

# Analysis of Miscarriage Occurrence per Population Group

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## ABSTRACT

Miscarriage is a fairly relevant pathology in obstetric and gynecological practice, as it contributes not only to an increase in the number of reproductive losses, but also negatively affects the health of a woman. A study of the prevalence of this nosology will allow us to assess the need for therapeutic and preventive measures among women at risk.

**Purpose:** Conducting a retrospective medical and epidemiological analysis according to obstetric and gynecological hospitals in Moscow for 2014-2018 and data of the Perinatal Center of the M. P. Konchalovskiy City Clinical Hospital.

**Materials and methods:** archival materials of gynecology hospitals in the city of Moscow have been used (including the Perinatal Center of the M. P. Konchalovskiy City Clinical Hospital). The number of charts with RM cases has been 2017. For statistical analysis, in the case of comparing two dependent (paired) samples of parameters, paired Student t-test has been used. Where the compared sets of unrelated samples go against the law of normal distribution, the Mann-Whitney criterion has been used to compare them. The critical level of reliable significance of the analyzed statistical hypotheses is taken as a value of less than 0.05, since it is at this level that the probability of differences between the studied parameters is more than 95%. An analysis of the results is presented as  $M \pm \sigma$ .

**Results:** The obtained data indicates a tendency toward increased

occurrence of RM in Moscow (per 100 live and stillbirths) from 11.6 to 14.2 cases in 2017 and to 13.5 cases in 2018. The total reproductive loss, according to data provided by the Perinatal Center in 2018, grew up to 618.6 thousand, i.e. more than by a quarter (25.2%) The data on fertility loss due to spontaneous abortions in 2018 in Moscow is higher (412400) than across the Russian Federation (223154).

**Conclusion:** The retrospective medical and epidemiological analysis based on the data provided by gynecology hospitals has demonstrated a rather high proportion of RM in the structure of gynecological morbidity both in the Russian Federation and in the city of Moscow (using the data provided by the M.P. Konchalovsky Perinatal Center).

**Keywords:** miscarriage, reproductive loss, recurrent miscarriage, infertility, abortion.

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## INTRODUCTION

Miscarriage is an involuntary interruption of pregnancy, which occurs without the patient's or any other persons' assistance, at different time points from conception through week 28, counted from the first day of the last menstrual period [1,2]. Recurrent miscarriage (RM) is two or more consecutive involuntary interruptions of pregnancy [2].

Up to 85% of abortions occur during the first trimester of pregnancy, and the remaining 15% - during mid pregnancy and the last trimester.

Literature reports suggest that there are specific differences between quantitative miscarriage and stillbirth registration approaches used in different countries [3,4,5].

Based on national registers or population follow-up studies, the registered risk of miscarriage in Sweden, Finland and Denmark is 12.9% to 13.5%.

In Europe, the USA and Canada, the RM percentage ranges from 5% to 9% of the total number of pregnancies. In the Russian Federation – from 6% to 15% in different regions, in Moscow and Saint Petersburg – 6% to 9% [5,6].

The World Health Organization (WHO) classifies miscarriages into spontaneous abortions – a loss of

pregnancy within 22 weeks; premature birth occurring between week 22 through week 37 with fetus weight exceeding 500 g [7].

In Russia, miscarriage is loss of pregnancy occurring between conception and the end of week 37 (less than 259 days from the last menstrual period).

In this country, since 2012, this time interval has been divided into the following periods: early miscarriages are those occurring within less than 12 weeks; late miscarriages – from 12 through 22 weeks; extremely preterm birth – from 22 through 27 weeks; premature birth – at 28 weeks or later [1,2].

Women younger than 35 years old have a 15% chance of miscarriage, and it increases with age: women aged 35 to 39 years old have a 25% risk of miscarriage; those aged 40-44 years old – 51%; women over 45 run an up to 90% risk [8,9].

Lack of data on induced abortions hinders the understanding of how seriously this competing risk corrupts the miscarriage occurrence statistics. Also, calculating the number of RM cases per patient population may indirectly reflect women's reproductive health, particularly those of childbearing age.

Therefore, a retrospective medical and epidemiological analysis of RM occurrence based on data collected from gynecology hospitals in Moscow should help define the percentage of cases of the condition.

Purpose: analysis of RM occurrence based on data provided by obstetrics and gynecology hospitals of Moscow City from 2014 through 2018 and the Perinatal Center of the M. P. Konchalovsky City Clinical Hospital.

**MATERIALS AND RESEARCH METHODS**

Researchers have used archived materials provided by gynecology hospitals of Moscow City (including the Perinatal Center of the City M. P. Konchalovsky Clinical Hospital). Over 2014-2018, gynecology hospitals provided 21961 patient charts (No 003/y) for the study. This ensured a hundred-percent RM case sampling, and the number of patient charts confirming RM cases totaled 2017.

For statistical analysis, to compare two related (paired) samples of parameters, a paired Student t-test has been used.

In cases whereby sets of unrelated samples go against the normal distribution law, the Mann-Whitney test has been used. For statistical comparison of two related samples, the Wilcoxon test has been used. To compare qualitative characteristics, which cannot be expressed numerically, the  $\chi^2$  value has been applied (when analyzing qualitative indicators). The critical degree of significant relevance of statistical hypotheses is expressed as a value of less than 0.05, because the degree ensures a higher than 95% probability of discrepancy between the parameters being studied. The outcome analysis is expressed as  $M \pm \sigma$ .

**RESULTS**

Pregnancy outcome statistics based on data provided by obstetrics and gynecology hospitals of Moscow over 2014-2018 and the Perinatal Center of the M. P. Konchalovsky City Clinical Hospital is shown in Table 1.

**Table 1:** Pregnancy outcomes (number of confirmed cases based on data provided by in-patient obstetrics and gynecological facilities) in Moscow and the Zelenograd Administrative District and in the Perinatal Center of the City Clinical Hospital named after M. P. Konchalovsky over 2014-2018.

Year	Moscow City			Perinatal Center		
	Ended in birth	Recurrent miscarriage (per 100 cases of live and still birth)	Induced abortion	Ended in successful birth	Recurrent miscarriage (per 100 cases of live and still birth)	Induced abortion
2014	138358.	11.6	76.5	4412	7.5	16.3
2015	143150	12.5	69.2	4023	8.2	15.2
2016	146000	12.7	56.9	4452	7.9	15.6
2017	134573	14.2	58.3	3714	8.7	14.2
2018	99082	13.5	57.6	3872	8.9	14.3

The data presented here demonstrates a tendency toward increase in RM occurrence in Moscow City (per 100 live or still births) from 11.6 to 14.2 in 2017 and up to 13.5 in 2018. Also, an increase in RM occurrence was observed in the Perinatal Center and the Zelenograd Administrative District (from 7.5 to 8.7 in 2017 and to 8.9 in 2018).

RM occurrence in Moscow (as exemplified by the Perinatal Center of the Zelenograd Administrative District of Moscow)

was 7.9% in 2018, which is 66.6% higher than in 2014 and much higher than the Russia-wide index (3.98 per 100 successful pregnancies in 2018).

A comparative analysis of a miscarriage-related birth rate decline observed in the Russian Federation (RF) from 2014 through 2018 is shown in Table 2.

**Table 2:** Comparative analysis of a miscarriage-related birth rate decline in the Russian Federation (RF) in 2014 through 2018.

Cause of loss	2014	2015	2016	2017	2018
Female infertility	371271	392008	560549	628291	642570
Miscarriage	167291	168140	147208	210741	223154

This data demonstrates a general increase in birth losses in the RF over the period from 2014 through 2018: a leap from 371271 up to 642570 losses caused by female infertility, and from 167291 to 223154 losses caused by spontaneous abortions.

The general decline in the birth rate in the RF, as per 2014, totaled 538562, and 865724 as per 2018, which amounts to a one-and-a-half-time decrease.

A comparative analysis of the total reproductive loss in the RF and Moscow (according to data provided by the Perinatal Center of the M. P. Konchalovsky City Clinical Hospital) in 2014 through 2018 is shown in Figure 1.

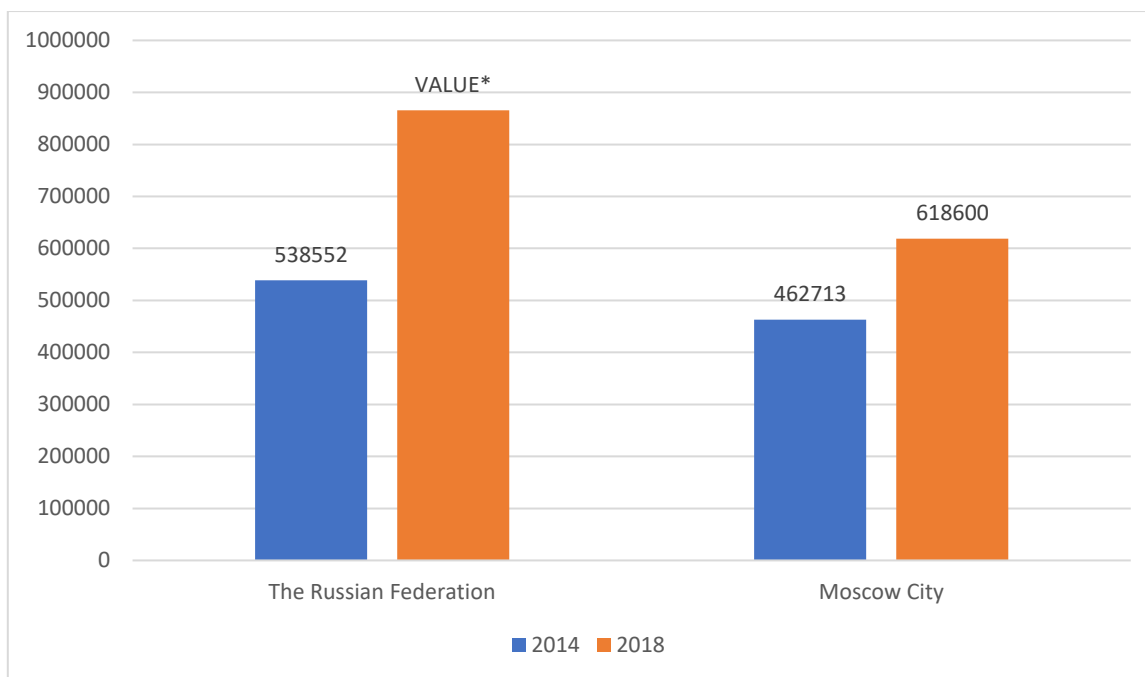


Fig. 1: Comparative analysis of the total reproductive loss in the RF and Moscow (based on data provided by the Perinatal Center of the M. P. Konchalovsky City Clinical Hospital) in 2014 through 2018.

Note: \*p < 0.05 is significance of difference between means.

The total reproductive loss, as per 2018 data from the Perinatal Center, reached 618 600 in 2018, i. e. increased by more than a quarter (by 25.2%)

A comparative analysis between the total reproductive loss observed in the RF and in Moscow City in 2018, and reproductive loss resulting from spontaneous abortions, is shown in Figure 2.

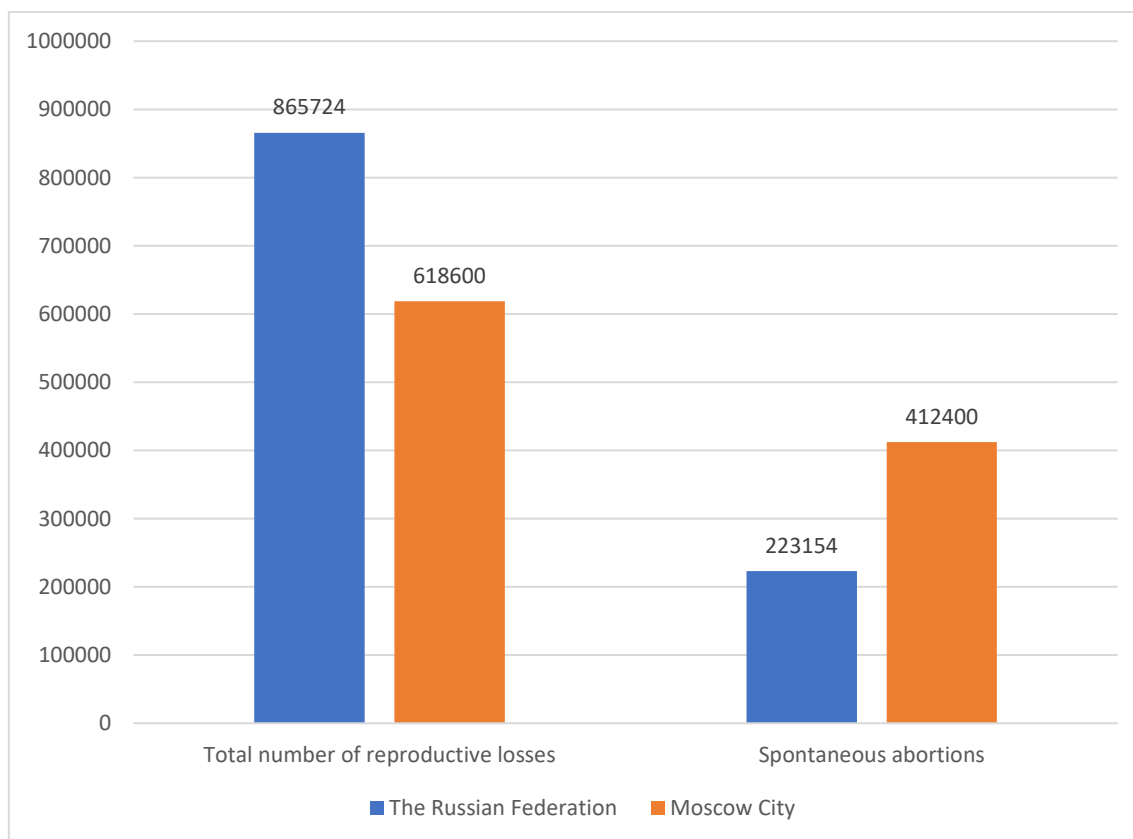


Рис. 2: Comparative analysis between the total reproductive loss in the RF and in Moscow City in 2018, and reproductive loss resulting from spontaneous abortions.

This data confirms the pivotal role of RM in the decline of birth rate, and it has been observed that losses resulting from spontaneous abortions are higher in Moscow than in the rest of the RF.

The analysis of this data proves that birth decline dynamics vary greatly in different administrative districts of Moscow.

Given the leadership of the spontaneous abortion factor, the analysis focuses on the specifics of losses that are caused by it. A comparative analysis between Moscow's administrative districts (AD), as per 2014-2018, showing the highest and lowest reproductive loss (percentage-wise), is demonstrated in Figure 3.

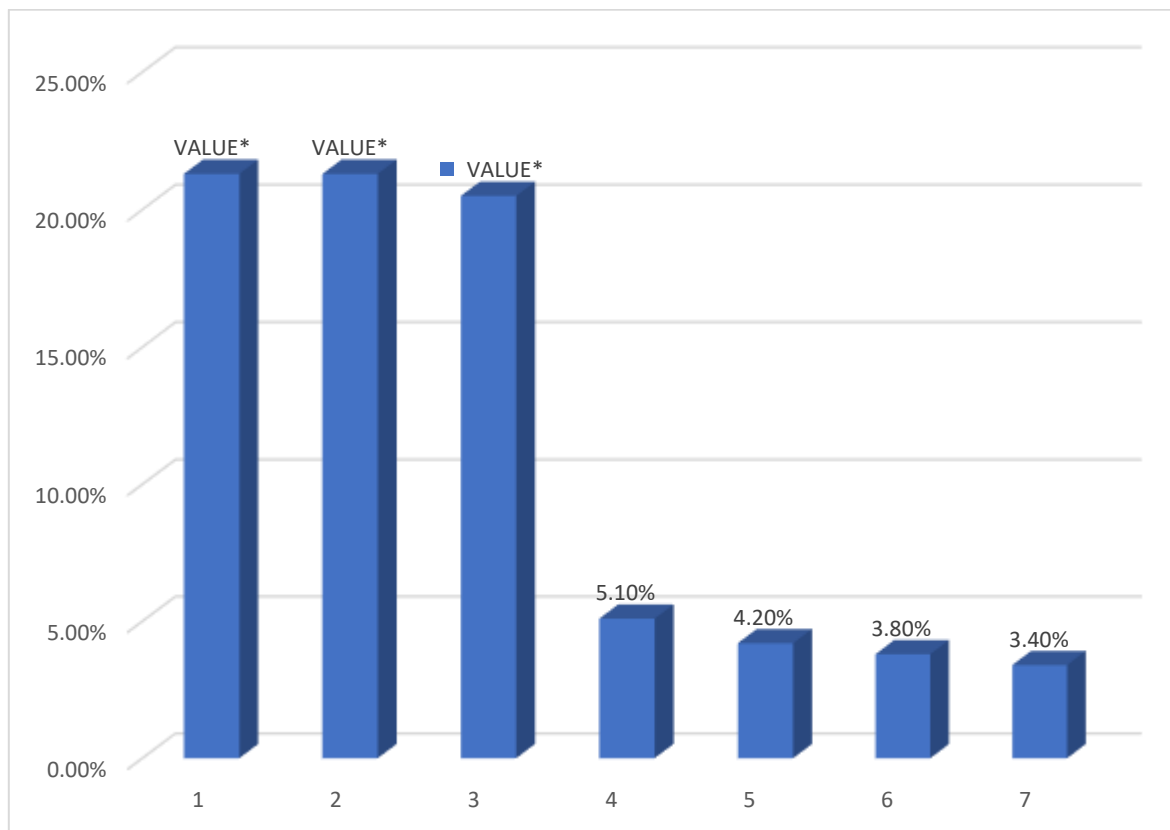


Fig. 3: Comparative analysis between Moscow's administrative districts (AD), as per 2014-2018, showing the highest and lowest reproductive loss (percentage-wise).

Note:

1. South AD;
2. South-West AD;
3. East AD;
4. Central AD;
5. North AD;
6. Zelenograd AD;
7. North-West AD.

\*p < 0.05 is significance of difference between group means

The following administrative districts are “spontaneous abortion champions:” South (21.3%), South-West (21.3%), and East (2.5%). In 2014-2018, the situation was most favorable in the Central (5.1%), North (4.2%), Zelenograd (3.8%) and North-West (3.4%) administrative districts.

### RESULTS AND DISCUSSION

many authors note in their papers that RM is among the most relevant issues in obstetrical practice [8,9,10,11]. A major factor contributing to the condition are infectious and inflammatory complications [12,13,14,15,16].

Many researchers have demonstrated in their works that a better understanding of pregnancy loss occurrence (including RM-related) can help in planning treatment and

diagnostic procedures within the sphere of reproductive health [17,18,19,20]. Therefore, the importance of this research is undoubted.

### CONCLUSION

The retrospective medical and epidemiological analysis, which relies on data provided by gynecology hospitals, has demonstrated a fairly high RM occurrence in the structure of gynecological morbidity both in the RF and in Moscow City (as exemplified by the data provided by the Perinatal Center of the M. P. Konchalovsky City Clinical Hospital).

## REFERENCES

1. Kostin A.A., Ponomarenko B.P. Personnel management as a basis for modernization of the Russian health care system // *Public service*; 2015; No. 4 (96); Page 44.
2. Petrov Yu. A., Baikulova T.Yu. Contemporary perceptions of the induced abortion issue (review of literature) // *International journal of applied and fundamental studies*. 2016; 8–5: 727–731.
3. Lastochkina M.A. Effective health care in the mirror of modernization // *Humanities research*. 2015; 2-5 (45): 33.
4. Royal College of Physicians of Ireland. The management of second trimester miscarriage. In: *National Clinical Guidelines in Obstetrics and Gynaecology*. Republic of Ireland: Royal College of Physicians of Ireland, RCPI; 2017.
5. Morris A, Meaney S, Spillane N, O'Donoghue K. The postnatal morbidity associated with second-trimester miscarriage. *J Matern-Fetal Neo M*. 2016; 29(17): 2786–90.
6. Agenor A, Bhattacharya .S. Infertility and miscarriage: common pathways in manifestation and management. *Womens Health (Lond)* 2015; 11: 527–41. doi:10.2217/WHE.15.19. pmid:26238301
7. Kim C, Barnard S, Neilson JP, Hickey M, Vazquez JC, Dou L. Medical treatments for incomplete miscarriage. *Cochrane Database Syst Rev*. 2017; (1):CD007223.
8. Lane BF, Wong-You-Cheong JJ, Javitt MC, Glanc P, Brown DL, Dubinsky T, Harisinghani MG, Harris RD, Khati NJ, Mitchell DG, et al. ACR appropriateness criteria (R) first trimester bleeding. *Ultrasound Q*. 2013; 29(2): 91–6.
9. Purit E. I. First trimester non-developing pregnancy: risk factors, pregnancy termination methods // *Young scientist*. 2018; 49: 88-93; <https://moluch.ru/archive/235/54614/>
10. National Institute for Health and Care Excellence. Ectopic pregnancy and miscarriage: evidence update December 2014. In: *A summary of selected new evidence relevant to NICE clinical guideline 154 'Diagnosis and initial management in early pregnancy of ectopic pregnancy and miscarriage'*. UK: National Institute for Health and Care Excellence; 2014. p. 2012.
11. Alexandrova N. V., Bayev O. R. Early stages of the formation of the Mother-Placenta-Fetus system. // *Obstetrics and gynecology*. 2011; 8: 4–10.
12. Kolesnichenko A.A., Petrov Yu.A. Chronic endometritis and miscarriage // *International journal of applied and fundamental studies*. 2019; 10-2: 313-317.
13. Petrov Yu.A. Microbial factors in the origin of chronic endometritis // *Medical Science Annals of Kuban*. 2016; 3 (158): 113–118.
14. Plyasunova M.P., Khlybova S.V. Chronic endometritis as a pressing challenge in modern gynecology // *Medical Annals of Vyatka*. 2013; 1: 44–53.
15. Radzinsky V.E., Petrov Yu.A., Polina M.L. Chronic endometritis: modern aspects // *Medical Science Annals of Kuban*. 2017; V. 24; 5: 69–74.
16. Yakovchuk E.K., Sulima A.N., Rybalka A.N., Dyzha M.A., Anykin S.S., Symachova S.A. Chronic endometritis: current state of the problem, main aspects of origin and influence on the reproductive system // *Russian annals of an obstetrician/gynecologist*. 2016; V. 16; 5: 37–41.
17. Tirskaya Yu.I., Rudakova E.B., Shakina I.A., Pilipenko M.A., Poltoraka E.V., Lubavina A.E., Zavodova N.B. Contemporary views of the etiology and pathogenic mechanism of fetal loss syndrome (review of literature) // *Ural Medical Journal*. 2010; 1: 100–106.
18. Milovanov A.P., Fokina T.V., Rasstrygina I.M. Inflammation factor in the nosogeny of non-developing pregnancy // *Scientific journals of the Belgorod State University. Section: Medicine. Pharmacy*. 2013; V. 24; 25 (168): 97–99.
19. Kazachkova E.A., Khelashvili I.G., Kazachkov E.L., Voropayeva E.E., Miroshnichenko L.E. Chronic endometritis: clinical and morphological characteristics and specifics of endometrial receptivity // *Ural Medical Journal*. 2014; V. 118; 4: 47–52.
20. L. V. Tkachenko, T. I. Kostenko, N. D. Uglova, A. L. Shklyar. Miscarriage. Lecture at Volgograd State Medical University, Issue 1 (53); 2015; 3-9.