

ASSESSMENT OF THE VOLUME OF PERINATAL CARE DURING THE COVID-19 PANDEMIC IN A SEPARATE REGION

ZHDANOVICH O.I., SAVCHUK R.M.

Shupyk National University of Health Care of Ukraine,
Kyiv

An evidence-based approach is needed to improve the quality of care for mothers and newborns, prevent infections, and combat pandemics. The aim is to assess the volume of perinatal care during the COVID-19 pandemic in a separate region of Ukraine (using the Ivano-Frankivsk region as an example). Materials and methods of research. Statistical analysis of cases was carried out based on data from the electronic integrated disease surveillance system (EIDSS) and data from the "Ivano-Frankivsk Regional Perinatal Center" (RPC). Data from the State Statistics Service of Ukraine and statistical documents from the Ministry of Health of Ukraine were used. Bibliosemantic, analytical, statistical, and conceptual methods were used. The research period is 2020–2023. Results. The shortcomings of providing perinatal medical care during the COVID-19 pandemic include incompleteness of statistical reporting, insufficient provision of diagnostic and treatment tools (test systems, means for respiratory support, etc.), inadequate methodological and informational support for doctors regarding the management of pregnant women with COVID-19 (especially in the initial stages of the pandemic), organizational shortcomings (insufficient compliance with sanitary and epidemiological regulations, as evidenced by 9 cases of pregnant medical staff and 8 cases of positive COVID-19 tests in newborns). Conclusion. The identified shortcomings indicate the need to improve the provision of perinatal care in the event of possible future pandemics.

Key words: COVID-19 pandemic, pregnant women, perinatal care, statistics, health care organization

The emergence of the new coronavirus SARS-CoV-2, the etiological agent of COVID-19, in China in December 2019, and its rapid spread led to the largest and most severe pandemic of the 21st century [1, 2]. During the first three years of this healthcare crisis, the world experienced dramatic losses of over 6,696,926 lives due to COVID-19 [3]. In addition to health problems, the devastating impact of the COVID-19 pandemic on social and economic spheres worldwide disproportionately affected the most vulnerable populations [1, 4, 5].

In the context of this pandemic, many pregnant women experienced greater social vulnerability in addition to a greater susceptibility to complications from viral

infections [6]. The health and well-being of pregnant women and their fetuses suffered, and the gains in women's health achieved through decades of effort were threatened [7].

Pregnant women and their children are considered a high-risk group during infectious disease outbreaks, as physiological and mechanical changes during pregnancy generally increase susceptibility to infection. In addition, the predominance of the T-helper 2 (Th2) system to protect the fetus during pregnancy makes the mother more vulnerable to viral diseases [8]. With the beginning of the coronavirus epidemic, pregnant women were classified as a risk group, and special instructions for their protection from infection

with this virus were published worldwide [5]. Although studies have shown that the manifestations and consequences of COVID-19 in pregnant women are similar to those in other cohorts of the population, hospitalization of infected pregnant women in intensive care units has increased [9]. In addition, the pandemic affected lifestyle, the quality and quantity of prenatal care, and exacerbated chronic anxiety.

The impact of the COVID-19 pandemic on pregnancy was not limited to severe respiratory diseases and maternal mortality; the introduction of a nationwide quarantine disrupted the work of essential maternal and child health services [10]. A meta-analysis revealed an increased chance of stillbirth, maternal death, termination of pregnancy, and maternal depression during the pandemic. Significant differences were found between countries with high and low financial resources regarding the severity of the impact of the disease in the respective regions [11]. Similarly, perinatal outcomes have worsened worldwide.

In a situation where the new challenges identified during the COVID-19 epidemic were not fully controlled, scientists predict that a new pandemic may arise on the planet. Therefore, to improve the quality of care for mothers and newborns, prevent infections, and combat pandemics, an approach based on the actual data obtained during the COVID-19 pandemic is necessary.

Purpose – to assess the volume of perinatal care during the COVID-19 pandemic in a separate region of Ukraine (using the Ivano-Frankivsk region as an example)

MATERIALS AND METHODS OF RESEARCH

Statistical analysis of COVID-19 cases in pregnant women in the Ivano-Frankivsk region was carried out based on an information certificate prepared by downloading data from the electronic integrated disease surveillance system (hereinafter referred to as EIDSS) and data from the "Ivano-Frankivsk Regional Perinatal Center of the Ivano-Frankivsk Regional Council" (abbreviated RPC). Data from the State Statistics Service of Ukraine and statistical documents of the Ministry of Health of Ukraine were used.

The Electronic Integrated Disease Surveillance System (EIDSS) is a unified system for monitoring and registering infectious diseases, the implementation of which began in 2017. Since 2020, through EIDSS, the centers for disease control and prevention of the Ministry of Health of Ukraine must submit daily certificates regarding suspected or confirmed cases of coronavirus disease COVID-19.

During the research, bibliosemantic, analytical, statistical, and conceptual methods were used. The research period is 2020–2023.

OBTAINED RESEARCH RESULTS AND THEIR DISCUSSION

According to EIDSS data, during the pandemic in the Ivano-Frankivsk region, the diagnosis of COVID-19 was laboratory-confirmed in 341 pregnant women. Among the total number of COVID-19 patients, the share of pregnant women is 0.17%, and among the number of female patients, the share of pregnant women is 0.29%. Out of 341 pregnant women who fell ill, 210 were hospitalized in healthcare facilities of the region (a share of 61.6% of the total number of patients), and 131 pregnant women were observed on an outpatient basis.

Analysis of the data of the "Ivano-Frankivsk Regional Perinatal Center" (hereinafter RPC) shows that incomplete information was entered into the EIDSS. According to incomplete data, 834 pregnant women were hospitalized in the RPC with confirmed COVID-19 (632 patients) or with suspected COVID-19 (182 women), i.e., this is even without taking into account pregnant women who had a mild course of the disease and were not hospitalized. From the data in Table 1 and Figure 1, it can be seen that in 2020, information was almost not entered into the EIDSS, only 11 cases were registered in this database (4.0% of all information from 2020-2022), while according to the RPC data, 323 cases were conducted in 2020 (141 confirmed and 182 with suspicion - 40.0% for the corresponding period). In 2021, the situation with entering data into the EIDSS improved somewhat, but the RPC conducted 2.5 times more cases (365 vs. 145). And only in 2022 did these figures almost equalize.

Table 1

Distribution of COVID-19 cases in pregnant women by year of the pandemic (by date of initial case registration) according to EIDSS data and incomplete data from the "Ivano-Frankivsk Regional Perinatal Center"

Year	EIDSS	«Ivano-Frankivsk Regional Perinatal Center»		
		Confirmed COVID-19	Suspected COVID-19	Suspected COVID-19
2020	11	141	182	323
2021	145	365	-	365
2022	132	146	-	146
2023	53	-	-	-
Всього	341	652	182	834

Note. Hyphen - data not available

From the distribution of cases by year 39.0% of cases were recorded in 2020, and (see Figure 1), it can be seen that in the RPC, 17.0% of cases in 2022.

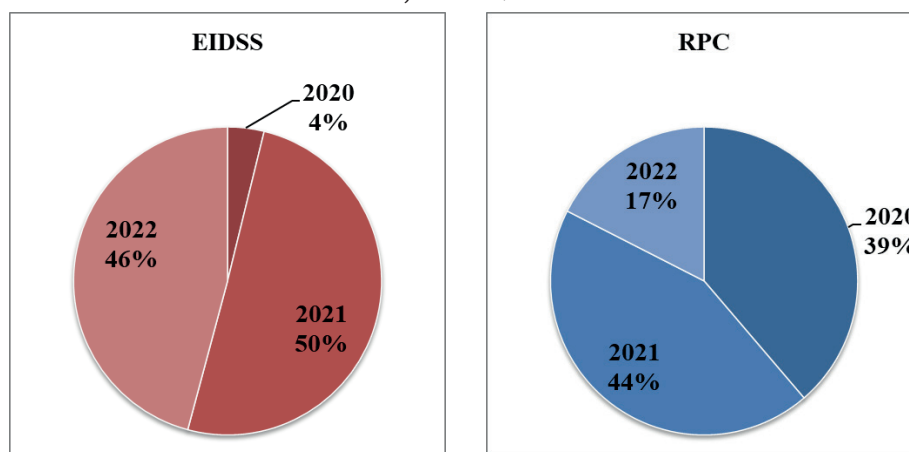


Figure 1. Percentage distribution of COVID-19 cases in pregnant women by year of the pandemic (2020-2022) according to EIDSS and RPC data

Analysis of the dynamics of cases for the disease had a seasonal character and were 2020-2021 (Figure 2) shows that outbreaks of observed in March and November.

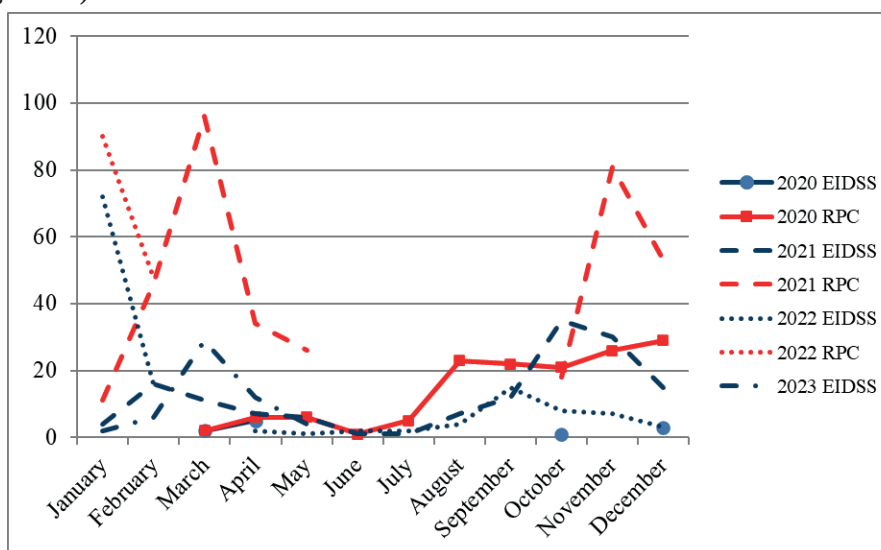


Figure 2. Dynamics of COVID-19 cases in pregnant women by year of the pandemic (2020-2023) according to EIDSS and RPC data

Analysis of cases by newly formed districts of the region (Table 2) showed that the largest absolute number of cases was observed in Kalush district (109 cases) and Ivano-Frankivsk district (97 cases), despite the fact that Kalush district has almost 2 times less population and its density, i.e., in terms of

per 1000 population, the incidence of COVID-19 among pregnant women in Kalush district was more than 2 times higher (0.383 vs. 0.173 cases per 1000 population), which may be due to stricter adherence to restrictions (mask regime, contacts, distance, sanitary treatment) in Ivano-Frankivsk district.

Table 2

Distribution of COVID-19 cases among pregnant women by newly formed districts (for the entire pandemic period)

District	Area, kmI	Population, thousands	Population density, people/kmI	Number of COVID-19 cases among pregnant women	
				abs.	per 1000 population
Ivano-Frankivsk	3913.1	559.866	143.1	97	0.173
Kalush	3555	284.704	80.1	109	0.383
Kolomyia	2484.5	277.735	111.8	52	0.187
Kosiv	853.7	85.063	99.6	35	0.411
Verkhovyna	1271.7	30.479	24.0	5	0.164
Nadvirna	1872	130.250	69.6	43	0.330
Total	13950	1368.097	98.1	341	0.249

In terms of the relative number of cases, Kosiv district ranked first (0.411), Kalush district second (0.383), and Nadvirna third (0.330). If Nadvirna and Kosiv districts are the most touristic, the high indicator of Kalush region may be explained by certain organizational shortcomings. The smallest absolute (5 cases) and relative (0.164) number of cases was found in the least densely populated Verkhovyna district.

Out of the total number of 341 COVID-19 cases among pregnant women, 210 women were hospitalized (61.6%), and 131 (38.4%) were treated on an outpatient basis.

Fourteen healthcare facilities (HF) in the region admitted pregnant women with COVID-19 for hospitalization. Analysis of COVID-19 cases among pregnant women by HF showed that slightly more than half (56.2%) of the cases were conducted in the "Ivano-Frankivsk Regional Perinatal Center", 22 cases (10.5%) - in the "Kosiv Central District Hospital", 21 (10.0%) - "City Clinical Perinatal Center" (Ivano-Frankivsk), 17 (8.1%) - in the "Regional Infectious Diseases Hospital" (Ivano-Frankivsk), 10 (4.8%) - "Kalush Central

District Hospital". The vast majority - 169 (75.7%) cases of COVID-19 among pregnant women were conducted in various HFs in Ivano-Frankivsk.

131 pregnant women were treated on an outpatient basis for COVID-19 in 34 state and private medical institutions in the region. The largest number of pregnant women who were on outpatient treatment was recorded in Kalush district - 51 (38.9%).

Among the pregnant women who fell ill, 9 (2.6%) were medical workers of HFs, 3 (one third) - in Kalush district, such data indicate that pregnant women should be removed from work in medical institutions that admit infected patients during a pandemic.

As can be seen from Figure 3, the age distribution of pregnant women registered with COVID-19 (EIDSS data) corresponded to the distribution of all pregnant women in Ivano-Frankivsk region for 2021-2022 (data from the State Statistics Service of Ukraine), although the proportion of patients aged 40 and older was significantly higher (3.8 vs. 2.2%, $p < 0.05$), which may reflect the recognized fact of vulnerability to COVID-19 in older people.

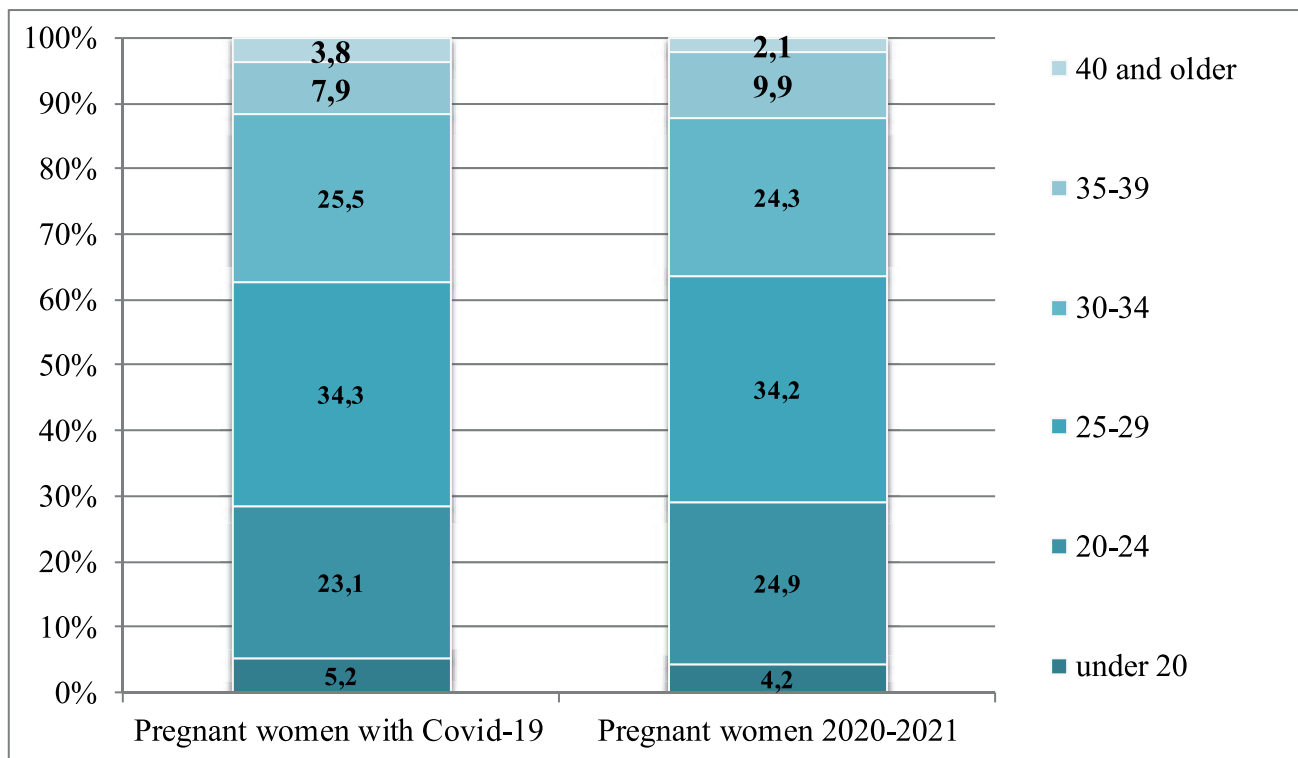


Figure 3. Age distribution of pregnant women registered with COVID-19 (EIDSS data) and pregnant women in Ivano-Frankivsk region for 2021-2022 (data from the State Statistics Service of Ukraine)

It is generally recognized that the presence of concomitant somatic pathology significantly increases morbidity and mortality in COVID-19. Out of 341 pregnant women who fell ill, 46 (13.5%) had concomitant somatic diseases: cardiovascular diseases in 25 (7.3%), diabetes mellitus in 2 (0.6%) pregnant women, liver disease in 1 (0.3%) pregnant woman, kidney disease in 5 (1.5%) pregnant women, and chronic lung diseases in 13 (3.8%) pregnant women. In the structure of extragenital diseases, cardiovascular diseases (54.5%) and chronic lung diseases (28.3%) prevailed.

Out of 341 pregnant women who contracted COVID-19, 5 cases were fatal (14.7 cases per 1000 pregnant women). All 5 pregnant women were in the anesthesiology and intensive care units (AICU), oxygen therapy. In 2020 - 2 fatal cases, in 2021 - 3 fatal cases. All women died against the background of progressive respiratory failure (subtotal pneumonia, PE). One woman was at 8 weeks of gestation, one - in the postoperative period, one - in the second trimester, and 2 - in the third trimester of pregnancy. One woman was diagnosed with obesity grade 4, which is a generally recognized risk factor for severe disease and death in COVID-19. Two women had preeclampsia (mild

and moderate severity).

From a more detailed analysis of one case of maternal death, it can be assumed that appropriate respiratory therapy was not applied due to inadequate assessment of the degree of respiratory failure.

To date, the possibility of vertical transmission of COVID-19 has not been definitively established, although it is unlikely. During the pandemic period in Ivano-Frankivsk region, 8 cases of a positive COVID-19 test were recorded in children in the early neonatal period. In the vast majority, the child's age at the time of the positive test was 3-6 days, and only in one child - 2 days (maternal death), which suggests that the infection occurred in utero. 4 cases (50.0%) were recorded in Kosiv district, and one of these women was treated on an outpatient basis.

CONCLUSIONS

An objective assessment of the volume and level of perinatal care provided during the COVID-19 pandemic in Ivano-Frankivsk region is complicated by shortcomings in statistical reporting.

The largest share of cases, according to both EIDSS and RPC data, falls on 2021

(50.0% and 44.0%, respectively), i.e., during the period of dominance of the Delta virus, which was the most contagious and led to more severe consequences, particularly in pregnant women. The Omicron strain, which dominated in 2022, was very contagious but caused less severe consequences compared to the Delta variant, but remained dangerous for the most vulnerable groups of the population, including pregnant women.

The prevalence of the virus among pregnant women had a pronounced seasonal character, and outbreaks of the disease were observed in March and November. The decrease in the number of diseases in 2022-2023 indicates the fading of the pandemic and the transition of the virus to the cohort of seasonal ARVI, which gave grounds for the cancellation of the pandemic regime worldwide in May 2023.

Out of the total number of 341 COVID-19 cases among pregnant women, 210 women were hospitalized (61.6%), and 131 (38.4%) were treated on an outpatient basis.

Among the pregnant women who fell ill, 9 (2.6%) were medical workers of healthcare facilities, 3 (one third) of them - in Kalush district, such data indicate that pregnant women should be removed from work in medical institutions that admit infected patients during a pandemic.

The age distribution of pregnant women registered with COVID-19 (ELISZ data) corresponded to the distribution of all pregnant women in Ivano-Frankivsk region for 2021-2022 (data from the State Statistics Service of Ukraine), although the proportion of patients aged 40 and older was significantly higher (3.8 vs. 2.2%, $p < 0.05$), which may reflect the recognized fact of vulnerability to COVID-19 in older people.

46 (13.5%) of the pregnant women who fell ill had concomitant somatic diseases: cardiovascular diseases in 7.3% of pregnant women, chronic lung diseases in 3.8%, diabetes mellitus in 0.6%, liver disease in 0.3% of pregnant women, and kidney disease in 1.5% of pregnant women.

Out of 341 pregnant women who contracted COVID-19, 5 cases were fatal (14.7 cases per 1000 pregnant women).

During the pandemic period in Ivano-Frankivsk region, 8 cases of a positive

COVID-19 test were recorded in children in the early neonatal period. The child's age at the time of the positive test was 3-6 days, and only in one child - 2 days (maternal death), which suggests that the infection occurred in utero.

The shortcomings of providing medical perinatal care during the COVID-19 pandemic include: incomplete statistical reporting, insufficient provision of diagnostic and treatment tools (test systems, means for respiratory support, etc.), insufficient methodological and informational support for doctors regarding the management of pregnant women with COVID-19 (especially in the initial stages of the pandemic), organizational shortcomings (insufficient adherence to sanitary and epidemiological regime, as evidenced by 9 cases of pregnant medical staff and 8 cases of positive COVID-19 tests in newborns), i.e., there is a need to improve the provision of perinatal care in the context of possible future pandemics.

REFERENCES/ЛІТЕРАТУРА

1. United Nations Development Programme | UNDP. Coronavirus, COVID-19 pandemic. An integrated global response is an investment in our future. Available at: <https://www.undp.org/coronavirus>.
2. Mas-Coma S, Jones MK, Marty AM. COVID-19 and globalization. *One Health*. 2020;9:100132. 10.1016/j.onehlt.2020.100132.
3. Worldmeters. Coronavirus Update (Live) COVID-19 Coronavirus Pandemic. 2022. Available at: <https://www.worldometers.info/coronavirus/>.
4. World Health Organization | WHO. Impact of COVID-19 on people's livelihoods, their health and our food systems - Joint statement by ILO, FAO, IFAD and WHO. 2020. Available at: <https://www.who.int/news/item/13-10-2020-impact-of-covid-19-on-people's-livelihoods-their-health-and-our-food-systems>.
5. World Health Organization | WHO. The impact of COVID-19 on global health goals. 2021. Available at: <https://www.who.int/news-room/spotlight/the-impact-of-covid-19-on-global-health-goals>.
6. Silasi M, Cardenas I, Kwon JY, Racicot K, Aldo P, Mor G. Viral infections during pregnancy. *Am J Reprod Immunol*. 2015 Mar;73(3):199-213. doi: 10.1111/aji.12355.
7. World Health Organization | WHO. Conflict, climate crisis and COVID-19 pose great threats to the health of women and children. 2020.

Available at: <https://www.who.int/news/item/25-09-2020-conflict-climate-crisis-and-covid-19-pose-great-threats-to-the-health-of-women-and-children>.

8. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Painel de casos de doença pelo coronavírus 2019 (COVID-19). 2021. Available at: <https://covid.saude.gov.br/>.
9. Brasil. Ministério da Saúde. openDATASUS. 2022. Available at: <https://opendatasus.saude.gov.br/organization/ministerio-da-saude>.
10. Orellana J, Jacques N, Leventhal DGP, Marrero L, Moryn-Duarte LS. Excess maternal mortality in Brazil: Regional inequalities and trajectories during the COVID-19 epidemic. PLoS ONE. 2022;17:e0275333. doi: 10.1371/journal.pone.0275333.
11. Gonzalves BMM, Franco RPV, Rodrigues AS. Maternal mortality associated with COVID-19 in Brazil in 2020 and 2021: comparison with non-pregnant women and men. PLoS ONE. 2021;16:e0261492. doi: 10.1371/journal.pone.0261492.

РЕЗЮМЕ

ОЦІНКА ОБ'ЄМУ ПЕРИНАТАЛЬНОЇ ДОПОМОГИ В ПЕРІОД ПАНДЕМІЇ COVID-19 В РОЗРІЗІ ОКРЕМОГО РЕГІОНУ

ЖДАНОВИЧ О.І., САВЧУК Р.М.

Для покращення якості догляду за матерями та новонародженими, профілактики інфекцій та боротьби з пандеміями необхідний підхід, що ґрунтується на фактичних даних. **Мета** – оцінити об'єм перинатальної допомоги при пандемії

COVID-19 у розрізі окремо взятого регіону України (на прикладі Івано-Франківської області). **Матеріали та методи дослідження.** Статистичний аналіз випадків проводився на основі даних з електронної інтегрованої системи спостереження за захворюваннями (ЕЛІССЗ) та даних КНП «Івано-Франківський обласний перинатальний центр» (ОПЦ). Використано дані Держкомстат України та статистичні документи МОЗ України. Використано бібліосемантичний, аналітичний, статистичний та концептуальний методи. Період дослідження 2020–2023 рр. **Результати.** До недоліків надання медичної перинатальної допомоги в період пандемії COVID-19 можна віднести: не повноту статистичної звітності, недостатність забезпечення діагностично-лікувальними засобами (тест-системи, засобів для проведення респіраторної підтримки і т.п.), недостатність методичного та інформаційного забезпечення лікарів щодо ведення вагітних жінок з COVID-19 (особливо на початкових етапах пандемії), організаційні недоліки (недостатнє дотримання санепідрезиму, про що свідчить 9 випадків захворювання вагітних співробітниць медичних закладів та 8 випадків позитивного тесту на COVID-19 у новонароджених). **Висновок.** Виявлені недоліки вказують на потребу удосконалення надання перинатальної допомоги в умовах можливих наступних пандемій.

Ключові слова: пандемія COVID-19, вагітні, перинатальна допомога, статистика, організація охорони здоров'я.