

# Trends in Live Birth Rates Among Adolescents in Brazil, São Paulo, and Piracicaba

Tendência das Taxas de Nascidos Vivos Em Adolescentes no Brasil, São Paulo e Piracicaba  
Tendencia de las Tasas de Nacidos Vivos en Adolescentes en Brasil, São Paulo y Piracicaba

## RESUMO

**Objetivo:** Analisar a tendência de nascidos vivos em adolescentes no Brasil, no estado de São Paulo e no município de Piracicaba, no período de 2000 a 2023. **Métodos:** Utilizou-se dados do Sistema de Informação de Nascidos Vivos (SINASC). Foram calculadas as taxas de nascidos vivos (número de nascidos vivos por 1.000 adolescentes do sexo feminino) nas faixas de 10 a 14 anos e de 15 a 19 anos, em cada ano. Realizou-se análises de correlação de Pearson entre as taxas de nascidos vivos e o ano, considerando o nível de significância de 5%. A seguir foram construídos gráficos de controle para estudar os padrões na série de dados. **Resultados:** Entre 2000 e 2023, a taxa de nascidos vivos entre adolescentes no Brasil apresentou queda significativa. Na faixa etária de 10 a 14 anos, a taxa reduziu de 3,29 para 1,96 por 1.000 adolescentes, com correlação negativa moderada com o ano. Para adolescentes de 15 a 19 anos, a queda foi mais acentuada, de 80,08 para 39,00, com correlação negativa muito forte. Considerando ambas as faixas, a taxa caiu de 42,15 para 20,89. No estado de São Paulo, os dados indicam queda significativa, com taxas passando de 2,36 para 0,93 (10 a 14 anos) e de 70,27 para 27,29 (15 a 19 anos). Em Piracicaba, observou-se correlação negativa fraca para 10 a 14 anos e muito forte para 15 a 19 anos, com redução das taxas e presença frequente de pontos nas zonas de controle inferior a partir de 2019. **Conclusão:** Houve redução nas taxas de nascidos vivos entre adolescentes no Brasil, no estado de São Paulo e em Piracicaba no período de 2000 a 2023.

**DESCRIPTORES:** Nascido Vivo; Diagnóstico da situação de saúde; Gravidez.

## ABSTRACT

**Objective:** To analyze trends in live births among adolescents in Brazil, the state of São Paulo, and the municipality of Piracicaba from 2000 to 2023. **Methods:** Data from the Live Birth Information System (SINASC) were used. Live birth rates (number of live births per 1,000 female adolescents) were calculated for the age groups 10–14 years and 15–19 years for each year. Pearson correlation analyses were performed between live birth rates and year, considering a 5% significance level. Subsequently, control charts were constructed to examine patterns in the data series. **Results:** Between 2000 and 2023, live birth rates among adolescents in Brazil showed a significant decline. In the 10–14 age group, the rate decreased from 3.29 to 1.96 per 1,000 adolescents, with a moderate negative correlation with year. Among adolescents aged 15–19 years, the decline was more pronounced, from 80.08 to 39.00, with a very strong negative correlation. Considering both age groups, the rate fell from 42.15 to 20.89. In the state of São Paulo, data indicated a significant decline, with rates decreasing from 2.36 to 0.93 (10–14 years) and from 70.27 to 27.29 (15–19 years). In Piracicaba, a weak negative correlation was observed for ages 10–14 and a very strong negative correlation for ages 15–19, with reduced rates and frequent points in the lower control zones from 2019 onward. **Conclusion:** There was a reduction in live birth rates among adolescents in Brazil, the state of São Paulo, and Piracicaba from 2000 to 2023.

**DESCRIPTORS:** Live Birth; Health Situation Diagnosis; Pregnancy.

## RESUMEN

**Objetivo:** Analizar la tendencia de los nacidos vivos en adolescentes en Brasil, en el estado de São Paulo y en el municipio de Piracicaba, en el período de 2000 a 2023. **Métodos:** Se utilizaron datos del Sistema de Información sobre Nacidos Vivos (SINASC). Se calcularon las tasas de nacidos vivos (número de nacidos vivos por cada 1.000 adolescentes de sexo femenino) en los grupos etarios de 10 a 14 años y de 15 a 19 años, para cada año. Se realizaron análisis de correlación de Pearson entre las tasas de nacidos vivos y el año, considerando un nivel de significación del 5%. Posteriormente, se construyeron gráficos de control para estudiar los patrones de la serie de datos. **Resultados:** Entre 2000 y 2023, las tasas de nacidos vivos entre adolescentes en Brasil presentaron una

disminución significativa. En el grupo de 10 a 14 años, la tasa se redujo de 3,29 a 1,96 por 1.000 adolescentes, con una correlación negativa moderada con el año. En las adolescentes de 15 a 19 años, la reducción fue más acentuada, de 80,08 a 39,00, con una correlación negativa muy fuerte. Considerando ambos grupos etarios, la tasa descendió de 42,15 a 20,89. En el estado de São Paulo, los datos indican una disminución significativa, con tasas que pasaron de 2,36 a 0,93 (10–14 años) y de 70,27 a 27,29 (15–19 años). En Piracicaba, se observó una correlación negativa débil para el grupo de 10 a 14 años y muy fuerte para el grupo de 15 a 19 años, con reducción de las tasas y presencia frecuente de puntos en las zonas de control inferior a partir de 2019. **Conclusión:** Hubo una reducción en las tasas de nacidos vivos entre adolescentes en Brasil, en el estado de São Paulo y en Piracicaba en el período de 2000 a 2023.

**DESCRIPTORES:** Nacido Vivo; Diagnóstico de la Situación de Salud; Embarazo.

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## INTRODUCTION

Data from the 2023 Demographic Census indicate that, in 2022, Brazil had a population of more than 28 million adolescents, representing approximately 14% of the country's total population<sup>1</sup>. Adolescence, as defined by the World Health Organization (WHO), is understood as the transition phase between childhood and adulthood, divided between pre-adolescence and adolescence itself, covering the age group from 10 to 19 years of age<sup>2</sup>. This period is marked by intense emotional, hormonal, and social changes, as well as the search for freedom and autonomy,

which often includes the initiation of sexual practices<sup>3,4</sup>. This scenario can encourage risky behaviors, such as the use of psychoactive substances and unsafe sexual practices, which increase the likelihood of unplanned pregnancies<sup>5,6</sup>.

In Brazil, between 2008 and 2019, approximately 6,118,205 births to adolescent mothers were recorded. Of this total, 296,959 (4.86%) occurred among adolescents aged 10 to 14 years, while 5,821,246 (95.14%) were among mothers aged 15 to 19 years<sup>7</sup>. In 2020, the number of births to adolescents totaled 380,778, representing 14% of the total live births in the country that year. Although the WHO recognizes a global

downward trend in adolescent fertility rates, inequalities between different regions and even within countries remain evident, reinforcing the need for specific and contextualized approaches to understanding and addressing this phenomenon<sup>2</sup>.

Several factors contribute to teenage pregnancy, notably disadvantaged socioeconomic status, low educational attainment, insufficient knowledge about the correct use of contraceptive methods, misinformation about sexuality, a history of early pregnancy in the adolescent's mother, restricted access to health services, and, especially in younger age groups, cases of sexual violence<sup>8–11</sup>. It is

important to note that the impacts of teenage pregnancy are not limited to biomedical risks for the mother and baby<sup>12</sup>. In social terms, pregnant adolescents often drop out of school, compromising their chances of continuing their education and future entry into the labor market, which can result in social exclusion and marginalization<sup>13</sup>.

This adverse social condition affects not only adolescents, but also their children, who are exposed to the consequences of early pregnancy, reinforcing the cycle of vulnerability and perpetuating low-income conditions, thus constituting a persistent public health problem<sup>2,14</sup>. Although the national literature already presents studies on the temporal trend of teenage pregnancy, these studies generally cover periods limited to a decade or focus on specific regions of the country<sup>9,12,15</sup>.

Thus, the objective of this study was to analyze the trend of live births among adolescents in Brazil, in the state of São Paulo, and in the municipality of Piracicaba, São Paulo, from 2000 to 2023.

## METHODS

### Study design

This is an epidemiological, ecological, and longitudinal study based on the analysis of secondary data from a national database covering the period from 2000 to 2023 and conducted in accordance with the *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) guidelines.

### Participants and variables

All records of live births among adolescents in Brazil, the state of São Paulo, and the municipality of Piracicaba, São Paulo, from 2000 to 2023 were included. The total number of records was 76,530.

The variable studied was: live birth rate per 1,000 female adolescents aged 10 to 14 and 15 to 19 years old, each year (from 2000 to 2023), in Brazil, the state of São Paulo, and the municipality of Piracicaba, São Paulo.

### Data sources and measurement

Data collection was performed using Tabnet software, with information from the Live Birth Information System (SINASC) provided by the Department of Informatics of the Unified Health System (DATASUS) and the Brazilian Institute of Geography and Statistics (IBGE).

### Quantitative variables

This study analyzed quantitative variables related to the live birth rate per 1,000 female adolescents, divided into two age groups: 10 to 14 years and 15 to 19 years.

### Statistical methods

Pearson correlation analyses were performed between live birth rates and the year, considering a significance level of 5%. Control charts were then constructed to study patterns in the data series. Zones A (control zones), B (alert zones), and C (central zones) were then defined in the graphs. Zones A are between 2 and 3 standard deviations from the mean, Zones B are between 1 and 2 standard deviations, and Zones C are within one standard deviation from the mean. Variations in live birth rates were analyzed in the control charts according to the following aspects: at least six consecutive years with increasing or decreasing rates, at least nine consecutive years with rates on the same side of the curve (above or below the mean), two of three consecutive years with rates in any of the Zones A, and four of five consecutive years with rates in any of the Zones B or beyond<sup>16,17</sup>.

## RESULTS

The live birth rate among adolescents aged 10 to 14 in Brazil ranged from 3.29 live births per 1,000 female adolescents in 2000 to 1.96 in 2023. There was a significant, negative, moderate correlation between the rate and the year. In other words, there was a significant decrease in the rate over time ( $p < 0.05$ ), but with a moderate correlation with the year. In the 15-19 age group, there was a signif-

icant, negative, very strong correlation between the rate and the year, with the rate decreasing from 80.08 live births per 1,000 female adolescents in 2000 to 39.00 live births per 1,000 female adolescents in 2023 ( $p < 0.05$ ). When considering the two age groups together, there is also a significant, negative, very strong correlation between the rate and the year ( $p < 0.05$ ), ranging from 42.15 live births/1,000 female adolescents in 2000 to 20.89 in 2023.

Figure 1 shows the control charts for the rate considering the city of Piracicaba, the state of São Paulo, and the entire country, as well as the two age groups and the total. For the rates in Brazil and the two age groups combined (Total), there were ten consecutive points above the average in the initial period of the study, i.e., from 2000 to 2009, indicating higher rates in this period. In addition, from 2005 to 2010, there were six consecutive years of decline, indicating a downward trend, with the rate decreasing from 38.13 in 2005 to 32.32 in 2010. From 2010 onwards, there was a trend towards stabilization in the rate, which began to decline again from 2014 (ten consecutive years of decline until 2023). During this period, the rate fell from 34.09 in 2014 to 20.89 in 2023. Thus, considering the period from 2000 to 2023, it can be said that there was a decline in the rate of live births among adolescents in Brazil.

Analyzing the two age groups separately, we can observe that for the 10-14 age group, there were seventeen consecutive years above the average in the period from 2000 to 2016 (Figure 1), indicating higher rates in this period, with rates of 3.29 in 2000 and 3.16 in 2016. From 2014 to 2020, a downward trend can be observed (with seven consecutive years of decreasing rates), decreasing from 3.57 in 2014 to 2.43 in 2020. In addition, for this same age group, from 2020 to 2023, four out of five consecutive points can be observed in the Alert and Lower Control Zones, and in 2022 and 2023, two out of three consecutive points in the Lower Control Zone, indicating that the rate

fell during the period studied. For the 15-19 age group, there were ten consecutive years with above-average rates between 2000 and 2009, indicating higher rates in this period, with rates of 80.08 in 2000 and 63.97 in 2009. From 2005 to 2010, there were six consecutive years with decreasing rates, ranging from 71.71 in 2005 to 61.51 in 2010. Furthermore, from 2014 to 2023, there were ten years with decreasing rates in this age group, and from 2015 to 2023, there were nine consecutive years with below-average rates.

For rates in the state of São Paulo, a significant, negative, strong correlation was observed between the live birth rate and the year for the 10-14 age group and a very strong correlation for the 15-19 age group,  $p < 0.05$ . In the state of São Paulo, the live birth rate among adolescents aged 10 to 14 in Brazil ranged from 2.36 live births per 1,000 female adolescents in 2000 to 0.93 live births per 1,000 female adolescents in 2023. In the 15-19 age group, it ranged from 70.27 in 2000 to 27.29 in 2023. The control chart (Figure 1), considering the two age groups together, shows sixteen consecutive years above the average from 2000 to 2015, indicating higher rates in this period. From 2005 to 2010, there was a consecutive drop from 31.17 to 26.87. Next, there was a stabilization in the rate from 2010 to 2014 and another consecutive drop from 2014 to 2023, from 28.27 to 14.17. Considering the period from 2000 to 2023, it can be said that there was a decline in the rate of live births among adolescents in the state of São Paulo (Figure 1).

When the 10-14 age group was analyzed separately, sixteen consecutive years from 2000 to 2015 showed above-average rates for the period, indicating that the highest rates occurred during this period, at 2.36 in 2000 and 2.09 in 2015. From 2014 onwards, there was a drop in the rate, from 2.33 in 2014 to 0.93 in 2023. For the 15 to 19 age group, the control chart shows sixteen consecutive years from 2000 to 2015 with above-

average rates for the period, ranging from 70.27 in 2000 to 50.67 in 2015. In the periods from 2005 to 2010 and from 2014 to 2023, there were consecutive declines in the rate, from 57.76 in 2005 to 27.29 in 2023 (Figure 1).

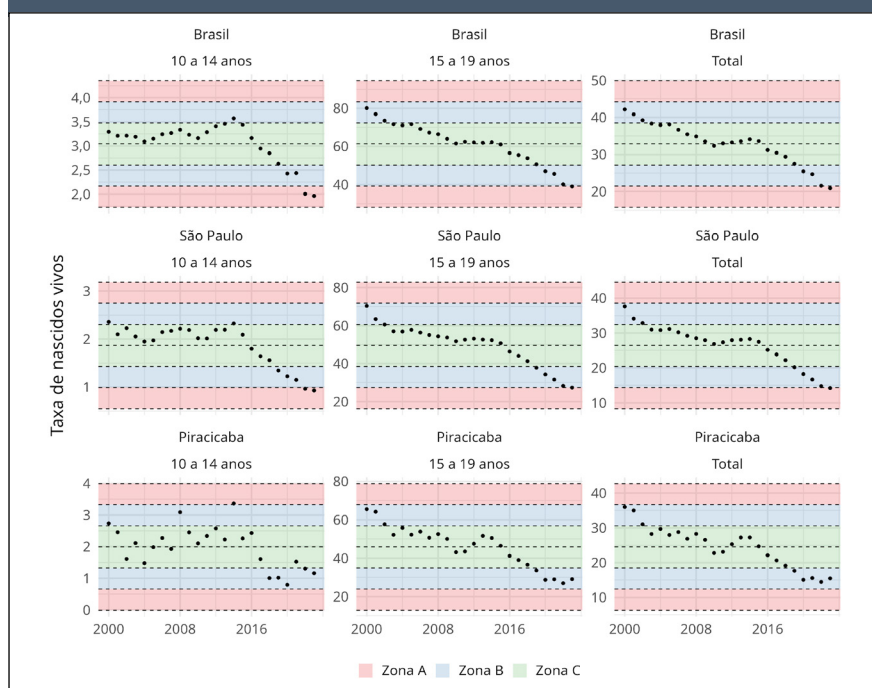
When analyzing the rates in the municipality of Piracicaba, there is a significant, negative, weak correlation between the rate and the year for the 10-14 age group and a very strong correlation for the 15-19 age group (Figure 1). In the 10-14 age group, the rate in the municipality fell from 2.74 live births per 1,000 female adolescents in 2000 to 1.16 in 2023. In the 15-19 age group, the rate fell from 65.46 in 2000 to 29.04 in 2023. When the two age groups were analyzed together in a control chart (Figure 1), it can be seen that from 2000 to 2009, there were ten years with rates above the average for the period, indicating higher rates during this period. From 2014 to 2020, there was a consecutive decline in the rate in the municipality, from 27.24 to 15.06 live births per 1,000 female adolescents. From

2019 to 2023, there were five years with rates in the lower alert zone.

For the 10-14 age group, from 2008 to 2016, there were nine years with rates above the average. For the 15-19 age group, there were ten years with above-average rates from 2000 to 2009 and eight consecutive years with decreasing rates from 2013 to 2020, falling from 51.60 in 2013 to 28.70 in 2020. From 2019 to 2023, there were five years with rates in the lower control zone (Figure 1).

Therefore, in the comparative analysis of the 10-14 age group between the country, the state, and the municipality, it can be observed that for the country and the state, there was a drop in the rate starting in 2014 (Figure 1). For the municipality of Piracicaba, however, there was fluctuation in the rate during this period. For the 15-19 age group, it can be observed that in the country and the state, there were declines in the rate from 2005 to 2010 and from 2014 onwards. In the municipality of Piracicaba, there was a decline in the rate from 2013 onwards.

**Figure 1. Control charts of the adolescent live birth rate in Brazil, the state of São Paulo, and the city of Piracicaba (number of live births/1,000 female adolescents), according to age group, from 2000 to 2023.**



## DISCUSSION

Teenage pregnancy remains a complex and multifactorial challenge in the field of public health, generating significant impacts on both the health and social development of a population. On a global scale, the prevention of early pregnancy and child marriage is included in the Sustainable Development Goals (SDGs) agenda, which includes as an indicator the adolescent birth rate per 1,000 women in this age group<sup>2,18</sup>. Brazil, as a signatory to the SDGs, has sought to align its public policies with the proposed goals. This study showed a downward trend in both age groups observed, although with different dynamics over time in Brazil. Among adolescents aged 10 to 14, there has been a continuous reduction since 2014, when the rate was 3.57 live births per 1,000 adolescents, reaching 1.96 in 2023. In the 15-19 age group, the downward trend began in 2005, with a rate of 71.71, which fell progressively to 39.00 in 2023. These results indicate important advances in reducing adolescent fertility, albeit at different rates among age groups. The findings of this study corroborate the results of Monteiro et al. (2021)<sup>19</sup>, which indicate that there was a 37.2% drop in teenage pregnancies in all regions of the country.

According to the WHO, globally, the birth rate among adolescents aged 10 to 14 in 2023 was estimated at 1.5 per 1,000 women, with higher rates in underdeveloped regions such as Sub-Saharan Africa and Latin America<sup>2,20</sup>. Thus, according to the data shown in this study, Brazil achieved results slightly higher than the international average for underdeveloped regions in 2023 (1.96 live births per 1,000 female adolescents). In the 15-19 age group, there has been a downward trend in the live birth rate in Brazil since 2005, reaching 39.00 live births per 1,000 female adolescents

in 2023. According to the WHO (2024)<sup>2</sup>, the global birth rate in this same age group decreased from 64.5 per 1,000 women in 2000 to 41.3 in 2023, indicating that, in general, Brazil performed better than the global average, reflecting advances in fertility control among adolescents in the country.

The downward trend in live birth rates among adolescents indicates potential advances in public health and education policies aimed at preventing early pregnancy, such as the Health at School Program (PSE)<sup>21</sup>, as well as in expanding access to contraceptive methods. In the Brazilian context, the Ministry of Health has promoted initiatives such as the National Week for the Prevention of Teenage Pregnancy and the National Plan for the Primary Prevention of Early Sexual Risk and Teenage Pregnancy, with the aim of strengthening knowledge on the subject, training health professionals, raising community awareness, improving services, and involving families.

A survey conducted in 2023<sup>24</sup> showed that the school environment is one of the most effective strategies for promoting reproductive health education and preventing teenage pregnancy, which corroborates the findings of the present analysis by demonstrating the downward trend in the live birth rate among adolescents in Brazil. It should be noted that the PSE, established in 2007, coincides with the beginning of this reduction, suggesting a possible relationship between intersectoral policies and the decline in adolescent fertility. However, a study by Assis et al. (2022)<sup>25</sup> points out that inadequate education for this age group is directly associated with the recurrence of teenage pregnancy, showing that among adolescents who drop out of school, in addition to the lack of formal education, already associated with a higher incidence of early preg-

nancy<sup>26</sup>, there is also a lack of sex education by the PSE, which reinforces the findings observed in this study.

Although the live birth rate among adolescents has been declining overall in Brazil, this reduction is not uniform across all regions, as several studies have pointed out. Borges et al. (2016)<sup>9</sup> identified higher fertility rates in the North and lower rates in the Southeast. Similarly, Vaz et al. (2016)<sup>27</sup> observed that between 2000 and 2011, there was a 5.0% increase in the number of live births to mothers aged 10 to 14 in the North and Northeast regions, while the other regions showed a decline. These data indicate an inverse relationship between the proportion of live births and the Human Development Index (HDI).

The HDI, which considers indicators of income, health, and education, has a direct influence on investments aimed at improving the living conditions of the population, significantly impacting the trajectories of adolescents<sup>28</sup>. When young women have favorable economic prospects, they are more likely to invest in their human capital, which can contribute to the postponement of early motherhood<sup>20,30</sup>. Even in regions considered more developed, structural challenges persist, such as socio-spatial segregation and inequality, especially when taking into account the heterogeneity among Brazilian states<sup>31</sup>. Although the state of São Paulo has an HDI of 0.783, higher than the national average of 0.754, this higher level of relative development is not sufficient to eliminate internal inequalities that negatively impact various social indicators, including teenage pregnancy. The results of this study show a downward trend in live birth rates among adolescents aged 10 to 19 in the state of São Paulo since 2014. In 2023, there was a rate of 0.93 live births per 1,000 female adolescents aged 10 to 14, and 27.29

per 1,000 adolescents aged 15 to 19.

In the state of São Paulo, the reduction in live birth rates among adolescents can be attributed, in part, to the implementation of the Adolescent Health Program. In this context, the work of the 29 Adolescent Houses stands out, offering multidisciplinary care with an emphasis on educational activities on contraception and reproductive planning<sup>33</sup>. Another example is the "Vale Sonhar" project, included in the high school biology curriculum since 2008, with the aim of promoting sexuality education through workshops<sup>34</sup>. It should be noted that São Paulo has the largest population of illicit drug users in the country. In this context, Bessa et al. (2010)<sup>35</sup> identified that the use of cocaine or marijuana during pregnancy in adolescents is associated with reports of at least three sexual partners, highlighting the need for specific interventions to further reduce the rate in the state.

It should also be noted that Martinez et al. (2011)<sup>36</sup> demonstrated that early pregnancy in the state of São Paulo is more frequent in municipalities with lower GDP per capita, higher poverty rates, lower HDI, and a higher proportion of individuals classified as grade 5 or 6 in the São Paulo Social Vulnerability Index, confirming the strong association between teenage pregnancy and socioeconomic vulnerability. The data from this study show that the live birth rate among adolescents in Piracicaba varied over the period analyzed. In 2023, there were 1.16 live births per 1,000 girls aged 10 to 14. In the 15-19 age group, there was a downward trend from 2013 onwards, with the rate falling from 51.60 to 29.04 live births per 1,000 female adolescents in 2023.

In Piracicaba, data reveal that between 2008 and 2016, live birth rates among girls aged 10 to 14 remained consistently above average and higher than in the state of São Paulo in 2023.

This scenario may be related to the process of decentralization and municipalization of health services, in which the implementation of public policies is the responsibility of local managers, who, although they have a closer understanding of the reality of the territory, may adopt different priorities and approaches. This occurs despite the guidelines established by the Ministry of Health since 2000, through the booklet *"The pregnant adolescent and municipal health services"*<sup>37</sup>, which provides guidance on the actions that health services should offer to prevent teenage pregnancy.

On the other hand, outside the direct control of public managers, pregnancies among adolescents aged 10 to 14 are often associated with sexual violence and coercion, factors that contribute significantly to the increase in rates in this age group, since early sexual relations tend to occur more frequently in a non-consensual manner<sup>38</sup>, indicating the need to strengthen public policies against sexual violence. Finally, another challenge to understanding and addressing teenage pregnancy is the socio-cultural heterogeneity of the public. The 10-14 age group also requires a differentiated and meticulous approach<sup>39</sup>. Data on violence highlight the violation of the rights of girls and women, who, in addition to sexual violence, face risks such as sexually transmitted infections and unwanted pregnancies, aggravating their vulnerability<sup>40</sup>. In some contexts, however, teenage pregnancy can be seen as a goal, whether through the search for recognition through motherhood, the desire to start a family, or emotional needs. The lack of alternatives and future prospects can also influence this choice<sup>41</sup>.

This study has some limitations that should be considered, such as the possibility of underreporting in SINASC, which may compromise

the accuracy of the results; and the absence of comparison with socio-demographic and geospatial data, which could help to draw up a more complete profile of the population exposed to risk factors for early pregnancy. Future research may explore the relationship between adolescent fertility rates and sociodemographic and geographic variables, deepening our understanding of the phenomenon and regional inequalities. Among the strengths of the study is the analysis of an extensive time series, which allows for the continuous monitoring and evaluation of health actions aimed at reducing adolescent pregnancy. Another relevant aspect is the comparison between the trends observed in Brazil, the state of São Paulo, and the municipality of Piracicaba, offering a broad view of regional differences and the effectiveness of public policies in different contexts.

## CONCLUSION

There was a reduction in live birth rates among adolescents in Brazil, the state of São Paulo, and Piracicaba between 2000 and 2023.

## REFERENCES

1. Instituto Brasileiro de Geografia e Estatística. Censo demográfico, 2023.
2. World Health Organization (WHO). Adolescent health. 2024.
3. World Health Organization (WHO). Adolescent health. 2020.
4. Brasil. Ministério da Saúde. Gravidez na adolescência: saiba os riscos para mães e bebês e os métodos contraceptivos disponíveis no SUS, 2023.
5. Gonçalves H, Machado EC, Soares ALG, Camargo-Figuera FA, Seerig LM, Mesenburg MA, et al. Início da vida sexual entre adolescentes (10 a 14 anos) e comportamentos em saúde. *Rev Bras Epidemiol*. 2015;18(1):25-41.
6. Bicalho, MLC et al. Trends in fertility rates, proportion of antenatal consultations and caesarean sections among Brazilian adolescents. *Revista Brasileira de Enfermagem*, v. 74, p. e20200884, 2021.
7. Fundo das Nações Unidas para a População (UNFPA). Sem Deixar Ninguém para Trás: Gravidez, Maternidade e Violência Sexual na Adolescência. 2023.
8. Darroch JE, Woog V, Bankole A, Ashford LS. Adding it up: costs and benefits of meeting the contraceptive needs of adolescents. Guttmacher Institute. 2016.
9. Borges, A.L.V., Chofakian, C.B.d.N., Sato, A.P.S. et al. Fertility rates among very young adolescent women: temporal and spatial trends in Brazil. *BMC Pregnancy Childbirth* 16, 57 (2016).
10. Santos, L. A. V., Lara, M. O., Lima, R. C. R., Rocha, A. F., Rocha, E. M., Glória, J. C. R., & Ribeiro, G. de C. (2018). História gestacional e características da assistência pré-natal de puérperas adolescentes e adultas em uma maternidade do interior de Minas Gerais, Brasil. *Ciência & Saúde Coletiva*, 23(2), 617-625.
11. Silva ALR, Nakagawa JTT, Silva MJP. A composição familiar e sua associação com a ocorrência da gravidez na adolescência: estudo caso-controle. *Rev Enferm UERJ*. 2020;28:36283.
12. Sodré, N.S. et al. Gravidez na adolescência: aspectos epidemiológicos da maternidade precoce no Estado do Pará, Brasil. *Saúde em Debate*, v. 16, n. 2, e11200, 2023.
13. Marteleto LJ, Villanueva A. The educational consequences of adolescent childbearing and union formation in Brazil. *Stud Fam Plann*. 2018;10.1111/sifp.12071.
14. Zangiacomi Martinez E, da Roza DL. Ecological analysis of adolescent birth rates in Brazil: Association with Human Development Index. *Women Birth*. (2020).
15. Pinto IV, Bernal RTI, Souza JB, Andrade GN, Araújo LF, Felisbino-Mendes MS, Souza MFM, Montenegro MMS, Vasconcelos NM, Malta DC. Pregnancy in girls under 14 years old: Spatial analysis in Brazil, 2011-2021. *Cien Saude Colet*. 2024 Sep;29(9):e10582024. Portuguese, English.
16. Arantes, A, Carvalho ES, Medeiros EAS, Farha CK, Mantese OC. Uso de diagramas de controle na vigilância epidemiológica das infecções hospitalares. *Revista de Saúde Pública*. 2003. 37,768-774.
17. Jones B. Avoiding Data Pitfalls: How to Steer Clear of Common Blunders When Working with Data and Presenting Analysis and Visualizations. Hoboken, New Jersey: John Wiley & Sons, Inc. 2020
18. United Nations. Transforming our world: the 2030 Agenda for Sustainable Development. 2015.
19. Monteiro DLM, Monteiro IP, Machado MSC, et al. Trends in teenage pregnancy in Brazil in the last 20 years (2000-2019). *Rev Assoc Med Bras* (1992). 2021;67(5):759-765.
20. United Nations. Department of Economic and Social Affairs, Population Division. World family planning 2020 highlights: accelerating action to ensure universal access to family planning (ST/ESA/SER.A/450). New York: United Nations; 2020.
21. Brasil. Decreto nº 6.286, de 5 de dezembro de 2007. Institui o Programa Saúde na Escola - PSE, e dá outras providências. 2007.

22. Brasil. Ministério da Saúde. Lei nº 13.798, de 3 de janeiro de 2019.
23. Brasil. Ministério da Saúde. Secretaria de Atenção Primária à Saúde. Departamento de Ações Programáticas. Manual de gestação de alto risco. Brasília: Ministério da Saúde; 2022.
24. Alves TV, et al. Principais alterações fisiológicas e psicológicas durante o período gestacional. *Id on Line Rev Mult Psic*. 2023;14(49):2324.
25. Assis TSC, Martinelli KG, Gama SGND, Santos Neto ETD. Recurrence of teenage pregnancy: associated maternal and neonatal factor outcomes. Reincidência de gravidez na adolescência: fatores associados e desfechos maternos e neonatais. *Cien Saude Colet*. 2022;27(8):3261-3271.
26. Faisal-Cury A, Tabb KM, Niciunovas G, Cunningham C, Menezes PR, Huang H. Lower education among low-income Brazilian adolescent females is associated with planned pregnancies. *Int J Womens Health*. 2017;9:43-48.
27. Vaz RF, Monteiro DL, Rodrigues NC. Trends of teenage pregnancy in Brazil, 2000-2011. *Rev Assoc Med Bras (1992)*. 2016 Jul;62(4):330-5.
28. Programa das Nações Unidas para o Desenvolvimento (PNUD). Relatório do Desenvolvimento Humano, 2015.
29. Kearney MS, Levine PB. Why is the teen birth rate in the United States so high and why does it matter? *J Econ Perspect*. 2012.
30. Kearney MS, Levine PB. Income inequality and early non-marital childbearing. *J Hum Resour*. 2014.
31. Viana ALA, Rocha JSY, Elias PE, Ibañez N, Novaes MHD. Modelos de atenção básica nos grandes municípios paulistas: efetividade, eficácia, sustentabilidade e governabilidade. *Ciênc Saúde Coletiva*. 2006;11:577-606.
32. Programa das Nações Unidas para o Desenvolvimento (PNUD). Atlas do Desenvolvimento Humano no Brasil. Brasília: PNUD, 2013. Disponível em: <http://www.atlasbrasil.org.br>. Acesso em: 16 jun. 2025.
33. Instituto de Saúde. Adolescência e Saúde 4 - construindo saberes, unindo forças, consolidando direitos / organizado por Neusa Francisca de Jesus (coord.), José Maria Soares Junior, Sandra Dircinha Teixeira de Araújo Moraes. São Paulo: Instituto de Saúde, 2018.
34. Antoniassi PV, Miranda MAGC. Projeto Vale Sonhar como instrumento de educação sexual nas escolas públicas de São Paulo. *Revista Eletrônica de Educação*, v.14, 1-19, e3801101, jan./dez. 2020.
35. Bessa MA, Mitsuhiro SS, Chalem E, Barros MC, Guinsburg R, Laranjeira R. Correlates of substance use during adolescent pregnancy in São Paulo, Brazil. *Braz J Psychiatry*. 2010;32(1):66-69.
36. Martinez EZ, Roza DL, Caccia-Bava Mdo C, Achcar JA, Dal-Fabbro AL. Gravidez na adolescência e características socioeconômicas dos municípios do Estado de São Paulo, Brasil: análise espacial [Teenage pregnancy rates and socioeconomic characteristics of municipalities in São Paulo State, Southeast Brazil: a spatial analysis]. *Cad Saude Publica*. 2011;27(5):855-867.
37. Brasil. Ministério da Saúde. Cartilha gravidez na adolescência, 2000. Disponível em: [https://bvsms.saude.gov.br/bvs/publicacoes/0101adolescente\\_gravida.pdf](https://bvsms.saude.gov.br/bvs/publicacoes/0101adolescente_gravida.pdf)
38. Finer LB, Zolna MR. Shifts in intended and unintended pregnancies in the United States, 2001-2008. *Am J Public Health*. 2014.
39. Cabral C da S, Brandão ER. Gravidez na adolescência, iniciação sexual e gênero: perspectivas em disputa. *Cad Saúde Pública*. 2020;36(8):e00029420.
40. Pinto IV, Bernal RTI, Souza JB, Andrade GN, Araújo LF, Felisbino-Mendes MS, Souza MFM, Montenegro MMS, Vasconcelos NM, Malta DC. Pregnancy in girls under 14 years old: Spatial analysis in Brazil, 2011-2021. *Cien Saude Colet*. 2024 Sep;29(9):e10582024. Portuguese, English.
41. Dias ACG, Teixeira MAP. Gravidez na adolescência: um olhar sobre um fenômeno complexo. *Paid Ribeirão Preto*. 2010;20(45):123-131.