPO).

Abstract - The purpose of this paper is to assess the importance of Maternal Age (MA) in the overincidence of low weight observed in children delivered to adolescent mothers (10-19 years old) in comparison with the children of 20-29 year-old women. Information has been gathered from the Brazilian Newborn Information System (SINASC) related to the cities of Rio de Janeiro and Recife (2000-2002) regarding MA, Gestational Age (GA) and the number of Prenatal Appointments (PA). The age specific low birth weight rates were calculated and the prevalence ratios for each set of MA, GA and PA were compared. Results suggest that MA seems to play an intervenient role, yet not determinant, as to the occurrence of LW newborns from adolescents mothers. The MA-GA-PA combination seems to had a great impact on LBW due to exogenous adverse variables that prevailed in this group before pregnancy.

Keywords - low birth weight, health inequality, adolescent pregnancy.

Introduction

Throughout the last decade in Brazil the theme of adolescent pregnancy has gained visibility in the media, in academic centers and among public administrators mainly due to the increase of women fertility in the age groups of 10-14 and 15-19 years in the Total Fertility Rate (TFT).

The social implications of this phenomenon have fostered a broad debate and also a consideration of numerous questions that characterize adolescent pregnancy as an early event with negative effects, ranging from social relationships and life projects to the health of adolescent mothers and their children.

Studies that privilege social and psychological aspects state that having a child at such an early age would interrupt the process socially considered as ideal or before adolescent has reached a psychosocial condition understood as the most adequate to constitute a family. In most of these studies pregnancy is seen as undesirable, a misfortune resulting from the lack of information and maturity of individuals who experience it. Similarly, the use of the medical discourse has also strengthened the negative scenario associated to adolescent fertility by classifying it as a public health problem strongly connected to two important indicators: maternal mortality and infant mortality.

Epidemiologic studies indicate the relationship between maternal age and the incidence of a varied set of obstetrical problems. The most outstanding ones are prematurity and low birth weight. These factors represent the main causes of morbimortality in the first year of life. However, a numerous studies consider that some aspects related to the pregnant women social life – such as education, household income per
and access to medical services during pregnancy – may be more significant to birth outcomes than maternal biological age itself.\textsuperscript{[5,12-14,16,18-26]}

This type of evidence gives way to questioning if approaching the theme under labels such as “troublesome”, “risky”, “early”, “unwanted” would end up disseminating a discriminatory, moralist and reductionist perspective of the topic,\textsuperscript{[20]} thus contributing for its persistence and increase the exposure of adolescents to risk situations that could be otherwise reduced or avoided.\textsuperscript{[6,7]}

Finally, it is worth mentioning that adolescent pregnancy can be approached from the notion of reproductive rights, in conformity with the terms agreed upon in the international conferences organized by the United Nations during the 90’s.\textsuperscript{[13]} This perspective had already been considered in concrete actions since the reformulation of the Brazilian health system during the 80’s. Guaranteed access and quality to the services provided to women before, during and after delivery has always been in the list of feminist claims in the health area as an attempt to face high maternal mortality rate in Brazil. During the 80’s, under the influence of women organized movement, a process of change in paradigms has started within the Brazilian public health system that has lead to the implementation of the Programa de Assistência Integral a Saúde da Mulher – PAISM (Full Health Assistance Program for Women), which focused on a broader and more adequate care to women’s health specificities at all ages. This context has favored a debate about the specific condition of pregnant adolescents that had been ignored by the system until then.\textsuperscript{[27]}

Prenatal care appears as one of the essential services that should be offered periodically, systematically and adequately, in conformity with the pregnancy risk level. Recognized as a basic right, the importance of prenatal care is emphasized by literature as a means to control the health status of the pregnant woman and her child.\textsuperscript{[27]} Proper follow-up during pregnancy – considering the multiple social inequalities experienced by women – would contribute to reduce a large number of risk factors and behaviors observed among pregnant women, especially pregnant adolescents.\textsuperscript{[8]}

In face of the aspects listed herein about the debate on adolescent fertility, this paper aims at assessing the incidence of low weight birth in the population of newborns to mothers between 10-19 and 20-29 years in Rio de Janeiro (capital of the State of Rio de Janeiro) and Recife (capital of the State of Pernambuco) by analyzing the impact of maternal age on delivery \textit{vis-à-vis} the level of prenatal care received by the pregnant woman.

Methodology: concepts and procedures

Due to the evidences mentioned by the medical literature about the intrinsic relationship between Birth Weight (BW), Gestational Age (GA) and number of Prenatal Appointments (PA),\textsuperscript{[8,28]} we consider that whenever possible multiple combinations of these variables shall always be identified, broken-up and crossed, with the purpose of providing a more enlightening interpretation of their impact on birth outcome.\textsuperscript{[29]} Thus in addition to the demographic variable Maternal Age (MA), the following indicators will be analyzed: BW, or more specifically, Low Birth Weight (LBW), GA and PA.

Birth Weight

The World Health Organization (WHO) considers BW as an efficient neonatal and infant morbimortality indicator\textsuperscript{[8,30]} and we have followed its definition by which newborns with less than 2,500g are considered low weight.

Gestational Age

GA is a variable intrinsically associated to LBW. The last review of the International Classification of Diseases (ICD-10) defines GA as the time of gestation in completed days or weeks counting from the first day of the last regular menstrual period. In accordance with ICD-10 protocol gestations can be classified as: preterm (less than 37 weeks or 259 days of gestation); fullterm gestation (from 37 weeks to less than 42 weeks or from 259 to 293 days of gestation) or; postterm (from 42 weeks or from 294 days of gestation on).\textsuperscript{[31]}

Prenatal care

According to the WHO,\textsuperscript{[30]} adequate prenatal care may be measured by observing the PA that the woman undergoes during pregnancy. The WHO Technical Working Group suggests a minimum of four prenatal appointments, scheduled in specific periods in order to provide a basic level of care. Nevertheless, a larger number of appointments may be necessary, depending on the woman’s specific conditions and needs.

In Brazil, the recommendation contained in the Guidelines of Information for Administrators and Technicians (Cartilha de Informações para Gestores e Técnicos) of the Prenatal and Birth Humanization Program (Programa de Humanização no Pré-natal e Nascimento) prepared by the Public Health Policies Secretariat/Ministry of Health, pregnant women must have at least six appointments scheduled in the three trimesters of gestation.\textsuperscript{[32]}

Moreover, according to the publication contained in the Guidelines Project of the Brazilian Federation of

\textsuperscript{[5,16,17]}
Gynecology and Obstetrics and the State Societies (FEBRASGO), it is consensus among physician and experts that observance to the recommended number of appointments associated to the beginning prenatal care still in the first pregnancy trimester indicates a qualitative perspective of a woman with her pregnancy. A plausible hypothesis resulting from these observations is that living in unfavorable social contexts contributes for inadequate or insufficient prenatal care. Thus, in the absence of measurable socioeconomic variables regarding adolescent mothers at the time of delivery, prenatal care may be taken as a proxy to assess the socioeconomic context in which adolescents were inserted when their children were born.

**Procedures**

This analysis was based on birth records of Brazilian Newborn Information System (Sistema de Informações de Nascidos Vivos - SINASC) of the Ministry of Health, related to the triennium 2000-2002 for the cities of Rio de Janeiro (located in the Southeast Region of Brazil, the wealthiest of the country) and Recife (located in the Northeast Region of Brazil, the region that concentrates the poorest states of the country).

Figure 1 presents a synthesis of selected indicators for both cities.

<table>
<thead>
<tr>
<th>Year</th>
<th>Indicator</th>
<th>Rio de Janeiro</th>
<th>Recife</th>
<th>Brazil</th>
</tr>
</thead>
</table>
|      | Brazilian geographic region | | | | | 1
|      | Geographical area (km²) | 1,182 | 217 | 8,514,876 |
| 2001 | Total population (millions) | 5,897 | 1,437 | 172,4 |
| 2001 | % of female population | 53.1 | 53.5 | 50.7 |
| 2001 | % of 10-19-year-old female population | 15.2 | 18.4 | 20.3 |
| 2001 | Population density (inhabitants/km²) | 4,989 | 6,623 | 20 |
| 2000 | Life expectancy at birth (e₀) | 70.26 | 68.62 | 68.61 |
| 2000 | Total fertility rate (TFR) | 1.87 | 1.81 | 2.37 |
| 2000 | Human development | 0.842 | 0.797 | 0.766 |
| 2000 | Infant mortality rate (per 1,000 births) | 21.83 | 29.78 | 30.57 |
| 2000 | Income per capita (Reais) | 596.65 | 392.46 | 297.23 |
| 2000 | physician (per 1,000 inhabitants) | 3.68 | 3.58 | 1.16 |
| 2000 | Literate rate (percentage) | 95.59 | 89.45 | 86.39 |
| 2001 | Homicide rate (per 100,000 inhabitants) | 55.52 | 96.86 | 27.79 |
| 2000 | household income of the 80% poorest | 34.5 | 27.4 | 31.9 |
| 2000 | household income of the 10% wealthiest | 48.2 | 55.1 | 52.4 |
| 2000 | average income ratio of 10% wealthiest and 40% poorest | 26.85 | 41.75 | 32.93 |
| 2000 | Gini index | 0.616 | 0.680 | 0.645 |
| 2002 | Gross national product per capita (Reais) | 10,537 | 7,822 | 7,631 |

**Sources:**

1. IBGE - Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics).
2. IPEA - Instituto de Pesquisa Econômica Aplicada (Institute Economic Research Applied).
Results

The first step enclosed the complete database in order to characterize and compare newborns of adolescent mothers vis-à-vis of the children of mothers of the 20-29 years age group.

Results are in concordance with the findings described in the literature mentioned about higher LBW and preterm proportions among adolescent mothers in comparison with mothers from the 20-29 years age group (Figure 2).[9-11,16,22,33-36]

Similarly, it has been noted that during that triennium, in both cities, adolescent mothers presented a lower number of PA than that observed in the other age groups (figure 3).[9-11,16,22,33-36]

The 10-14 year-old mothers presented twice as high births proportions in classes PA=0 and [1;3] than those observed in the 25-29 year strata. This scenario suggests a situation of higher risk for these children and also a situation of vulnerability for adolescent mothers.

The following analyses have not considered records that presented “unknown” information for one or more fields that represented variables BW, GA and PA.

From a total of 255,204 births records to 10-29 year-old mothers during the triennium 2000-2002, 7,693 or 3% (3.6% in Rio de Janeiro and 1.2% in Recife) did not present the minimum requirements to be included in the analysis.

As mentioned previously, LBW global analysis hides differences that can make the results interpretation difficult. Nevertheless, this kind of obstacle can be overcome by building more homogeneous groups for analysis. Thus, in addition to MA, births data have been regrouped by variables GA, BW and PA.

Figure 4 shows the rates of newborn with LW (per thousand births) and the impact of MA, GA and PA on the incidence of LBW. Note that among the selected variables the isolated impact of GA outstands as the main determining factor of LBW occurrence. PA impact is also evident, mainly for the newborn with GA<37 weeks. Lastly, the impact of MA has shown to be the less evident at all GA and PA levels.

By virtue of the numerous possibilities to analyze the available information, the following synthesis is proposed in order to quantify each impact: in addition to discrimination by GA<37 weeks to represent preterm births and GA≥37 weeks to characterize the non-preterm births, three age groups have been considered, i.e. 10-19; 20-24 and 25-29 years. We have decided to compare the level of prenatal care considered as the most deficient – due its absence (PA=0) or insufficiency (PA=[1;3]) – against the best level of prenatal care – PA≥7. The decision of considering the extreme levels was due to the fact that data was presented in SINASC database as fixed categories.28

Based on the Guidelines of Information for Administrators and Technicians, which recommends a total of seen or more appointments during a standard gestation, we have adopted PA≥7 to characterize the proper level of care, as this class is less subject to dubious interpretation than the previous one, i.e. PA at level [4;6].

It is worth mentioning that this level of prenatal care can be reached between the 28th and 32nd week of gestation, if care has been started and conducted in accordance with the schedule recommended in mentioned the document.29
Figure 5 shows the LBW rates (per thousand births) for both cities, according MA, PA and GA.

<table>
<thead>
<tr>
<th>Prenatal Appointments</th>
<th>RIO DE JANEIRO</th>
<th>RECIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>802</td>
<td>823</td>
</tr>
<tr>
<td>7 or +</td>
<td>508</td>
<td>614</td>
</tr>
</tbody>
</table>

Source: SINASC, 2005

Figure 6 presents the prevalence ratios of newborns with low birth weight, by city, according to the adjusted set of MA (see Figure 6: column 1, lines 4 to 6 for Rio de Janeiro; lines 7 to 9 for Recife), GA and PA (headlines 1 and 2; columns 2 to 9). Except for the base variable (GA, PA or MA) indicated (at headline 3 of columns 2 to 9), the denominator of each ratio considers the same set of MA, GA, PA expressed in the numerator.

This representation clearly shows that GA had the highest impact on LBW. For example, in the 10-19 year group at PA level = [0;3] and GA<37 weeks, the prevalence ratio of LBW (per thousand births) was nine times higher than that obtained for the same age group with GA ≥ 37 weeks in Rio de Janeiro and 12.5 times higher in Recife. The same ratio was 11.7 times higher in the 25-29 year group in Rio de Janeiro and 13.6 times higher in Recife. For level PA ≥ 7 variation was even higher: 11.3 times for adolescents and up to 15.7 times for 25-29 year-old women living in Rio de Janeiro. In Recife ratios varied from 17.2 times among adolescents up to 20.2 times for 20-24 year-old mothers.

PA was the second variable that most affected the observed levels of LBW. However, its impact was quite lower than GA. We have also observed that PA effect was greater on GA ≥ 37 weeks level.
Individual comparisons between PA level = [0;3] and PA\( \geq 7 \) in each age group indicate that relative differentials were similar for both GA levels considered. In addition, among adolescent mothers, prevalence ratios were always higher in Rio de Janeiro than in Recife at this PA level. This fact suggests that the implementation of policies with the purpose of providing universal prenatal care for this age group would be proportionally more efficient in Rio de Janeiro – where the difference between the worst and best scenario are greater than Recife. However, there are opportunities to improve prenatal care in both cities and this would certainly benefit the population of the three age groups analyzed. In spite of what common sense would suggest, MA had the lowest impact on the low weight newborns rate – which resulted from the comparison between the low weight newborns rates obtained for a given set of MA, GA and PA and the reference age group (20-24 year-old mothers) with the same GA and PA combination.

If the levels of prenatal care observed in the triennium 2000-2002 were maintained in both cities and if the 10-19 year population would postpone fertility for the third decennium of life, their LBW rates would see little change. Thus, in the best-case scenario, there would be a reduction of the number of newborns with LW in the adolescent population, yet that would not necessarily imply a reduction on the proportion of LW newborns from those mothers. We could also reasonably suppose a consequent increase, in absolute numbers, of LW newborns of mothers who are 20 years or older.

Regardless of the facts and hypotheses that suggest GA and – less intensely – PA would have a higher impact on LBW incidence, we must ratify that with the same level of prenatal care, lower rates of LBW have also been reached by women older than 19 years.

In synthesis, it is indeed true that adolescent mothers give birth to LW children in higher proportions than 20-29 year-old women. However, there is evidence that improving prenatal care would provide for a large reduction of LBW rates in adolescent mothers and also their levels would be similar to those of the reference group (20-24 years). As shown in Figure 5, there is proportionally more room for improvement in prenatal care programs as to compliance and proper frequency in the adolescent mothers group (in quantitative terms).

Finally, analyses suggest that the hierarchy found in the set of variables as overincidence of LBW in adolescent mothers is the same in both cities considered in this study. The difference between them lies in the intensity of the relationship, as well as on the starting point of current LBW levels. In general terms, the situation in Rio de Janeiro has always been more favorable than in Recife. As the first city shows better socioeconomic indicators (Figure 1) than the second one, the hypothesis of the incidence of exogenous factors over LBW gains strength.

<table>
<thead>
<tr>
<th>GESTATIONAL AGE</th>
<th>&lt; 37w</th>
<th>&lt; 37w</th>
<th>&lt; 37w</th>
<th>&lt; 37w</th>
<th>&lt; 37w</th>
<th>&lt; 37w</th>
<th>&lt; 37w</th>
<th>&lt; 37w</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRENATAL APPOINTMENTS</td>
<td>≥ 7</td>
<td>[0;3]</td>
<td>[0;3]</td>
<td>[0;3]</td>
<td>[0;3]</td>
<td>≥ 7</td>
<td>[0;3]</td>
<td>≥ 7</td>
</tr>
<tr>
<td>BASE</td>
<td>GA( \geq 37w )</td>
<td>GA( \geq 37w )</td>
<td>PA ( \geq 7 )</td>
<td>PA ( \geq 7 )</td>
<td>MA 20-24</td>
<td>MA 20-24</td>
<td>MA 20-24</td>
<td>MA 20-24</td>
</tr>
<tr>
<td>RIO DE JANEIRO</td>
<td>MA = 10-19</td>
<td>11.3</td>
<td>9.0</td>
<td>1.6</td>
<td>2.0</td>
<td>1.0</td>
<td>1.4</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>MA = 20-24</td>
<td>14.9</td>
<td>12.4</td>
<td>1.5</td>
<td>1.8</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>MA = 25-29</td>
<td>15.7</td>
<td>11.7</td>
<td>1.4</td>
<td>1.9</td>
<td>1.0</td>
<td>1.1</td>
<td>1.0</td>
</tr>
<tr>
<td>RECIFE</td>
<td>MA = 10-19</td>
<td>17.2</td>
<td>12.5</td>
<td>1.3</td>
<td>1.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>MA = 20-24</td>
<td>20.2</td>
<td>15.4</td>
<td>1.4</td>
<td>1.9</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>MA = 25-29</td>
<td>19.2</td>
<td>13.6</td>
<td>1.5</td>
<td>2.1</td>
<td>1.0</td>
<td>1.1</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Source: calculated based on SINASC database, 2005.
Discussion

This study has explored the association of BW, GA, PA and MA with the purpose of demonstrating that exogenous factors have an impact on the overincidence of LW in newborns of adolescent mothers in comparison with 20-24 and 25-29 year-old groups. Prenatal care was used as a proxy to assess the maternal socioeconomic context at the time of delivery. Based on several studies, this procedure suggests that the group of adolescent mothers was inserted in a greater proportion in an unfavorable context.

Due to the complex interrelation of variables BW, GA and PA, more homogeneous subgroups were created, according to the variables mentioned. Regrouping the information allowed us to isolate how much each variable contributed to LBW occurrence.

GA was the variable that proved to be the most important in determining LBW. The minimum prevalence rate was 9 times (802/89) under inadequate care for the adolescent group living in Rio de Janeiro and reached a maximum of 20.2 times (567/28) under adequate care for the 20-24 year-old group living in the city of Recife at the time of delivery.

PA was the second variable with the most important individual impact although it was quite inferior to the level reached by variable GA. However, it was clear to notice that the response of LW to the increase in PA was quite similar in all age groups. Differences between adequate and inadequate prenatal care varied from 1.4 to 1.6 times for GA <37 weeks and from 1.8 to 2.0 times for GA ≥37 weeks in Rio de Janeiro. In Recife the differences varied from 1.3 to 1.5 times for GA <37 weeks and from 1.8 to 2.1 for GA ≥37 weeks. Nevertheless, as the LBW were higher in the 10-19 year-old group it is fair to suppose that they are the ones that would benefit the most (per thousand births) if prenatal care levels were improved.

Finally, MA impact revealed to be the lowest on the rates of LW newborn. However, data ratifies that the group of adolescent mothers is more vulnerable as to incidence of LBW.

Considering the results obtained and that prenatal care – as mentioned by the medical literature – is a good indicator that pregnant women are inserted in an unfavorable socioeconomic context at the time of delivery, MA seems to play an intervening role, yet not determinant, as to the occurrence of LW newborns from adolescent mothers.

Thus, it would be feasible to suppose that the implementation of specific actions would be a paramount contribution to reduce the incidence of LBW linked to the risks caused by adverse socioeconomic contexts prevailed – according to PA proxy – in the 10-19 year-old group. If we consider the counterpart line of thought, that is, if adolescents had better life conditions during pregnancy and at the time of delivery, a reduction of LBW could be expected in these age groups, in concomitance with an increase in prenatal care.

In spite of the convergence observed in LBW rates with a progressive elevation of PA and GA levels, it is not possible to guarantee that all age groups would reach the same rate of LBW – even if the analyzed variables were totally equalized. Nevertheless, the isolation of a few variables suggests that MA does not have a high impact on the incidence of LBW. Many studies point out that introducing more precise controls such as parity, income, fertility history, conjugal status, degree of formal education and race/ethnic group weaken or even dilute this type of association.

As adolescent pregnancy tends to concentrate in population groups of which maternal nutrition and health conditions are inadequate a correlation between GA and the risks for the newborn is frequently stated in empirical studies. Nevertheless, nor the age at which pregnancy occurs, nor biological factors associated to GA respond for the true risks of adolescent pregnancy.[1][2] Thus, we can infer that the interaction of these conditions with poor health condition, nutrition and prenatal care received by pregnant adolescents potentiate several risks as LBW.

In summary, the socioeconomic status of a large proportion of adolescents that give birth during the second decade of life seems to play a more important role than MA on the overincidence of LBW. It would not be acceptable to think that the simple age increase of conception and delivery could solve or reduce this type of problem, as in the 20-24 and 25-29 year-old groups – in which there is lower incidence of newborns with LBW – remains a significant number of women who experience this negative obstetric result.

Notes

1 Due to the reduced number of cases in the 10-14 year group (1.2% of all records, or 4.4 of the newborn of mothers between 10 and 19 years), we have decided to accumulate it with the 15-19 year group to obtain more consistent results.

2 PA = zero; 1 to 3; 4 to 6; 7 or + appointments.

References


XXV IUSSP International Population Conference. Tours, France - 18-23 July 2005


7. HEILBORN, Maria Luiza; SALEM, Tânia; KNAUTH, Daniela; AQUINO, Estela; BOZON, Michel; RODHEN, Fabiola; VICTORA, Ceres; MCCALLUM, Cecília; BRANDÃO, Eliane. Aproximações socioantropológicas sobre a gravidez na adolescência. Horizontes Antropológicos, n. 17, 2002.


**Acknowledgments**

This work was supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Capes). Financial support to attend IUSSP XXV International Population Conference was granted by French National Organizing Committee (NOC) and International Union for the Scientific Study of Population (IUSSP). The authors wish to thank their research advisors Maria Isabel Baltar da Rocha and Maria Coleta Ferreira Albino de Oliveira for stimulating comments on the course of this work.

**Correspondence:**

Humberto Corrêa
AC UNICAMP
Caixa Postal 6189
CEP 13083-970 Campinas, SP
Brazil
humberto@nepo.unicamp.br
gal@nepo.unicamp.br