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EPIDEMIOLOGY OF PREGNANCY AND DELIVERY OUTCOMES IN WOMEN LIVING WITH HIV: A RETROSPECTIVE ANALYSIS, 2018–2022

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Abstract

Introduction. Pregnancy in women living with HIV remains a significant medical challenge: despite advances in therapy, the risk of vertical transmission persists. In Kazakhstan, no systematic cohort exists to evaluate the course and outcomes of pregnancy among HIV-infected women.

Objective. To conduct a retrospective cohort analysis of pregnancy and delivery outcomes in HIV-positive women of reproductive age (18–49 years) in Almaty from January 1, 2018, to December 31, 2022, based on the regional HIV registry.

Materials and methods. Data were extracted from the National Electronic HIV Registry and medical records from the AIDS Center and antenatal clinics. A dynamic analysis was carried out on the number of pregnancies, timing of antenatal registration, transmission routes, disease stage, viral load and CD4 count, delivery methods, and perinatal outcomes. Statistical analysis included the Shapiro–Wilk test, χ^2 test, and analysis of variance, with a significance level of $p \leq 0.05$, confidence intervals, and effect size calculations.

Results. A total of 483 women were included (21.4% of all HIV-positive women of reproductive age). The mean age was 31.4 ± 5.3 years; antenatal registration occurred at approximately 10–13 weeks of gestation. The frequency of pregnancy termination before 12 weeks was 10.2%, and spontaneous miscarriage occurred in 7.3% ($p = 0.008$). Elective cesarean sections accounted for ~26%, vaginal deliveries 28%, and emergency cesarean sections 15% ($p < 0.05$). Sexual transmission represented 91.3% of cases. The proportion of women with suppressed viral load increased from 10.5% in 2018 to 79.7% in 2022. Live births accounted for 99.5%, with neonatal pathologies observed in 3.6% of cases.

Conclusions. The study demonstrates improved control of HIV therapy and progress in preventing vertical transmission but also highlights declining coverage of ART prophylaxis. Strengthening healthcare support and coordination is recommended to enhance treatment adherence and improve pregnancy outcomes among women with HIV.

Keywords: *HIV infection, pregnancy, antiretroviral therapy, vertical transmission, cesarean section, viral load*.

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Резюме

ЭПИДЕМИОЛОГИЯ ТЕЧЕНИЯ БЕРЕМЕННОСТИ И РОДОВ У ЖЕНЩИН С ВИЧ-ИНФЕКЦИЕЙ ПО ДАННЫМ РЕТРОСПЕКТИВНОГО АНАЛИЗА ЗА 2018–2022 ГОДЫ

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Введение. Беременность у женщин с ВИЧ остаётся значимой медицинской проблемой: несмотря на достижения в терапии, риск вертикальной передачи остаётся актуальным. В Казахстане отсутствует системная когорта, оценивающая течение и исход беременности у ВИЧ-инфицированных женщин.

Цель исследования. Провести ретроспективный когортный анализ течения беременности и родов у ВИЧ-положительных женщин фертильного возраста (18–49 лет) в Алматы в период с 1 янв. 2018 по 31 дек. 2022 года на основе регионального регистра.

Материалы и методы. Данные извлечены из Республиканского электронного регистра ВИЧ-инфицированных лиц и медицинских записей СПИД-центра и женских консультаций. Описан динамический анализ количества беременностей, сроков постановки на диспансерный учёт, путей передачи, стадии заболевания, вирусной нагрузки и CD4, методов родоразрешения и перинатальных исходов. Статистическая обработка включала тест Шапиро–Уилка, χ^2, дисперсионный анализ, с уровнем значимости $p \leq 0,05$, доверительными интервалами и расчётом эффектов.

Результаты. Всего включены 483 женщины (21,4 % всех ВИЧ-положительных фертильного возраста). Средний возраст – 31,4 ± 5,3 года; срок постановки на учёт – примерно 10–13 недель. Частота прерывания беременности до 12 недель составила 10,2 %, самопроизвольный выкидыш – 7,3 % ($p = 0,008$). Плановые кесаревы сечения составили около 26 %, роды — 28 %, экстренные — 15 % ($p < 0,05$). Половой путь передачи — 91,3 %. Доля женщин со сниженной вирусной нагрузкой выросла с 10,5 % до 79,7 % к 2022 году. Живорождений — 99,5 %; патологии — 3,6 %.

Выводы. Исследование демонстрирует улучшение контроля над ВИЧ-терапией и успехи в предотвращении вертикальной передачи, но выявляет снижение охвата АРТ-профилактикой. Рекомендуется усилить поддержку и взаимодействие медицинских служб, чтобы повысить приверженность лечению и улучшить исходы беременностей у женщин с ВИЧ.

Ключевые слова: *ВИЧ-инфекция, беременность, антиретровирусная терапия, вертикальная передача, кесарево сечение, вирусная нагрузка.*

Для цитирования:

Билибаева Г.Ж., Оспанова Д.А., Кажыгаликызы Р., Нурлыбаева М.Н., Ибраймжанова Ж.Е., Шокай У.Д., Курманханова Р.Ж., Сейтманова А.Б., Абдимуратова Б.К. Эпидемиология течения беременности и родов у женщин с ВИЧ-инфекцией по данным ретроспективного анализа за 2018–2022 годы // Наука и Здравоохранение. 2026. Vol.28 (1), С. 66-73. *doi 10.34689/SH.2026.28.1.008*

Түйіндеме

2018–2022 ЖЫЛДАР АРАЛЫҒЫНДАҒЫ РЕТРОСПЕКТИВТІ ТАЛДАУ ДЕРЕКТЕРІ БОЙЫНША ЖИТС-ПЕН ӨМІР СҮРЕТІН ӘЙЕЛДЕРДІҢ ЖҮКТІЛІК ПЕН БОСАНУ АҒЫМЫНЫҢ ЭПИДЕМИОЛОГИЯСЫ

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Кіріспе. ЖИТС-пен өмір сүретін әйелдердің жүктілігі маңызды медициналық мәселе болып қала береді: терапиядағы жетістіктерге қарамастан, вертикалды берілу қаупі әлі де өзекті. Қазақстанда ЖИТС-пен өмір сүретін әйелдердің жүктілік ағымын және оның нәтижелерін бағалайтын жүйелі когорталық база жоқ.

Зерттеудің мақсаты. Алматы қаласында 2018 жылғы 1 қаңтардан 2022 жылғы 31 желтоқсанға дейінгі аралықта репродуктивті жастағы (18–49 жас) ЖИТС-пен өмір сүретін әйелдердің жүктілік пен босану ағымына ретроспективті когорталық талдау жүргізу.

Материалдар мен Әдістер. Мәліметтер Республикалық ЖИТС-пен өмір сүретіндер электрондық тіркелімінен, ЖИТС орталығы мен әйелдер консультацияларының медициналық жазбаларынан алынды. Талдауға жүктілік санының динамикасы, диспансерлік есепке тұру мерзімдері, берілу жолдары, ауру сатысы, вирус жүктемесі мен CD4

көрсеткіштері, босандыру әдістері және перинаталдық нәтижелер енгізілді. Статистикалық өңдеуде Шапиро–Уилк сынағы, χ^2, дисперсиялық талдау қолданылды, маңыздылық деңгейі $p \leq 0,05$, сенімділік интервалдары және әсер көлемдері есептелді.

Нәтижелер. Барлығы 483 әйел (репродуктивті жастағы ЖИТС-пен өмір сүретіндердің 21,4 %-ы) қамтылды. Орташа жас - 31,4 ± 5,3 жас; есепке тұру мерзімі шамамен 10–13 апта. Жүктілікті 12 аптаға дейін үзу жиілігі — 10,2 %, өздігінен түсік - 7,3 % ($p = 0,008$). Жоспарлы кесар тілігі - шамамен 26 %, табиғи босану - 28 %, шұғыл кесар тілігі - 15 % ($p < 0,05$). Жыныстық жолмен берілу жиілігі - 91,3 %. Вирус жүктемесі төмен әйелдердің үлесі 2018 жылы 10,5 %-дан 2022 жылы 79,7 %-ға дейін өсті. Тірі туылу - 99,5 %; патология - 3,6 %.

Қорытынды. Зерттеу ЖИТС терапиясын бақылаудың жақсарғанын және вертикалды берілудің алдын алудағы жетістіктерді көрсетеді, алайда АРТ-профилактикамен қамтудың төмендеуін айқындайды. Әйелдердің емге бейілділігін арттыру және жүктілік нәтижелерін жақсарту үшін медициналық қызметтердің қолдауын және өзара әрекеттестігін күшейту ұсынылады.

***Түйін сөздер**: ЖИТС, жүктілік, антиретровирустық терапия, вертикалды берілу, кесар тілігі, вирус жүктемесі*

Дәйексөз үшін:

Билибаева Г.Ж., Оспанова Д.А., Кажыгаликызы Р., Нурлыбаева М.Н., Ибраймжанова Ж.Е., Шокай У.Д., Курманханова Р.Ж., Сейтманова А.Б., Абдимуратова Б.К. 2018–2022 жылдар аралығындағы ретроспективті талдау деректері бойынша ЖИТС-пен өмір сүретін әйелдердің жүктілік пен босану ағымының эпидемиологиясы // Ғылым және Денсаулық сақтау. 2026. Vol.28 (1), Б. 66-73. *doi 10.34689/SH.2026.28.1.008*

Introduction

Pregnancy is an important period in a woman's life; however, for HIV-infected women it carries increased risks for both mother and child. Despite progress in antiretroviral therapy (ART) and prevention of vertical transmission, the issue remains relevant. According to WHO and national programs, in countries with limited access to treatment, vertical HIV transmission continues to pose a serious threat [4,6]. International and domestic studies show that successful implementation of ART during pregnancy can significantly reduce the risk of HIV-positive births [5,1,15]. However, in settings with poor coordination of healthcare services and limited access to specialized care, the effectiveness of preventive measures may decline [13].

In Kazakhstan, official statistics show that HIV prevalence among individuals aged 15-49 years has increased from 0.15% in 2013 to 0.31% in 2022 [13]. However, data on pregnant women living with HIV remain fragmented, with only isolated reports available that do not comprehensively reflect pregnancy dynamics, delivery outcomes, and vertical transmission prevention practices.

Thus, current research provides scattered information about the impact of HIV on women's reproductive health, but systematic cohorts of pregnant women with HIV based on regional registries are lacking. A comprehensive epidemiological assessment is required, including the effectiveness of antenatal registration, timing of ART initiation, pregnancy complications, delivery methods, and maternal and neonatal outcomes.

Study Objective - to conduct a retrospective analysis of pregnancy course and outcomes in HIV-infected women of reproductive age (18–49 years) in Almaty from January 1, 2018, to December 31, 2022, based on the regional AIDS Center registry.

Materials and Methods

The study was conducted as a retrospective cohort analysis using data from the Regional Electronic Registry of HIV-infected women registered at the AIDS Center and antenatal clinics in Almaty. The study was carried out in accordance with the research protocol approved by the Republican Center for AIDS Prevention and Control (Almaty, Kazakhstan).

Study type.

This was a retrospective cohort study covering the period from January 1, 2018, to December 31, 2022. The dynamics and pregnancy outcomes were examined among women aged 18–49 years with confirmed HIV infection.

Participant selection.

All women of reproductive age with HIV registered in the AIDS Center and antenatal clinic databases in Almaty during the study period were included. Exclusion criteria: women outside the age range of 18-49 years, those without pregnancies, and patients with incomplete registry data on key variables (gestational age, delivery method, viral load). The study population comprised all HIV-positive women of reproductive age in Almaty. The final sample included 483 women, ensuring representativeness and sufficient statistical power.

Data collection.

The registry provided information on age, gestational age at registration, transmission routes (parenteral, sexual, unknown), HIV stage (I–IV), viral load indicators ("<" and "="), and mean CD4 counts. Data on delivery methods (elective cesarean, emergency cesarean, vaginal birth), pregnancy outcomes (abortions, miscarriages, live births), and ART regimen changes (treatment discontinuation, drug substitution, reasons) were also extracted.

Data processing and statistical analysis.

Continuous variables (e.g., age, gestational age at registration) were expressed as means ± standard deviation (SD). Categorical variables were presented as absolute values and percentages. Comparisons across years were conducted using the χ^2 test for categorical data and analysis of variance or the Kruskal–Wallis test for continuous variables, depending on distribution. Normality was assessed using the Shapiro–Wilk test. A significance level of $p \leq 0.05$ was applied, with all p-values reported to three decimal places (e.g., $p = 0.008$). For statistically significant results, 95% confidence intervals and effect sizes (e.g., odds ratio, relative risk) were calculated where applicable.

Ethical considerations. The study was approved by the Local Ethics Committee of the S.D. Asfendiyarov Kazakh National Medical University, Almaty, Republic of Kazakhstan (Protocol No. 7 (30), dated 30.05.2022).

Results

HIV incidence per 1,000 uninfected population in Kazakhstan, 2013–2022 (according to stat.gov.kz).

The number of HIV-infected individuals has increased annually. From 2013 to 2022, a steady increase in HIV prevalence was observed among both men and women aged 15–49 years. The overall growth of 0.31% during this period reflects both improved detection and persistent epidemiological challenges [6].

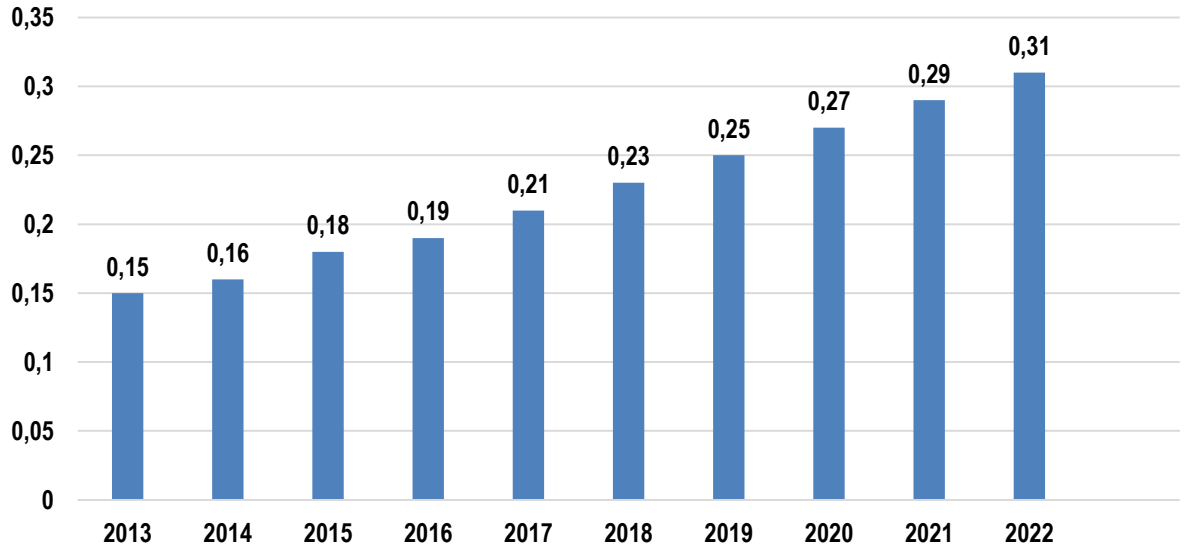

Figure 1. Prevalence of HIV Infection.

Between 2018 and 2022, a total of 2,254 HIV-infected women aged 15-49 years were registered in Almaty, of whom 483 (21.4%) experienced pregnancy and met the inclusion criteria. Distribution by year was as follows: 2018 - 100 women (20.7%), 2019 - 118 women (24.2%), 2020 – 104 women (21.5%),2021 - 83 women (17.2%),2022 – 78 women (16.1%).The mean age of the women was 31.4 ± 5.3 years, with no statistically significant changes across the study years (Figure 2).

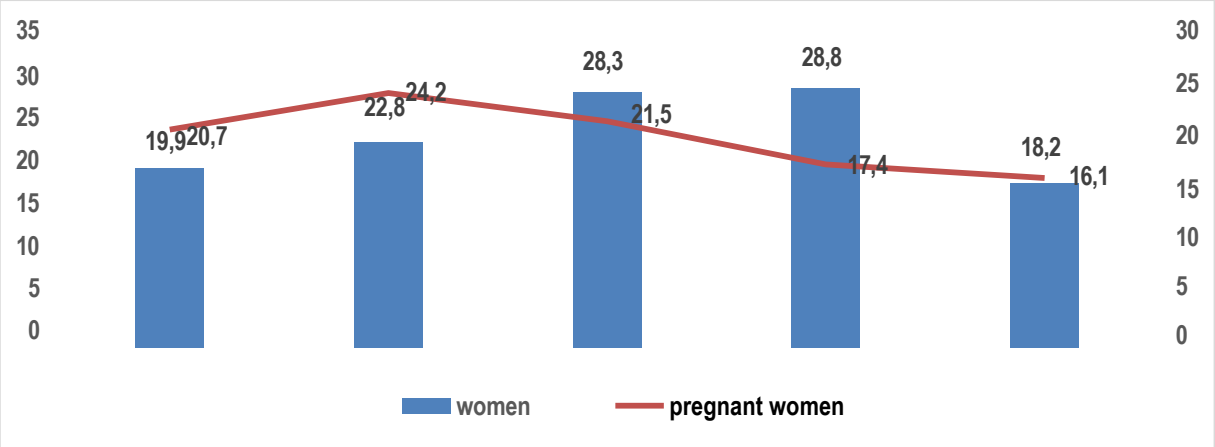

Figure 2. HIV Detection by Year.

Gestational age at the time of registration: at the AIDS Center - 12.9 ± 8.8 weeks (range 0-41), and at antenatal clinics – 10.4 ± 8.3 weeks (range 0-39).

Pregnancy outcomes: Elective cesarean sections accounted for 26.2% of cases.Vaginal deliveries constituted 28.3%, with the highest proportion observed in 2022 (24.5%).A statistically significant association was established between the mode of delivery and the clinical condition of the woman ($p < 0.05$), emphasizing the importance of early antenatal follow-up.A positive trend was noted in the reduction of induced abortions before 12 weeks, decreasing from 20% to 3.8% over the study period. However, the rate of spontaneous miscarriages remained at 7.3%, which requires further investigation of risk factors ($p = 0.008$).

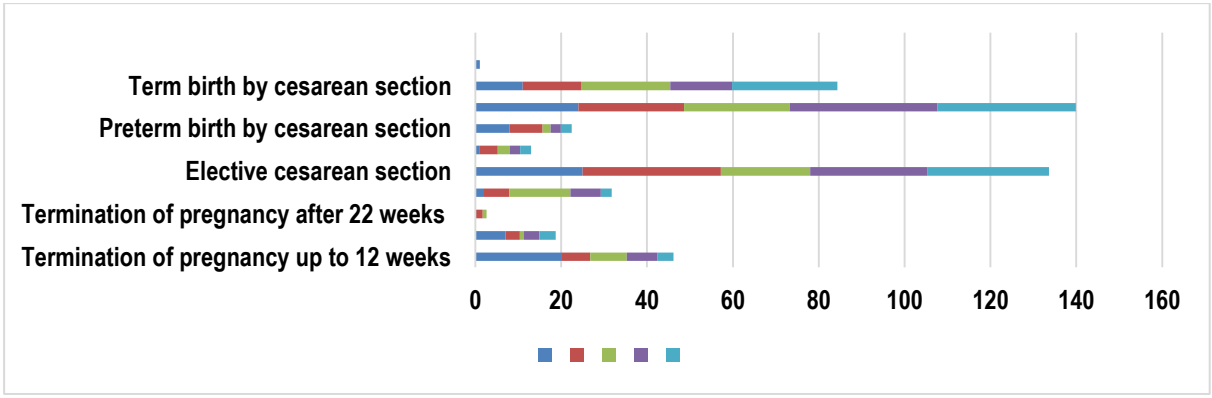

Figure 3. Pregnancy outcomes among HIV-infected women.

There is an increase in sexual transmission among HIV-infected pregnant women. A total of 91.0% were infected through sexual contact.

Half of the women were infected with HIV through parenteral transmission, and many used psychoactive substances (PAS) during pregnancy. In 2018 and 2022, the proportion of HIV-positive pregnant women who used drugs decreased from 10% in 2018 to 7.8% in 2022 ($p<0.01$).

As for cases with an unidentified transmission route, the data show minimal rates, accounting for about 1% throughout the entire study period (Figure 4).

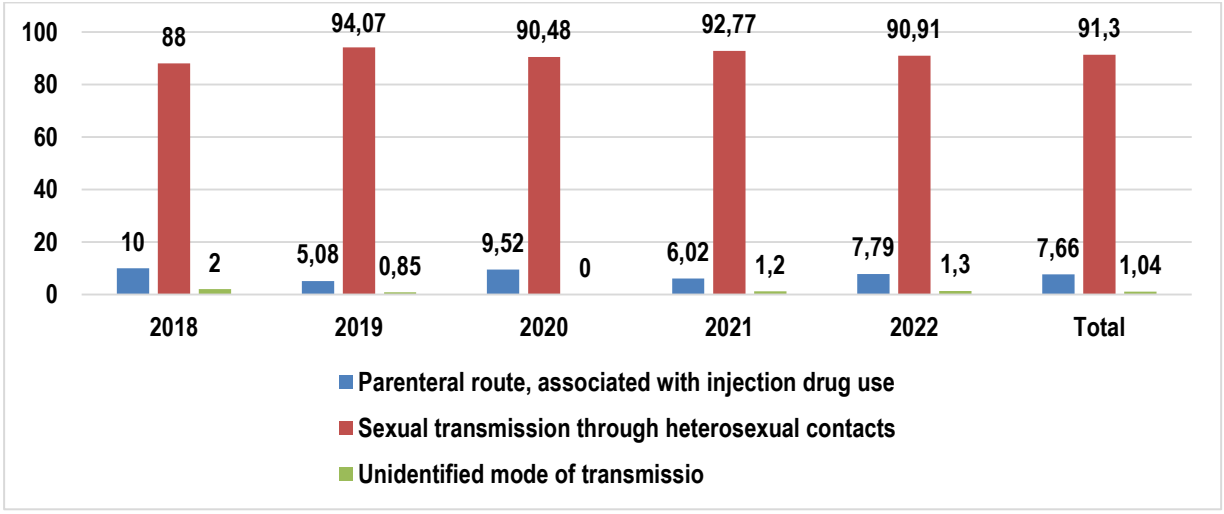

Figure 4. Routes of infection among pregnant women in 2018–2022.

It is also important to note that every third HIV-positive pregnant woman was at an advanced stage of the disease - on average 3.1%. The proportion of such women increased from 2.0% in 2018 to 4.8% in 2021, but then decreased to 1.3% in 2022 (Figure 5).

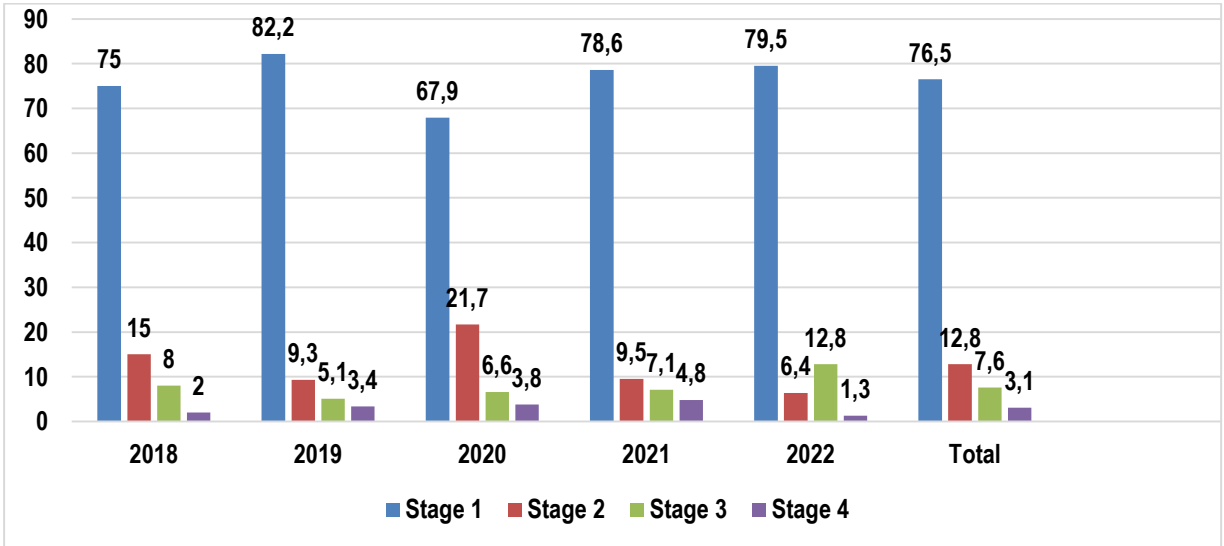

Figure 5. Disease stage among pregnant women with HIV infection.

From 2018 to 2022, a significant increase in drug substitution was recorded: from 46.3% in 2018 to 50.0% in 2022. This is associated with improved availability of new medications, which is confirmed by the statistical value (r = -0.224, p = 0.006) (Figure 6). Adherence was studied by the frequency of receiving antiretroviral therapy (ART) drugs from the pharmacy. The reasons for low adherence were differentiated into forgetfulness to take medication, feeling better, drugs use, alcohol use, toxic reactions, stigma or lack of privacy for taking ART or personal problems, being too severe due to illness, depression, and other cases [1].

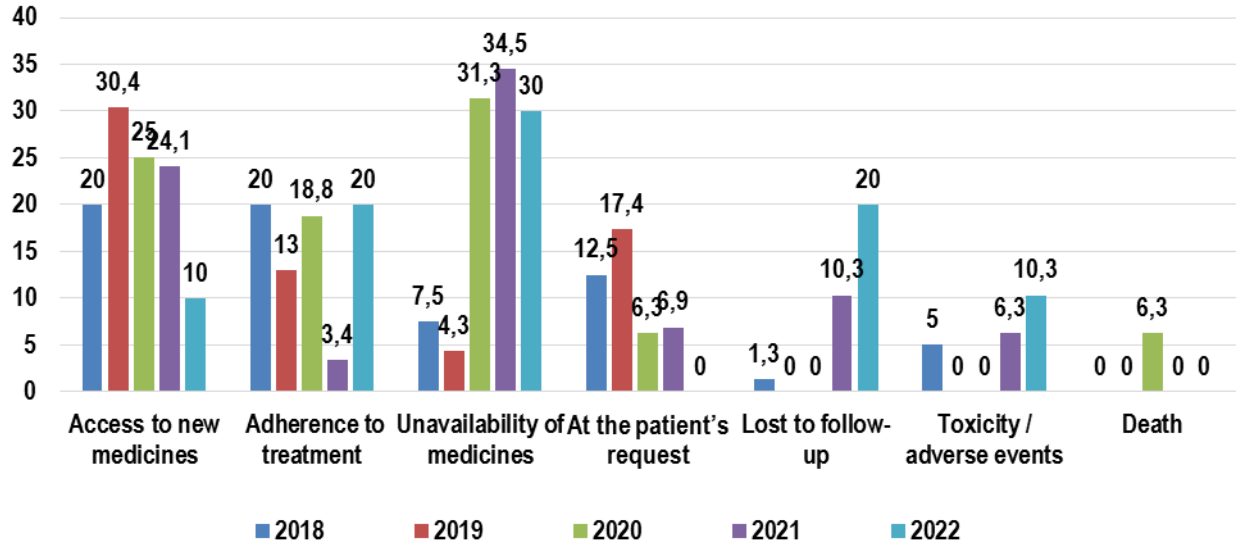

Figure 6. Dynamics of ART regimen discontinuation and substitution among HIV-infected pregnant women and main reasons.

The main factor contributing to the postponement of pregnancy is HIV infection at a late stage, characterized by a high level of the virus in the blood, which requires additional testing and treatment. However, during the observation period starting from 2018, this indicator changed sevenfold, reaching 79.7% in 2022.

The "<" type of viral load increased significantly from 10.5% in 2018 to 79.7% in 2022. At the same time, the "=" type of viral load decreased from 89.5% to 20.3%. The average CD4 level has remained stable throughout all the years, as shown in Figure 7.

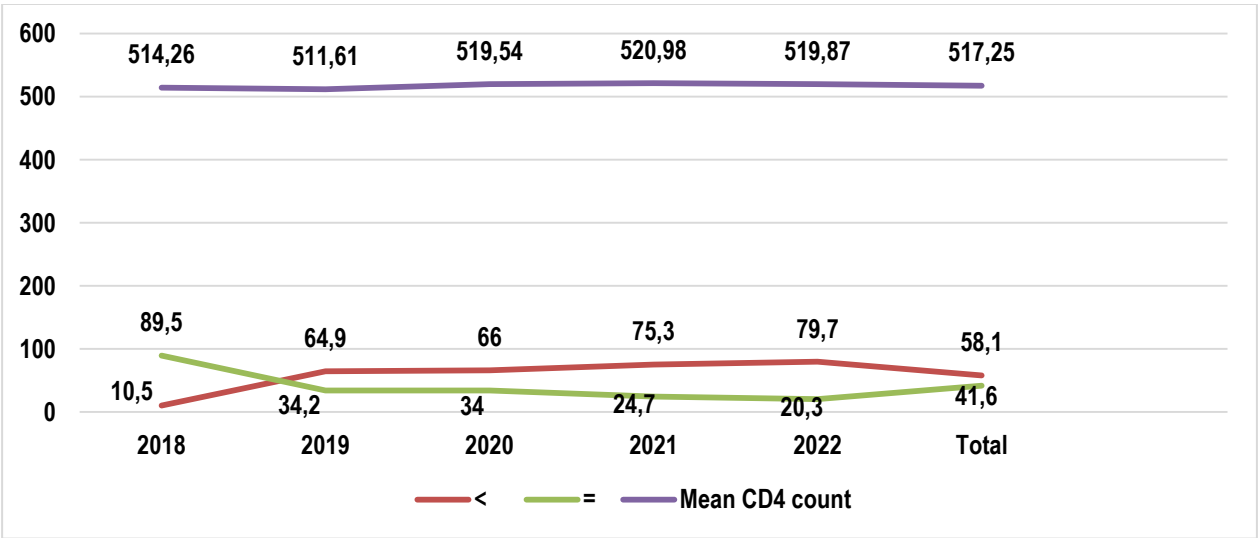

Figure 7. Type of viral load and average CD4 count among HIV-positive women.

Cesarean section remained the primary mode of delivery throughout the entire period – averaging 60.8%, with slight fluctuations: 63.7% in 2018 and 62.5% in 2022. The proportion of vaginal deliveries peaked in 2021 at 45%, but then decreased to 37.5% in 2022.

These differences are statistically significant ($p < 0.05$), highlighting the importance of cesarean section as a strategy for preventing mother-to-child transmission of HIV.

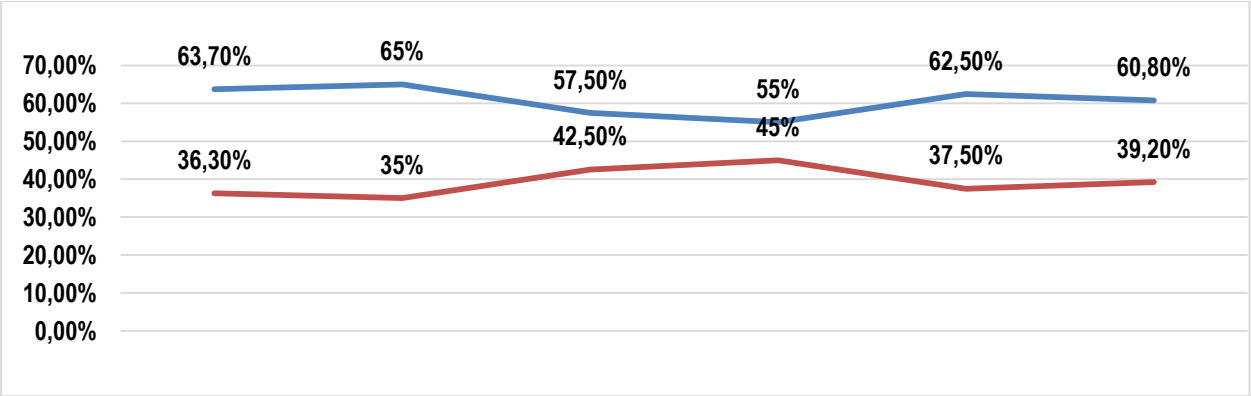

Figure 8. Distribution of delivery methods among pregnant women with HIV infection.

From 2018 to 2022, almost all deliveries resulted in live births. The only exceptions were two cases in which the infant did not survive (0.5%). In 2020 and 2022, isolated cases were recorded where delivery did not result in a live birth (1.3% and 1.4%, respectively). Nevertheless, overall, the proportion of live births remains very high - 99.5%.

Discussion of Results

The main findings of the study are consistent with international data: a high percentage of sexual transmission of HIV among pregnant women [5,15], as well as a significant proportion of women initiating ART in the first trimester (average gestational age – 10.4 weeks). However, the increase in the proportion of women with low viral load ("<") from 10.5% to 79.7% indicates improved treatment effectiveness and better infection control. The frequency of cesarean section (60.8%) is higher than in the general population, which can be explained by the intention to minimize the risk of vertical HIV transmission in line with international recommendations [4]. The high rate of live births (99.5%) and the low incidence of pathologies (3.6%) demonstrate the effectiveness of current pregnancy management protocols and ART monitoring.

The obtained data generally correspond to the results of international studies. The predominance of sexual transmission of HIV among pregnant women confirms the conclusions of UNAIDS (2022) [13] and several national studies *(Ivanova T.A. et al., 2019 [2]; Sadykova K., 2020 [10]).* Similar results were demonstrated in the study by *Ivanova T.A. et al.,* where more than 80% of HIV infections in women of reproductive age were also linked to sexual transmission. The significant increase in the proportion of women with undetectable viral load (from 10.5% to 79.7%) indicates the high effectiveness of antiretroviral therapy. Similar trends were observed in the studies by *Smith J. et al.* (2021) and *Zhang Y. et al.* (2020) [9,17]. However, in our study, the indicators were higher, which may be associated with the interdisciplinary approach and the improved coordination between AIDS centers and antenatal clinics.

The high frequency of cesarean section (60.8%) is consistent with the data from the European HIV Pregnancy Cohort (2018) [3], where the rate was 58–62%, and reflects the strategy of minimizing the risk of vertical transmission recommended by the *World Health Organization* [14,16]. The live birth rate (99.5%) is comparable to the findings of an international meta-analysis *(Tudor Car L. et al., 2020)* [11], while the low rate of congenital pathologies (3.6%) confirms the effectiveness of comprehensive monitoring and timely initiation of ART [9].

The strengths of this study include the analysis of a complete cohort of women over an extended period and a comprehensive assessment of medical and socio-epidemiological factors. The limitation remains the restricted geographic scope of the sample (Almaty), which may reduce the generalizability of the data. Promising directions for further research include the evaluation of socioeconomic factors influencing treatment adherence, as well as the implementation of psychological support programs, the effectiveness of which has been confirmed in previous studies *(Peterson K. et al., 2019; Li Ch. et al., 2021)* [7,5].

Conclusions

In Almaty, during 2018–2022, a total of 483 HIV-infected women of reproductive age experienced pregnancy, accounting for about 21% of all HIV-positive women in this age group. The average gestational age at enrollment for antenatal care was approximately 10–13 weeks, which allows for the timely initiation of ART.A significant proportion of women (over half) underwent ART regimen modification, and the share of those with low viral load increased substantially, indicating improvements in treatment quality. The frequency of cesarean section was higher than in the general population; however, it contributed to high rates of live births and healthy infants. The results of this study may serve as a basis for improving regional protocols for the management of pregnant women with HIV, including strengthening collaboration between healthcare structures, enhancing access to ART, and providing social support to improve treatment adherence.

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