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Trends and dynamics of HIV infection among the female population in 2016–2024

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Human immunodeficiency virus (HIV) remains one of the leading medical and social problems of our time, characterized by the steady circulation of the pathogen and the uneven dynamics of morbidity among different population groups. Special attention is paid to the female population, in which the epidemic process has specific socio-biological features related to demographic, behavioral and availability of medical services, factors affecting the level of detection and spread of infection, as well as the effectiveness of preventive measures and early diagnosis, timely treatment, and control of the course of the disease.

Aim – to analyze the trends and dynamics of registered cases of HIV infection among the female population in Ukraine in 2016–2024.**Materials and methods.** A retrospective descriptive epidemiological study was conducted based on official statistical data of the Public Health Center of the Ministry of Health of Ukraine. Methods of descriptive statistics, comparative and dynamic analysis with assessment of absolute indicators and rates of their changes in the temporal aspect were used.**Results.** It was established that in the years 2016–2022, there was a tendency towards a gradual increase in the number of registered HIV cases among women from 62,576 to 72,714 cases, reaching a peak value in 2022. In 2019, a slight decrease in the indicator was noted, which may indicate a temporary stabilization of the epidemic process. In 2023, a slight decrease in the number of cases was recorded, while in 2024, there was a sharp decrease in the indicator to 62,968. The revealed dynamics have a wave-like character with periods of growth, stabilization, and decline.**Conclusions.** The obtained results indicate the presence of an unstable epidemiological situation regarding HIV infection among the female population, with an upward trend in 2016–2022 and a further sharp decrease in 2024. The identified changes can be due to both real shifts in the epidemic process and the influence of external social and organizational factors, which require further comprehensive analysis.

No conflict of interests was declared by the authors.

Keywords: human immunodeficiency virus (HIV), women, morbidity, dynamics, epidemiology.

Тенденції та динаміка ВІЛ-інфекції серед жіночого населення у 2016–2024 роках

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Вірус імунодефіциту людини (ВІЛ) залишається однією з провідних медико-соціальних проблем сучасності, що характеризується стійкою циркуляцією збудника та нерівномірною динамікою захворюваності серед різних груп населення. Особливу увагу привертає жіноче населення, в якого епідемічний процес має специфічні соціально-біологічні особливості, пов'язані з демографічними, поведінковими та доступністю медичних послуг чинниками, що впливають на рівень виявлення та поширення інфекції, а також ефективність профілактичних заходів і ранньої діагностики, своєчасного лікування та контролю перебігу захворювання.

Мета – проаналізувати тенденції та динаміку зареєстрованих випадків ВІЛ-інфекції серед жіночого населення в Україні у 2016–2024 роках.**Матеріали та методи.** Проведено ретроспективне описове епідеміологічне дослідження на основі офіційних статистичних даних Центру громадського здоров'я МОЗ України. Використано методи описової статистики, порівняльного та динамічного аналізу з оцінкою абсолютних показників і темпів їхніх змін у часовому аспекті.**Результати.** Встановлено, що у 2016–2022 роках спостерігалася тенденція до поступового зростання кількості зареєстрованих випадків ВІЛ серед жінок – від 62 576 до 72 714 випадків із досягненням пікового значення у 2022 році. У 2019 році простежувалося незначне зниження показника, що може свідчити про тимчасову стабілізацію епідемічного процесу. У 2023 році зафіксовано незначне зменшення кількості випадків, тоді як у 2024 році відбулося різке зниження показника до 62 968. Виявлена динаміка має хвилеподібний характер із періодами зростання, стабілізації та спаду.**Висновки.** Отримані результати свідчать про наявність нестабільної епідеміологічної ситуації щодо ВІЛ-інфекції серед жіночого населення з тенденцією до зростання у 2016–2022 роках та подальшим різким зниженням у 2024 році. Виявлені зміни можуть бути зумовлені як реальними зрушеннями в епідемічному процесі, так і впливом зовнішніх соціально-організаційних чинників, що потребує подальшого комплексного аналізу.

Автори заявляють про відсутність конфлікту інтересів.

Ключові слова: вірус імунодефіциту людини (ВІЛ), жінки, захворюваність, динаміка, епідеміологія.

Introduction

Human immunodeficiency virus (HIV) infection remains one of the most urgent global public health problems due to its significant prevalence, chronic course, and significant impact on demographic and socio-economic processes [1]. Despite significant achievements in the field of prevention, diagnosis and treatment, in particular, the widespread introduction of antiretroviral therapy, the HIV epidemic continues to be characterized by persistent trends towards the preservation and periodic growth of morbidity levels in various regions of the world. In Ukraine, the situation with HIV infection remains tense, which requires constant epidemiological monitoring and analysis [2].

A special place in the structure of HIV infection is occupied by the female population, which is associated with a number of biological, social, and behavioral factors that increase the risk of infection [3]. Women's biological vulnerability, gender inequalities, limited access to health services for certain groups, and socio-economic difficulties can contribute to the spread of infection. In addition, an important aspect is the risk of vertical transmission of HIV from mother to child, which determines the need for timely detection and treatment of infected women of reproductive age [4].

Epidemiological rates of HIV infection among women can vary under the influence of a variety of factors, including the effectiveness of prevention programs, the level of testing coverage, the availability of antiretroviral therapy, and socio-political and economic conditions [5]. Dynamic analysis of these indicators makes it possible to identify the main trends in the development of the epidemic process, determine periods of increased risk and assess the effectiveness of health care system measures [6].

Recent years have been characterized by significant transformations in the field of public health, which may affect the level of registration of HIV infection, including changes in the accounting system, availability of medical services, and migration processes of the population. In this regard, the analysis of long-term morbidity trends among the female population becomes especially relevant, which allows not only to assess the current state of the problem, but also to form scientifically based approaches to its further solution. Conducting such studies is an important element of improving the system of epidemiological surveillance and planning preventive measures.

Aim – to analyze the trends and dynamics of registered cases of HIV infection among the female population in Ukraine in 2016–2024.

Materials and methods of the study

The study was conducted in the format of a retrospective descriptive epidemiological analysis using official statistical data on HIV infection among the female population for the period 2016–2024. Generalized reporting materials of the Public Health Center of the Ministry of Health of Ukraine, containing systematized data on the number of registered cases of HIV infection, served as the information base. The analysis includes absolute annual indicators reflecting the incidence of disease cases during the studied period.

The object of the study was the incidence of HIV among the female population, the subject – the dynamics of changes in the number of registered cases in the time interval. The research was comprehensive in nature and covered the full range of available statistical data for a certain period without using a sampling method.

The methods of descriptive statistics were used to process the obtained data, which involved the analysis of absolute indicators and their changes in the temporal aspect. The rates of increase and decrease of indicators between individual years were calculated, which made it possible to assess the intensity of changes and identify the main trends in the development of the epidemic process. Dynamic analysis made it possible to determine the direction of fluctuations of the indicators and outline the periods of their increase and decrease.

Graphical methods were used to visualize the research results, in particular, the construction of a linear diagram reflecting the dynamics of the number of registered cases of HIV infection among the female population in 2016–2024. The generalization of the results was carried out using an analytical approach, which ensured a systematic interpretation of the obtained data and made it possible to form reasonable conclusions about the researched process.

Results of the study and discussion

As a result of the conducted analysis, it was established that the dynamics of the number of registered cases of HIV infection among the female population in 2016–2024 is characterized by unevenness and the presence of several clearly defined stages of development. In general, the studied period shows

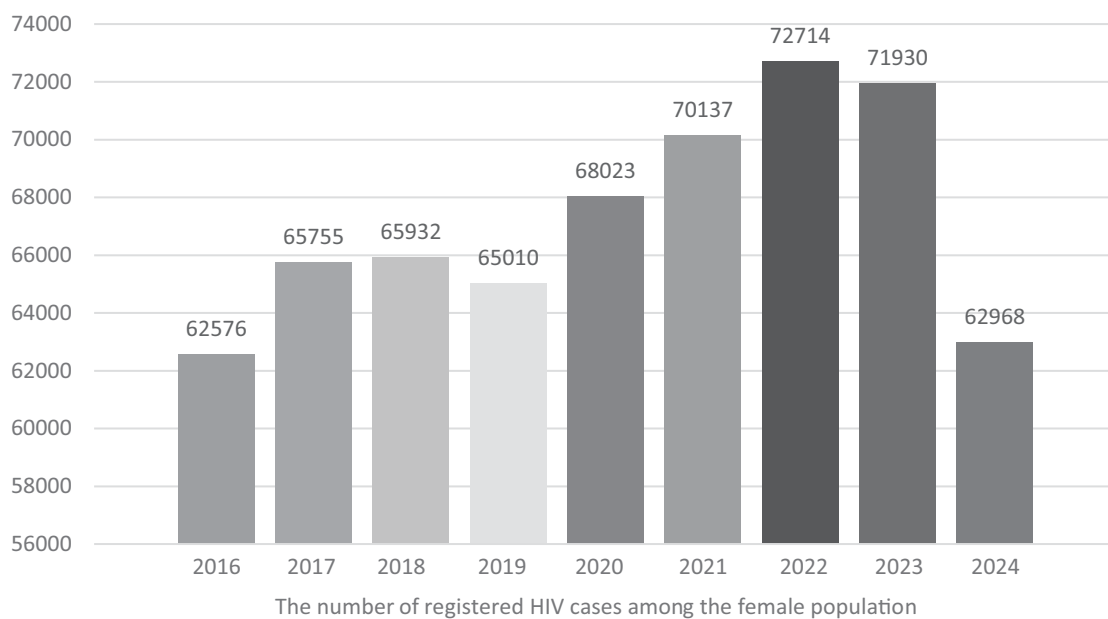


Fig. Dynamics of the number of registered cases of HIV infection among the female population of Ukraine in 2016–2024

a combination of a tendency to gradual growth with a further pronounced decrease in indicators at the end of the observation period (Figure).

At the initial stage (2016–2018), a gradual increase in the number of registered HIV cases among women was noted. In particular, in 2016, the indicator was 62,576 cases, in 2017 – 65,755, and in 2018 – 65,932. Thus, in two years, the increase was 3,356 cases, which corresponds to approximately 5.4%. Such dynamics may indicate a gradual expansion of the scale of the epidemic process or an increase in the effectiveness of detecting cases of HIV infection.

In 2019, a slight decrease in the number of cases was recorded to 65,010, which is 922 cases less compared to the previous year (about -1.4%). This may indicate a short-term stabilization of indicators or fluctuations within the general trend. However, already in 2020, there is a resumption of growth – the number of cases has increased to 68,023, which is 3,013 more than in 2019 (+4.6%).

The subsequent period (2020–2022) is characterized by the most pronounced growth of indicators over the entire studied interval. In 2021, the number of registered cases reached 70,137, which is 2,114 more than in 2020 (+3.1%). In 2022, the maximum value was recorded – 72,714 cases, which is 2,577 more than in the previous year (+3.7%). In general, for the years 2019–2022, the increase was 7,704 cases, or about 11.8%, which indicates the intensification of the epidemic process among the female population during this period.

In 2023, there is a slight decrease in the indicator to 71,930 cases (a decrease of 784 cases, or -1.1% compared to 2022), which can be seen as the beginning of stabilization after a period of growth. At the same time, in 2024, there was a sharp decrease in the number of registered cases to 62,968, which is 8,962 cases fewer than in 2023 (approximately -12.5%). This is the most significant decline over the entire studied period.

A comparative analysis of the extreme values shows that in 2024, the level of the indicator practically returned to the values of 2016, which indicates the completion of a certain cycle of dynamic changes. At the same time, if we consider the total amplitude of fluctuations, the difference between the minimum (2016 – 62,576) and maximum (2022 – 72,714) values is 10,138 cases, which emphasizes the significant variability of the indicators.

Analysis of growth rates allows us to distinguish several characteristic phases:

- phase of moderate growth (2016–2018);
- short-term stabilization phase (2018–2019);
- phase of intensive growth (2019–2022);
- decline phase (2022–2024).

Such wave-like dynamics may reflect the complex nature of the epidemic process, which is formed under the influence of a complex of factors. It is important that the growth of indicators for several years in a row is replaced by periods of stabilization or decline, which is typical for many infectious diseases.

A sharp decrease in the indicator in 2024 deserves special attention. Its scale significantly exceeds previous annual fluctuations, which indicates the presence of additional influences that could change the nature of registration or spread of HIV infection among the female population. At the same time, the very fact of such a decrease is an important element of the general dynamics and needs to be taken into account in further analysis.

The obtained results are consistent with the data of other studies, which note a tendency towards a gradual increase in HIV infection rates among the female population in recent years. In particular, one of the authors notes that the increase in the number of registered cases may be related not only to the actual spread of the infection, but also to the expansion of access to testing and an increase in the level of HIV detection [7,11].

Another researcher emphasizes that the wave-like nature of the dynamics of morbidity is typical for HIV infection and reflects the influence of a complex of socio-economic and behavioral factors. In this context, the alternation of periods of growth and stabilization of indicators revealed in our study corresponds to the general patterns of the development of the epidemic process [8].

Some authors emphasize the growing role of the female population in the structure of HIV infection, which is explained by the increased vulnerability of women to infection, in particular due to social and biological factors. At the same time, other scientists indicate that changes in the indicators may be associated with the transformation of the ways of transmission of infection and changes in the behavioral patterns of the population [9].

Particular attention is paid in the literature to periods of sharp changes in indicators. Thus, one of the researchers notes that significant fluctuations in registration levels may be caused by changes in the organization of medical care, availability of diagnostic services, and features of case accounting [10]. Another author emphasizes that sharp de-

creases in indicators do not always reflect a real improvement in the epidemic situation, but may be related to the influence of external factors. In this context, the significant decrease in the number of registered cases in 2024 revealed in our study can be considered as the result of the complex impact of various factors. Similar changes, according to other authors, require additional analysis for their correct interpretation.

The results of the conducted research generally agree with modern scientific ideas about the dynamic and multifactorial nature of the epidemic process of HIV infection among the female population.

Conclusions

As a result of the conducted research, it was established that the dynamics of registered cases of HIV infection among the female population in 2016–2024 is characterized by a wave-like course with alternating periods of growth, stabilization, and decreasing indicators. It was found that in the years 2016–2022, there was a general trend towards a gradual increase in the number of cases, reaching a maximum value in 2022. The subsequent period was marked by a change in trend: in 2023, a slight decrease was recorded, and in 2024, a significant decline of the indicator, which led to its values approaching the level at the beginning of the period under study.

The conducted analysis made it possible to single out the main stages of the development of the epidemic process and establish the presence of significant variability of indicators in the temporal aspect. The obtained results testify to the dynamic nature of changes and emphasize the importance of systematic monitoring of HIV infection rates among the female population. The generalization of the obtained data creates a basis for further scientific research and contributes to a deeper understanding of the features of the course of the epidemic process.

The authors declare no conflict of interest.

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