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Impact of the COVID-19 Pandemic on Vulnerable Obstetric Patients' Access to Reproductive Services: A Before and after Analysis in an Academic Medical Center in Romania

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ABSTRACT

Background: Teenage pregnancy as a vulnerable group of obstetric patients remains a global public health concern, with heterogeneous trends reported during the COVID-19 pandemic. While some low- and middle-income countries documented increases in adolescent pregnancies, other regions showed stability or even reductions. Romania has persistently high rates of adolescent pregnancies, but little is known about the impact of the pandemic on very young adolescents. This study aimed to assess whether the COVID-19 pandemic influenced the incidence of pregnancies and delivery outcomes among girls under 16 years of age in Romania. **Material and Methods:** A retrospective observational study was conducted, including all live births among girls aged 12–16 years between January 2018 and December 2024. Variables analyzed were maternal age, year of birth, and mode of delivery (spontaneous vs. cesarean section). Three time periods were defined: pre-pandemic (2018–2019), pandemic (2020–2021), and post-pandemic (2022–2024). **Results:** A total of 414 births were recorded. Annual cases ranged from 42 in 2020 to 76 in 2019. The majority occurred among 15–16-year-olds, while pregnancies at ages 12–13 were rare. Spontaneous vaginal delivery predominated, with cesarean sections accounting for 9–19% annually. Statistical testing revealed no significant differences between periods in either the number of births ($H = 2.20$, $p = 0.332$) or delivery mode ($\chi^2(2) = 0.36$, $p = 0.835$). **Conclusions:** Despite pandemic-related disruptions in access to reproductive health services, there was no increase in pregnancies among adolescents under 16 years in Romania. However, the concentration of cases in the 14–16 age group highlights the need for targeted reproductive health interventions and continuity of care during health system crises.

Keywords: adolescent pregnancy, COVID-19 pandemic, reproductive health, cesarean section, Romania

INTRODUCTION

Teenage pregnancy remains a pressing global public health concern, with an estimated 7.3 million girls under the age of 18 becoming pregnant each year.[1] While adolescent birth rates have generally declined in many regions over recent decades, wide disparities persist. In Europe, for instance, countries such as Romania and Bulgaria continue to report some of the highest teenage pregnancy and abortion rates, whereas Switzerland records the lowest.[2] In the United States, teenage birth rates declined steadily by about 2% annually from 2014 to 2020, reflecting the impact of sustained prevention programs and improved access to reproductive health services.[3] However, this downward trajectory has not been universal; in Africa, pooled prevalence remains at approximately 30%, with significant rural–urban differences.[4]

The COVID-19 pandemic disrupted these preexisting trends, exerting both direct and indirect effects on adolescent sexual and reproductive health. School closures, limited mobility, and healthcare service disruptions contributed to increases in adolescent pregnancies in several low- and middle-income countries. In Uganda, prevalence increased by 8% during lockdown, with significant month-to-month upward trends.[4] Similarly, studies from Kenya documented elevated risks, with hazard ratios up to 1.60 in urban areas and adjusted risk ratios exceeding 2.0 in rural counties.[5,6] South Africa reported alarming rises in adolescent births: 48.7% among 10–14-year-olds and 17.9% among 15–19-year-olds during the pandemic.[7]

By contrast, other regions demonstrated stability or even reductions in adolescent pregnancy rates. In the United States, data from Tennessee revealed no significant differences between pre-pandemic (5.8%) and pandemic (5.9%) prevalence,[8] while an urban adolescent clinic reported only a temporary spike in new pregnancy diagnoses that later returned to baseline.[9] In Brazil, despite notable declines in contraceptive use and intrauterine device insertions, national figures showed an 8.4% reduction in adolescent birth rates during the first year of the pandemic.[10] Likewise, a Canadian study reported lower-than-expected rates, with a persistent reduction in care utilization.[11]

These heterogeneous outcomes underscore the complexity of adolescent reproductive health in times of crisis. Factors such as educational attainment, rural residence, and socioeconomic status continue to shape vulnerability, with school closures and limited contraceptive access serving as amplifiers of risk in resource-limited settings.[12,13] In some contexts, the pandemic further exacerbated gender-based violence and forced school dropouts, intensifying adolescent exposure to unintended pregnancies.[14] At the same time, countries that maintained contraceptive distribution networks, despite health system disruptions, demonstrated resilience against rising teenage pregnancies.[10]

Taken together, the evidence highlights the fragility of progress in reducing adolescent pregnancies, which can be quickly reversed during health system shocks. Given the uneven trends observed across different regions, it is essential to evaluate country-specific situations. Romania represents a particularly relevant context, with persistently high adolescent pregnancy rates and strong rural–urban disparities. This study therefore aims to analyze births among minors under 16 years across a 7-year window (2018–2024), comparing pre-pandemic, pandemic, and post-pandemic trends. The analysis provides insights into whether disruptions in access to reproductive services translated into increased adolescent pregnancies and explores potential implications for maternal and fetal outcomes.

MATERIALS AND METHODS

This study employed a retrospective observational design, focusing on births among adolescent girls younger than 16 years, recorded between January 2018 and December 2024. Data were anonymous and were extracted from institutional birth records of Emergency County Hospital Târgu Mureș.

All cases of live births to mothers aged 12–16 years during the study period were included. The following variables were analyzed:

- maternal age at delivery (12–16 years);
- year of birth;
- mode of delivery (spontaneous vaginal vs. cesarean section).

Pregnancies ending in abortion or miscarriages were not included in the dataset. To account for the potential impact of the COVID-19 pandemic, three time intervals were defined:

- pre-pandemic: 2018–2019;
- pandemic: 2020–2021;
- post-pandemic: 2022–2024.

Descriptive statistics (absolute numbers, percentages) were used to summarize the data. Age-specific distributions and annual delivery trends were compared across the three intervals. Differences in delivery mode proportions were explored using chi-squared tests, and temporal varia-

TABLE 1. Births among <16-year-olds by year and delivery mode, 2018–2024

Year	Period	Spontaneous	Cesarean	Total	Cesarean %	Spontaneous %
2018	Pre-pandemic (2018–2019)	47	11	58	19	81
2019	Pre-pandemic (2018–2019)	69	7	76	9.2	90.8
2020	Pandemic (2020–2021)	38	4	42	9.5	90.5
2021	Pandemic (2020–2021)	48	9	57	15.8	84.2
2022	Post-pandemic (2022–2024)	54	9	63	14.3	85.7
2023	Post-pandemic (2022–2024)	48	7	55	12.7	87.3
2024	Post-pandemic (2022–2024)	51	12	63	19	81

tions were assessed descriptively through trend analysis.

All data were anonymized before analysis. Given that the dataset was derived from aggregated records, no individual patient consent was required. Ethical approval requirements will be addressed according to the institutional policies of the data source. Data were analyzed using IBM SPSS Statistics (IBM Corp). Descriptive statistics were first computed for all study variables, including frequencies, percentages, and means where appropriate.

To compare annual numbers of births across the three study periods, a Kruskal–Wallis test was applied, given the small sample size and the non-normal distribution of counts. The distribution of delivery mode across the same periods was evaluated using Pearson's chi-squared test of independence. Test results are reported as chi-squared values, degrees of freedom, and asymptotic significance (Asymp. Sig.). A p value of < 0.05 was considered statistically significant.

The data were collected anonymously and retrospectively from public databases; therefore, approval from an ethics committee was not required.

RESULTS

A total of 414 births among girls younger than 16 years were recorded between 2018 and 2024. Annual counts ranged from a maximum of 76 cases in 2019 to a minimum of 42 cases in 2020, corresponding to the first year of the COVID-19 pandemic (Figure 1, Table 1).

Regarding delivery mode, spontaneous vaginal births predominated throughout the entire study period. Cesarean deliveries accounted for approximately 9–19% of cases annually, with no clear upward or downward trend observed across the 7 years (Figure 2, Table 1).

Age-specific analysis showed that the majority of cases occurred among 15–16-year-olds, with far fewer cases reported at ages 12–13. Specifically, the highest single-year burden was recorded among 16-year-olds in 2019 (40 cas-

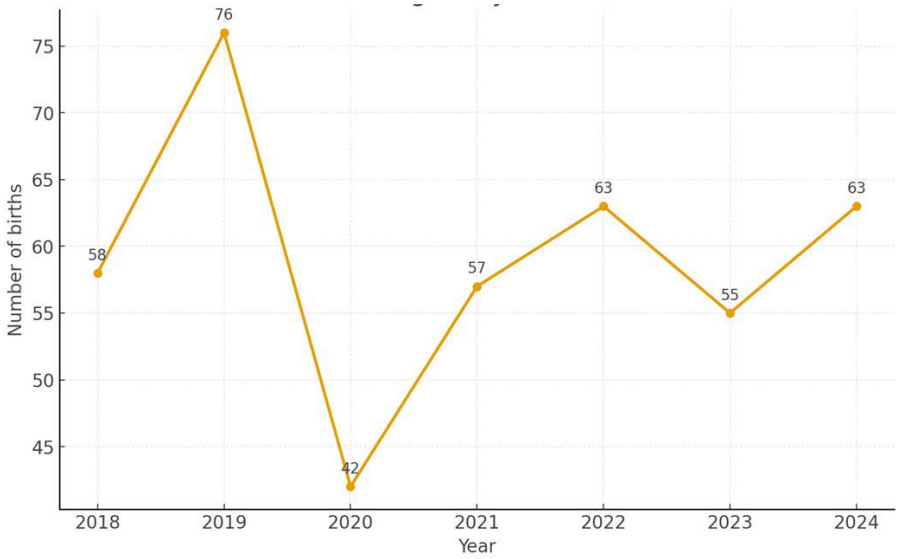

FIGURE 1. Total births among <16-year-olds, 2018–2024

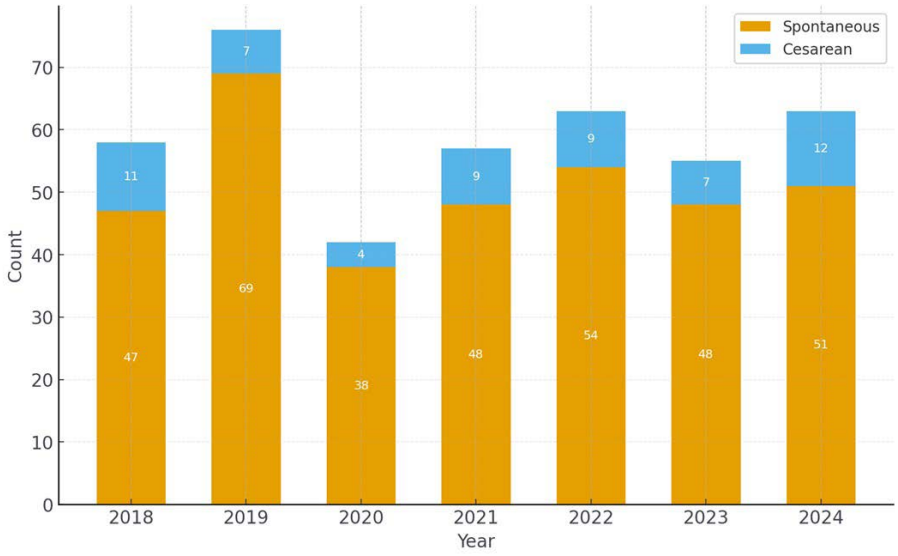

FIGURE 2. Births by delivery mode (<16), 2018–2024

es) and among 14-year-olds in 2024 (14 cases). In contrast, pregnancies at age 12 were extremely rare (only one case in 2022). It should be noted, however, that age data for 2022 were incomplete, as the sum of age-disaggregated births was lower than the total reported for that year (43 vs. 63), suggesting possible reporting gaps (Figure 3, Table 2).

When comparing defined time intervals, the average annual number of births was 66.9 in the pre-pandemic period (2018–2019), decreased to 49.5 during the pandemic (2020–2021), and partially rebounded to 60.3 in the post-pandemic period (2022–2024). Cesarean delivery rates remained stable across these three periods, averaging around 14–15% (Figure 4, Table 3).

Overall, these results suggest that despite documented difficulties in accessing reproductive health services during the COVID-19 pandemic, there was no increase in the number of adolescent pregnancies under 16 years in the analyzed setting. Instead, a temporary decline was observed in 2020, followed by stabilization in subsequent years.

Table 4 presents the distribution of annual births across the three periods, together with the Kruskal–Wallis test. Although the mean number of annual births appeared higher in the pre-pandemic years (M = 67.0) compared to the pandemic years (M = 49.5) and slightly lower in the post-pandemic period (M = 60.3), the differences were not statistically significant. The Kruskal–Wallis test indicated

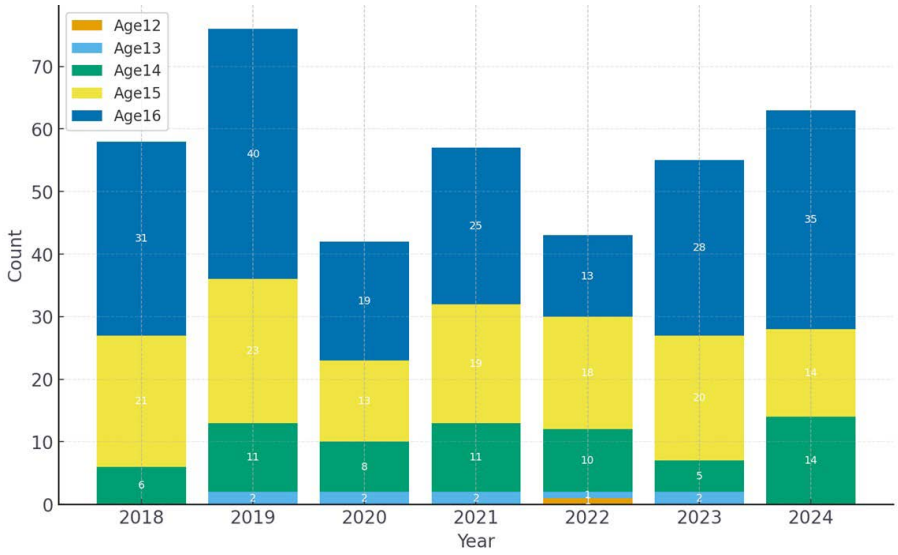

FIGURE 3. Age distribution (12–16) of births by year, 2018–2024

TABLE 2. Age distribution of births among <16-year-olds, 2018–2024

Year	Age12	Age13	Age14	Age15	Age16	Reported age total	Computed sum	Age data complete vs. total
2018	0	0	6	21	31	58	58	OK
2019	0	2	11	23	40	76	76	OK
2020	0	2	8	13	19	42	42	OK
2021	0	2	11	19	25	57	57	OK
2022	1	1	10	18	13	43	43	Mismatch
2023	0	2	5	20	28	55	55	OK
2024	0	0	14	14	35	63	63	OK

H(2) = 2.20, Asymp. Sig. = 0.332, confirming that the observed variation did not reach significance.

Table 5 shows the crosstabulation of delivery mode (spontaneous vs. cesarean) by study period, together with the chi-squared test. The proportion of cesarean deliveries remained relatively stable, ranging between 13–18% across all periods. Pearson's chi-squared test confirmed that the differences were not significant: $\chi^2(2) = 0.36$, Asymp. Sig. = 0.835.

DISCUSSION

Our analysis of births among girls under the age of 16 in Romania between 2018 and 2024 shows that the COVID-19 pandemic did not lead to an increase in pregnancies in this age group. On the contrary, a temporary decline was observed in 2020, followed by stabilization in subsequent years. These findings contrast with reports from several low- and middle-income countries, where school closures, reduced healthcare access, and socioeconomic stressors contributed to sharp increases in adolescent pregnancies. For example, Uganda reported an 8% increase during lockdown, with marked month-to-month upward trends,[4] while studies in Kenya found elevated risks with hazard ratios up to 1.60 in urban areas and adjusted risk ratios above 2.0 in rural settings.[5,6] Similarly, South Africa documented substantial rises in adolescent births: 48.7% among 10–14-year-olds and 17.9% among 15–19-year-olds during the pandemic.[7] By contrast, our results align more closely with evidence from high- and middle-income countries where no significant increase was observed. In Tennessee, USA, the prevalence of adolescent pregnancy remained unchanged (5.8% vs. 5.9%) across pre-pandemic and pan-

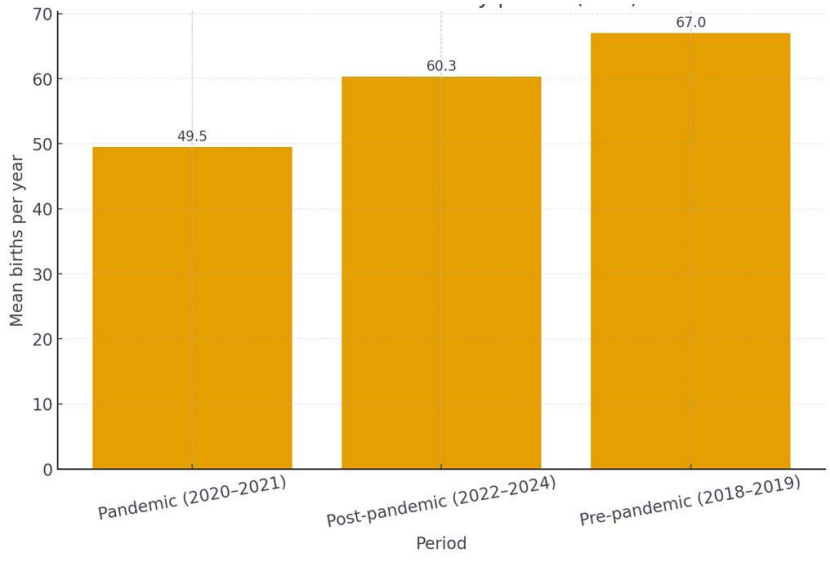

FIGURE 4. Mean annual births among <16-year-olds by study period

TABLE 3. Summary of births among <16-year-olds by study period

Period	Total births	Mean annual births	Cesarean rate mean
Pandemic (2020–2021)	99	49.5	12.65
Post-pandemic (2022–2024)	181	60.33333	15.33333
Pre-pandemic (2018–2019)	134	67	14.1

TABLE 4. Annual births by period (<16 years) and Kruskal–Wallis test results

Period	No. of years	Annual births	Mean
Pandemic (2020–2021)	2	58. 76	67
Post-pandemic (2022–2024)	2	42. 57	49.5
Pre-pandemic (2018–2019)	3	63. 55. 63	60.3
Test	**Chi-squared**	**df**	**Asymp. Sig. (p)**
Kruskal–Wallis H	2.2	2	0.332

TABLE 5. Crosstabulation of delivery mode by study period and chi-squared test results

Delivery mode	Pre-pandemic (2018–2019)	Pandemic (2020–2021)	Post-pandemic (2022–2024)	Total
Spontaneous	116	86	153	355
Cesarean	18	13	28	59
Test	**Value**	**df**	**Asymp. Sig. (p)**	
Pearson chi-squared	0.36	2	0.835	

demic years,[8] and an urban adolescent clinic reported only a temporary spike in pregnancy diagnoses that soon returned to baseline.[9] Brazil even reported an 8.4% reduction in adolescent birth rates during the first pandemic year, despite declines in contraceptive use and intrauterine device insertions.[10] Similarly, Canadian data indicated lower-than-expected adolescent pregnancy rates, coupled with reduced healthcare utilization.[11]

Several factors may explain why Romania did not experience a surge in adolescent pregnancies during the pandemic. First, although healthcare access was disrupted, emergency obstetric and reproductive care remained available, particularly in hospital settings. Second, cultural and demographic factors may play a role: adolescent pregnancies in Romania are concentrated in disadvantaged rural areas and within marginalized populations, where social determinants of health (low education, poverty, limited contraception access) exert long-term effects that are less sensitive to short-term crises. This contrasts with the acute pandemic-related effects reported in Sub-Saharan Africa, where school closures and gender-based violence were major drivers of new cases.[12–14]

At the same time, our findings suggest that while the number of pregnancies did not increase, outcomes for adolescent mothers and their infants may still have been affected. International evidence shows that pregnant adolescents often experienced delayed access to antenatal care and increased complications during the pandemic, even when pregnancy incidence remained stable.[10,11] This concern is supported by our data showing that cesarean section rates remained relatively stable, but maternal age distribution continued to cluster in the youngest, most vulnerable categories (14–16 years).

The study provides a rare focus on very young adolescents (<16 years), a group often underrepresented in reproductive health research. The 7-year time window allowed for clear comparison across pre-pandemic, pandemic, and post-pandemic periods. However, several limitations should be acknowledged. The analysis was restricted to live births, excluding abortions and miscarriages, which may underestimate the true burden of adolescent pregnancies. Additionally, age-specific data for 2022 were incomplete, potentially affecting the accuracy of distributional analysis. Finally, the findings reflect cases recorded

in a specific institutional setting – a single academic level III maternity unit and therefore generalizability at the national level should be considered with caution.

CONCLUSION

This study examined births among girls under 16 years of age in Romania over a 7-year period, covering pre-pandemic, pandemic, and post-pandemic intervals. The analysis revealed that, unlike trends observed in some low- and middle-income countries, the COVID-19 pandemic did not result in an increase in very young adolescent pregnancies in this setting. Instead, a temporary decline occurred in 2020, followed by stabilization in subsequent years.

Mode of delivery remained largely unchanged, with spontaneous births predominating and cesarean rates remaining stable across the three periods. Statistical testing confirmed that neither the incidence of adolescent births nor the distribution of delivery modes differed significantly across time intervals.

From a clinical and public health perspective, these results underscore that while disruptions in access to reproductive services during the pandemic did not increase pregnancy incidence, the continued concentration of cases among 14–16-year-olds highlights a persistent vulnerability. Strengthening adolescent reproductive health education, ensuring equitable access to contraception, and safeguarding continuity of care during future health system shocks are crucial to improving maternal and neonatal outcomes in this high-risk population.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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