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**The pregnancy rate among Romanian adolescents: an eleven years (2009–2020)
observational, retrospective study from a single center**

[Running title:] **Adolescent pregnancy in Romania**

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ABSTRACT

Objectives: It has been recently documented that Romania has the highest prevalence of adolescent pregnancy in Europe.

Material and methods: Therefore, the present study aims to offer a conclusive view of the current situation by assessing a series of parameters in the last 11 years.

Results: Throughout the present manuscript, we showed that 1788 pregnancies occurred in the last 11 years in just one center from the northeastern region of Romania. The Kolmogorov–Smirnov test ($p < 0.05$) performed suggests that gestational age does not follow a normal distribution; an interval during which 899 (50.27%) male and 889 (49.72%) female babies were born. There were a total of 1383 (86.00%) deliveries at full-term and 225 (13.99%) were under 37 weeks. Of 1788 teenage girls, 1467 (82.04%) were from the rural area, whereas 321 (17.95%) from the urban area.

Conclusions: Fortunately, one common feature that we observed was that starting from 2017 there was a significant reduction within the last 2 studied parameters, the situation being

much more fluctuating until 2014.

Key words: adolescent pregnancy; birth under 37 weeks; full-term birth; gestational age; prevalence; rural; urban

INTRODUCTION

Congruent with the World Health Organization's (WHO) guidelines, "adolescent pregnancy" is by definition the process of child-bearing in which the mother's age is under twenty years old before the ending of the current gestation. The latest figures issued indicate that more than 20 million girls remain pregnant during the transition period from adolescence to early adulthood. Around 12 million give birth, whereas approximately 800 000 births occur when girls are under the age of 15 [1].

Even though the tendency of unintended pregnancies is growing in developed countries, the governments possess all the resources necessary to mediate this phenomenon. Unfortunately, this is not the case for lower or middle-class countries [2]. It was previously documented that various factors are responsible [3].

One example of a middle-class country with no strong knowledge in terms of sexual education is Romania, which currently has the highest number of cases of teenage pregnancies in Europe; around 34 700 pregnancies in 2011 according to the United Nations Statistics Division's Demographic Yearbook data [4]. By analyzing all evidence, only on two previous occasions, it has been discussed by the authors the critical phase encountered in Romania [5, 6].

The repercussions are pronounced, starting from the method of delivery which, imperatively, affects the fetus [7, 8] and may culminate in death [9]. On the other hand, among 21 countries with liberal abortion laws, the percentages regarding the number of abortions is 61% [4], this further indicating a poor family planning [10].

Based on the aforementioned, the main objectives that defined the present study are the following: (I) to establish the prevalence of adolescent pregnancy; (II) gestational age, (III) full-term births versus those under 37 weeks, and (IV) the percentage of minors from the urban (U) and rural (R) area that gave birth.

MATERIAL AND METHODS

Data

The data used in this manuscript correspond to the period 2009–2020. All information needed have been extracted from the archive of the Clinical Hospital of Obstetrics and

Gynecology “Cuza Voda” from Iasi, a reference unit from the northeastern region of Romania.

Study participants

A total of 1788 (mean = 16.32; confidence interval [CI] 95% = 0.04) teenage girls were included in this study and subsequently divided into groups based on their age. From the total, (n = 1) was 11, (n = 2) 12, (n = 13) 13, (n = 54) 14, (n = 221) 15, (n = 539) 16, and (n = 958) 17. As we mentioned above, this manuscript describes the situation of 1788 teenage girls that have been hospitalized in “Cuza Voda” from Iasi in the last 11 years. The main procedures that girls underwent were as follows: 580 had an emergency lower segment caesarean section (C-section); 537 had episiotomy; 239 had postpartum evacuation of uterus by dilatation and curettage; 114 had suture of 1st or 2nd degree tear of perineum; 86 had suture of current obstetric laceration of cervix; 67 had medical and surgical induction of labour; 56 had suture of current obstetric laceration of vagina; 30 had surgical augmentation of labour; 28 had suture of current obstetric laceration of bladder and/or urethra without perineal involvement; 15 had spontaneous vertex delivery; 8 had other invasive procedures on female genital organs; 8 had surgical induction of labour by artificial rupture of membranes (ARM); 8 had postpartum manual exploration of uterine cavity; 7 had suture of 3rd or 4th degree tear of perineum; one had emergency classical caesarean section; one had postpartum evacuation of uterus by suction curettage; one had vacuum extraction; one had spontaneous breech delivery, and one had medical and surgical augmentation of labour.

Inclusion/exclusion criteria and limitations

The main exclusion criterion was over 18 years of age. We implied this method because it is considered that the person already has discernment. There were no restrictions regarding religion, ethnicity, social status, or medical status. It should be also mentioned that data presented were centralized per year. Additionally, data regarding the number of vaginal versus caesarean sections (C-sections), and complications that occurred during intervention have been already discussed by other teams [5, 6].

Ethical approval

The design of this study was approved by the ethical committee of the Clinical Hospital of Obstetrics and Gynecology "Cuza Voda" from Iasi (no 116/565/January/25/2021). It must be stated that the present study respected the Helsinki Declaration on Human Rights,

concomitantly with National and European legislation regarding the Biomedical Research.

Statistical Analysis

An MS Excel was used to build a database. We used Microsoft Excel 2010 and then exported the files into Minitab 19 software (Minitab Inc., 2019). Due to heterogeneity between groups, we were unable to perform any standard statistical tests either for equal or unequal groups.

RESULTS

As can be seen in Figure 1, there was a fluctuating tendency in the past 11 years. Specifically, the peak was reached in 2015 with 189 (10.57%) adolescent pregnancies, with slight differences between 2014 ($n = 180$ — 10.06%) and 2016 ($n = 182$ — 10.17%). A significant decrease was noted starting with 2017 ($n = 153$ — 8.55%) followed by 2018 ($n = 127$ — 7.10%), 2019 ($n = 118$ — 6.59%), and 2020 ($n = 109$ — 6.09%). The situation in 2018 differed from that in 2009 with only one case ($n = 128$ — 7.15%). Even though in 2010 only 154 cases were registered (8.61%), for 4 years, the number of adolescent pregnancies was varying — 2011 ($n = 142$ — 7.94%), 2012 ($n = 169$ — 9.45%), and 2013 ($n = 137$ — 7.66%).

The predetermined interval associated with the gestational age was between 24 and 42 weeks (mean = 38.09, CI 95% = 0.09). Teenage girls gave birth to 899 male (50.27%) and 889 female (49.72%) babies, respectively. After we perform a Kolmogorov–Smirnov test, we noted that there are significant differences ($p = 0.010$; KS — 0.250) by showing that the data do not follow a normal distribution (Fig. 2).

We observed that most of the teenage girls gave birth after a full-term pregnancy ($n = 1383$ — 86.00%) in contrast to those that gave birth under 37 weeks ($n = 225$ — 13.99%) (Fig. 3). In 2015 and 2016 was noted the same number ($n = 157$ — 9.76% per year), followed by 2012 ($n = 148$ — 9.20%). We also noted the same number of full-term deliveries in 2010 and 2017 ($n = 128$ — 7.96% per year), one less than in 2011 ($n = 129$ — 8.02%). Even if there is a difference of 10 cases between 2013 ($n = 125$ — 7.77%) and 2018 ($n = 115$ — 7.15%), the tendency decreased significantly in 2019 ($n = 103$ — 6.40%), and 2020 ($n = 97$ — 6.03%). The lowest rate of full-term pregnancies has been noted in 2009 ($n = 96$ — 5.97%). On the other hand, the peak of under 37 weeks deliveries was reached in 2015 and 2009 ($n = 32$ — 1.99%), followed by 2010 ($n = 26$ — 1.61%) and 2012 ($n = 21$ — 1.30%). In 2016 and 2017 we observed the same number ($n = 25$ — 1.55% per year) of under 37 weeks

deliveries. Analogous, in 2013, 2018, and 2020 we also noted the same number ($n = 12$ — 0.74% per year), with the mention that in 2011 and 2019 there was a difference of only 2 cases; 2011 ($n = 13$ — 0.80%) and 2019 ($n = 15$ — 0.93%). In 2014 there was no full-term, nor under 37 weeks delivery reported (0.00%).

As expected, there were significant differences among adolescent depending on the environmental origin. As indicated in Figure 4, the number of adolescents from the rural area in 2014 and 2016 was identical ($n = 145$ — 8.10% per year), followed by 2012 ($n = 141$ — 7.88%) and 2010 ($n = 138$ — 7.71%). There was also a small difference in 2011 ($n = 120$ — 6.71%) and 2017 ($n = 125$ — 6.99%) of 5 cases, the peak being reached in 2015 ($n = 162$ — 9.06%). Although there was a difference of only several cases between 2009 ($n = 101$ — 5.64%), 2013 ($n = 106$ — 5.92%), and 2018 ($n = 109$ — 6.09%), from that specific point the tendency started to decrease the following 2 years; in 2019 ($n = 95$ — 5.31%), the lowest ratio being registered last year ($n = 80$ — 4.47%). If we refer to urban girls, it can be observed a gradual increase per year starting from 2010 until 2014; in 2010 were registered 16 cases (0.89%), whereas in 2011 ($n = 22$ — 1.23%), in 2012 ($n = 28$ — 1.56%), in 2013 ($n = 31$ — 1.73%), and in 2014 ($n = 35$ — 1.95%). The highest point reached was in 2016 with 37 hospitalizations (2.06%), with a slight difference of several (< 15 cases) in 2018 ($n = 18$ — 1.00%), between 2009/2015 ($n = 27$ — 1.51% per year), 2019 ($n = 23$ — 1.28%), 2017 ($n = 28$ — 1.56%), and 2020 ($n = 29$ — 1.62%).

DISCUSSION

The most numerous adolescent pregnancies were registered between 2014 to 2016. More precisely, it accounted for 30.08% ($n = 551$). In this context, we support the conclusions of Iorga and his collaborators [6]. The number of pregnancies is dependent on age, concomitantly with a decrease of abortions; only 23 abortions on request were performed between 2007 and 2014. Another argument that strengthens our results is that both Iorga and our group clearly demonstrated the predominance of adolescent pregnancies among teenage girls from the rural area. While they reported disproportionality up to 5 times, in our case was 2, up to 8 times (1467 — 82.04% from the rural versus 321 — 17.95% from the urban area).

While the rates of adolescent pregnancy have elevated in Romania, Vaz et al. [11] demonstrated that live births (LB) from teenage mothers (10–19 years) have reduced in Brazil (23.5% in 2000 to 19.2% in 2011). While LB increased by 5.0% among teenage girls aged 10–14 years, those between 15–19 sustain those four main themes influenced their sexual status: sexual knowledge and access to sexual health resources, alcohol use and

relationships with others and the own person. Another Nigerian study emphasizes the results of Lys et al. [12], since in 50.1% of the cases, the first childbirth occurred within 15–19 years, and 38.1% within 20–29 years [13]. Such a phenomenon was also observed in Nepal, according to another team of researchers [14].

Dimitriu et al. [5] enrolled 74 female patients aged 14 to 20 and disseminated a questionnaire consisting of 15-items regarding their social, educational, and medical background. According to their results, 71.6% (n = 53) gave birth following a C-section and 28.3% (n = 21) through vaginal delivery. Noteworthy is that patients aged 14 to 16 years had a lower rate of C-sections in contrast with those between 17 to 20 years. They showed that 83.0% of the C-sections and 76.1% of the vaginal deliveries were at term, but there was a risk that women could give birth through C-sections. Although Dimitriu and co-authors enrolled a small cohort, Iorga reported in his study almost 300 C-section interventions and 992 natural births.

In our case, 1383 (86.00%) deliveries were at full-term and 225 (13.99%) were under 37 weeks. This aspect could be of significant interest since Murray et al. [15] discussed in a recent systematic review in which were included 41 344 children the possible long-term cognitive outcomes on both early term and late preterm births. Even though Dimitriu and his collaborators [5] concluded that there is a higher frequency in primiparae who gave birth under 37 weeks, our results contradict these findings.

Rada [16] performed a study between 2011 and 2012 in which 1215 participants of both sexes were enrolled and showed that 7.2% engaged in sexual intercourse for the first time at an early age (for example 15 years) or even earlier. Compared with the findings of Rada, we had only one case in which an eleven years old girl gave birth.

It has been discussed on 3 different occasions about volunteering termination of a pregnancy. Ganatra and Hirve [17] showed that 13.1% of the 17 171 married women had had an abortion, the most taking place in the private sector. They also argued that adequate counseling, spacing and lack used of contraceptive were the main reasons for abortions. Insufficient financial support from the state in severe cases (81%), despite the fact that mother had a medium standard life (75%) is another cause of abortion. Polish women do not take into consideration society's opinion (95%), but 97% informed their partner, 82% the family members, whereas 32% tell friends and 31% did not inform the gynecologist about this decision [18].

On the other hand, 74% of the Greek adolescents stated that they had acquired information on contraception (friends, doctors, and media — 64%, 47%, and 36%,

respectively). Mavroforou et al. [19] further demonstrated that withdrawal (49%) and condom use (28.5%) were also amongst the popular contraceptive precautions. Interestingly, adolescent's decision towards abortion was 65%, the partner's influence accounting for 73%. Even though 91% of them knew about the risks from doctors (87%) and socio-economic reasons (89%) were mainly invoked, their parents were rarely aware (28%) about the pregnancy and possible abortion (28%). Even though most were at the first abortion (78%), a significant proportion was aware of the Greek Church's opposition (89%) or the existence of an abortion law (86%).

Given the fact that Romania is a former communist state, the repercussions exercised by this regime remain notable even after 31 years since its decline. This could be the reason for the poor education of the general population. It is known that abortions or any other method of contraception was forbidden. Kaestle et al. [20] conducted a study 16 years ago which reunited post-Communist countries from Eastern and Central Europe, the authors concluding that the highest pregnancy rate among adolescents was in Romania (34% in 1000 women aged between 15 and 20 years). Impressed by this study, it is one reason that we wanted to offer a conclusive overview of the current situation in Romania. If it is to take into account all consequences associated with adolescent pregnancy, 11 countries including Romania successfully reduced the mortality rate up to 75% from 1990 to 2015 [21].

Even in today's society where women's health and the phenomenon of globalization are two topics of great interest the church, and the government exert important influences in this context, often being contradictory. Romanian legislation allows elective abortion until 14 weeks of pregnancy, but it is difficult to achieve because of discrimination and the limited number of clinics that perform such interventions [5].

It can be concluded that in Romania the situation is critical since these data are reported from a single-center. Therefore, this event is the consequence of the poor organization of the government, in parallel with the persistence of communist principles even after more than three decades. Teenage girls do not possess a stable spectrum of knowledge concerning the risks to which they expose and the child at the same time.

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Data availability statement

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Acknowledgments

Not applicable.

Conflicts of interest

The authors declare no conflict of interest.

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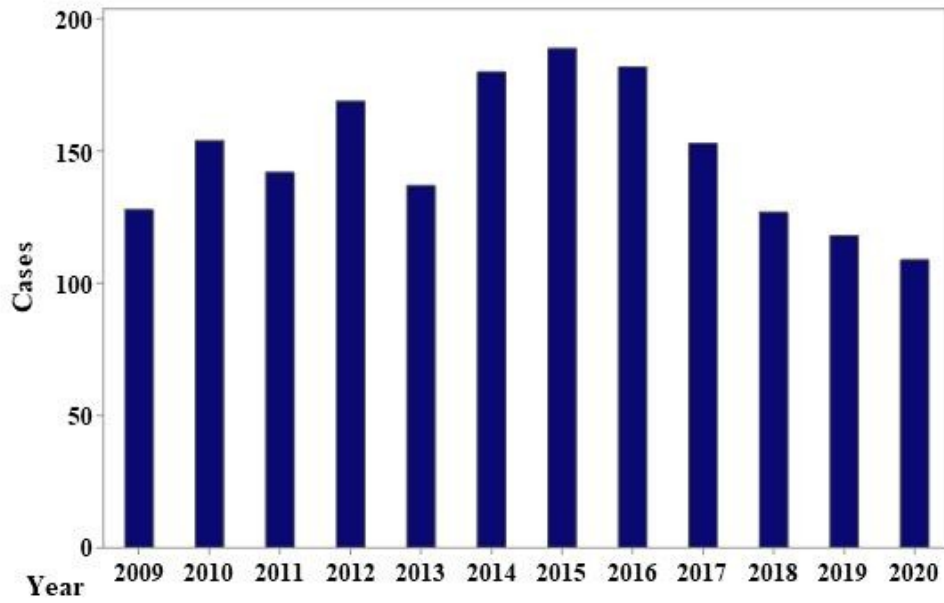


Figure 1. Overall prevalence among teenage girls within “Cuza Voda” in the last 11 years

Cases

200

150

100

50

0

Year 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019

2020

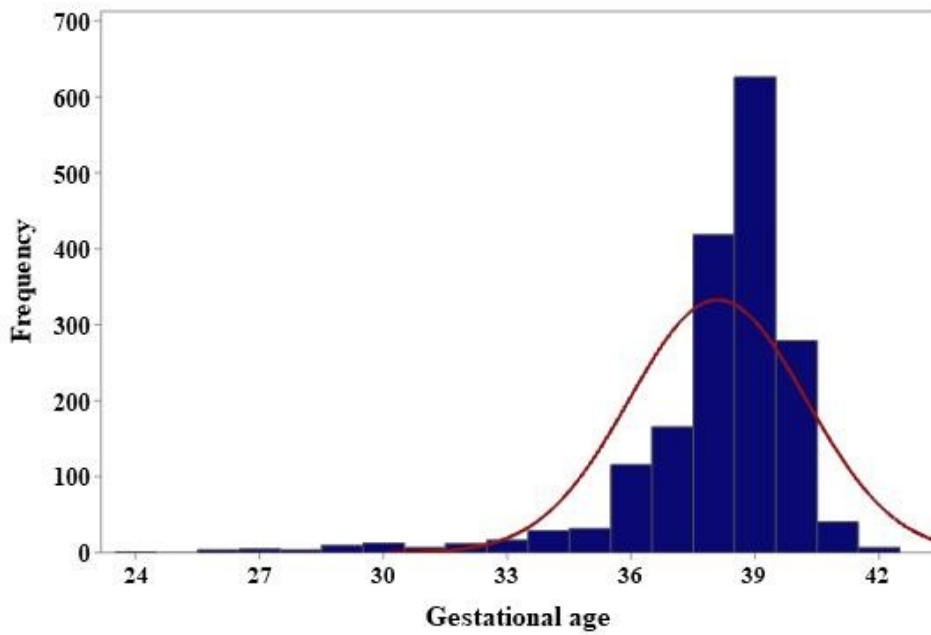


Figure 2. Kolmogorov–Smirnov histogram of “GESTATIONAL AGE” within “Cuza Voda” in the last 11 years (mean — 38.09; SD — 2.143; KS — 0.250; $p < 0.010$)

Frequency

700

600

500

400

300

200

100

0

24 27 30 33 36 39 42

Gestational age

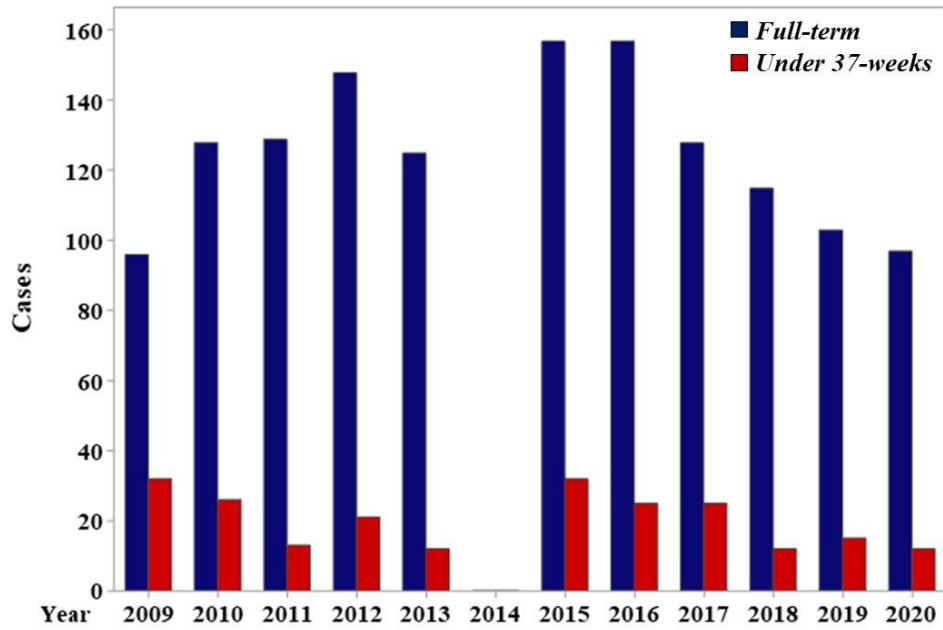


Figure 3. Ratio of full-term versus under 37 weeks deliveries within “Cuza Voda” in the last eleven years

Cases

160

140

120

100

80

60

40

20

0

Year 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
2020

Full-term

Under 37 weeks

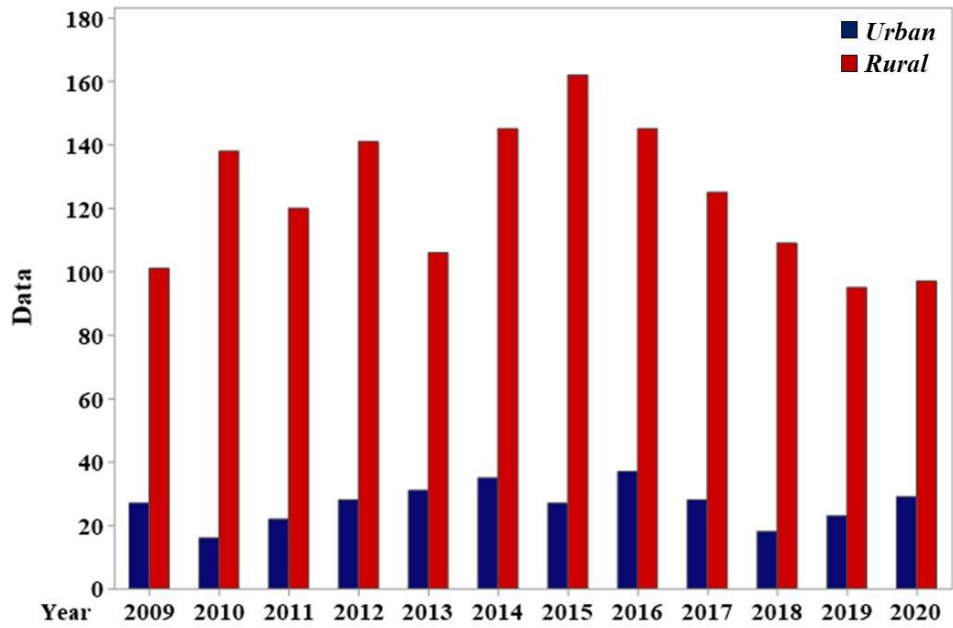


Figure 4. Environment origin ratio (U) versus (R) among teenage girls within “Cuza Voda” in the last 11 years

Data

180

160

140

120

100

80

60

40

20

0

Year 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019

2020

Urban

Rural