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Age structure of tuberculosis incidence among the female population of Ukraine in 2019-2023

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Tuberculosis remains a leading infectious disease and a significant medical and social problem for the public health system of Ukraine. It is important to monitor the morbidity among women, because the age structure reflects the epidemic process, socio-economic factors and the effectiveness of anti-tuberculosis measures.

Aim – to analyze the dynamics and age structure of tuberculosis incidence among the female population of Ukraine in 2019–2023.**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 regarding the number of registered cases of tuberculosis among women in Ukraine in 2019–2023. The absolute indicators and their share in the overall structure of morbidity were analyzed. A comparative analysis of the dynamics by years and age groups was carried out with the determination of trends and structural changes. Methods of descriptive statistics, structural and comparative analysis were used.**The results.** During 2019–2023, 27,833 cases of tuberculosis among the female population were registered in Ukraine. A decrease in the total number of cases was established from 7,529 in 2019 to 4,744 in 2022 (-36.9%), with a further increase to 5,057 in 2023. The incidence structure was dominated by women aged 35–44 (26.3% of the total number of cases). The age groups 45–54 years and 25–34 years also accounted for a significant share. A trend towards an increase in the specific weight of women aged 65 and older was revealed – from 11.8% in 2019 to 16.7% in 2023. The share of children and adolescents (0–17 years old) remained relatively low (about 6%), but in 2023 there was a certain increase in indicators in the age groups 5–14 years old.**Conclusions.** In 2019–2023, Ukraine observed a general decrease in the registered incidence of tuberculosis among women with a minimum level in 2022 and a partial recovery in 2023. A shift in the age structure towards older age groups has been established. The decrease in indicators in 2020–2022 requires careful interpretation, taking into account the impact of the COVID-19 pandemic and military events on the completeness of detection and registration of cases.

The authors declare no conflict of interest.

Keywords: tuberculosis, female population, morbidity, age structure, epidemiology, monitoring, Ukraine.

Вікова структура захворюваності на туберкульоз серед жіночого населення України в 2019–2023 роках

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Туберкульоз лишається провідною інфекційною хворобою й значною медико-соціальною проблемою для системи громадського здоров'я України. Важливий моніторинг захворюваності серед жінок, адже вікова структура відображає епідпроцес, соціально-економічні чинники та ефективність протитуберкульозних заходів.

Мета – проаналізувати динаміку та вікову структуру захворюваності на туберкульоз серед жіночого населення України у 2019–2023 роках.**Матеріали та методи.** Проведено ретроспективне описове епідеміологічне дослідження на основі офіційних статистичних даних Центру громадського здоров'я МОЗ України щодо кількості зареєстрованих випадків туберкульозу серед жінок в Україні у 2019–2023 роках. Проаналізовано абсолютні показники та їх частку у загальній структурі захворюваності. Здійснено порівняльний аналіз динаміки за роками та віковими групами з визначенням тенденцій і структурних змін. Використано методи описової статистики, структурного та порівняльного аналізу.**Результати.** Упродовж 2019–2023 років в Україні зареєстровано 27 833 випадки туберкульозу серед жіночого населення. Встановлено зниження загальної кількості випадків із 7 529 у 2019 році до 4 744 у 2022 році (-36,9%), із подальшим зростанням до 5 057 у 2023 році. У структурі захворюваності домінували жінки віком 35–44 роки (26,3% від загальної кількості випадків). Значну частку становили також вікові групи 45–54 роки та 25–34 роки. Виявлено тенденцію до зростання питомої ваги жінок віком 65 років і старших – з 11,8% у 2019 році до 16,7% у 2023 році. Частка дітей і підлітків (0–17 років) залишалася відносно низькою (близько 6%), однак у 2023 році простежувалося певне підвищення показників у вікових групах 5–14 років.**Висновки.** У 2019–2023 роках в Україні спостерігалось загальне зниження зареєстрованої захворюваності на туберкульоз серед жінок із мінімальним рівнем у 2022 році та частковим відновленням показників у 2023 році. Встановлено зміщення вікової структури у бік старших вікових груп. Зниження показників у 2020–2022 роках потребує обережної інтерпретації з урахуванням впливу пандемії COVID-19 та воєнних подій на повноту виявлення й реєстрації випадків.

Автори заявляють про відсутність конфлікту інтересів.

Ключові слова: туберкульоз, жіноче населення, захворюваність, вікова структура, епідеміологія, моніторинг, Україна.

Introduction

Tuberculosis remains one of the leading infectious pathologies, which retains significant medical and social importance for most countries of the world. Despite the availability of effective anti-tuberculosis drugs and the implementation of control strategies, the disease continues to form a significant epidemiological burden on the health care system [9]. Its course is closely related to socio-economic conditions, the standard of living of the population, the availability of medical care, the prevalence of concomitant diseases, and the state of the body's immunological reactivity [3]. In Ukraine, the problem of tuberculosis is complex and requires a systematic analysis of statistical indicators in order to objectively assess the current situation and determine priorities in the field of public health [6].

A special place in the structure of epidemiological studies is occupied by the analysis of morbidity among the female population. Women make up a significant part of the working and reproductive contingent, which determines not only the clinical, but also the demographic and social significance of this problem [1]. Impairment of women's health affects the quality of life of the family, the birth rate, raising children, and general social stability [4]. In addition, biological features, hormonal status, the presence of concomitant pathologies, as well as social roles and working conditions, can determine the specificity of the course of the disease and the timeliness of seeking medical help [5].

The age structure of morbidity is one of the key indicators that reflects the peculiarities of the development of the epidemic process. The analysis of the distribution of cases by age groups makes it possible to establish which categories of the population form the main share of registered cases, to assess the ratio between young, able-bodied, and older age groups, as well as to identify possible structural changes over time [7]. This approach makes it possible to detail the characteristics of the contingent of patients and to form a more complete picture of modern trends in morbidity.

Structural analysis involves the use of both absolute and relative indicators, which provides the possibility of an objective assessment of the specific weight of individual age groups in the total number of cases [2]. Determining the share of each category avoids the one-sided interpretation of data that can occur when analyzing only absolute numbers. The use of methods of descriptive statistics and compa-

orative analysis contributes to the identification of patterns that are important for further epidemiological studies [8].

The study of age-specific morbidity among women is an important element of information support for management decisions in the field of health care. The obtained results can be used to improve preventive measures, plan screening programs, define priority groups for active detection, and increase the efficiency of the organization of medical care. A comprehensive approach to the analysis of statistical data makes it possible to form a scientifically based basis for further monitoring and evaluation of the state of anti-tuberculosis work among the female population.

Aim – the goal is to analyze the dynamics and age structure of tuberculosis incidence among the female population of Ukraine in 2019–2023.

Materials and methods of the study

The study was carried out in the format of a retrospective descriptive epidemiological analysis based on official statistical data on the number of registered cases of tuberculosis among the female population of Ukraine by age group. The object of the study was the female population with the first registered and existing cases of the disease, and the unit of observation was one registered case of tuberculosis. The subject of the study is the dynamics of indicators and features of the age structure of morbidity.

The official statistical reporting materials of the health care system were used for the analysis, which contained absolute indicators of the number of cases in each age category and their share in the total structure (%). Age stratification was carried out in accordance with the generally accepted classification with the selection of the following groups: up to 1 year, 1–4 years, 5–9 years, 10–14 years, 15–17 years, 18–24 years, 25–34 years, 35–44 years, 45–54 years, 55–64 years, 65 years and older. This distribution made it possible to carry out a differentiated analysis of child, adolescent, young, able-bodied, and older contingents.

Statistical processing of the material was carried out using methods of descriptive medical statistics. Absolute indicators, relative values (the specific weight of each age group in the overall structure of morbidity) were calculated, as well as the ratio between individual age categories was analyzed. To evaluate changes over time, the method of dynamic series analysis is used to determine the rate of increase or decrease of indicators. The structural ana-

Table

Dynamics and age distribution of tuberculosis cases among women of Ukraine in 2019–2023

Age	2019		2020		2021		2022		2023		Total abs.
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	
Up to 1 year	16	0.21	5	0.09	7	0.13	15	0.31	18	0.35	61
1–4 years	77	1.02	31	0.59	47	0.89	36	0.75	49	0.96	240
5–9 years old	111	1.47	98	1.87	100	1.89	80	1.68	113	2.23	502
10–14 years old	88	1.16	59	1.12	75	1.42	77	1.62	128	2.53	427
15–17 years old	116	1.54	75	1.43	66	1.25	64	1.34	90	1.77	411
18–24 years old	450	5.97	297	5.67	240	4.55	217	4.57	213	4.21	1417
25–34 years old	1618	21.4	1135	21.6	968	18.3	753	15.8	774	15.3	5248
35–44 years old	2076	27.5	1414	27.0	1450	27.5	1119	23.5	1251	24.7	7310
45–54 years old	1276	16.9	940	17.9	964	18.2	952	20.0	922	18.2	5054
55–64 years old	811	10.7	534	10.2	640	12.1	644	13.5	651	12.8	3280
65 years and older	890	11.8	644	12.3	714	13.5	787	16.5	848	16.7	3883
In total	7529		5232		5271		4744		5057		27833

lysis made it possible to establish the peculiarities of the distribution of cases between age groups and to trace possible shifts in the age structure.

The generalization and interpretation of the results were carried out taking into account the possible influence of demographic processes, socio-economic conditions, and organizational features of the functioning of the health care system. The applied set of statistical methods ensured the systematization of available data and an objective assessment of the age characteristics of the incidence of tuberculosis among the female population.

Results of the study and discussion

As a result of statistical processing, it was established that the total number of registered cases of tuberculosis among the female population during the period under study was 27,833. The overall dynamics were characterized by wave-like changes: from 7,529 cases at the beginning of the period to 5,232 and 5,271 in subsequent years, with a further decrease to 4,744 and a certain increase to 5,057 cases in the final year (Table).

The absolute reduction between the maximum and minimum values was 2,785 cases, corresponding to a decrease of 36.9%. At the same time, a comparison of the first and last years shows a decrease of 32.8%, which indicates a general tendency to decrease the registration of cases within the studied interval.

An analysis of annual averages showed that an average of about 5,566 cases were registered per year. The greatest rate of decline was observed between the first and second years of observation (-30.5%), while in subsequent years the changes were less pronounced and had a multidirectional nature.

The age structure of morbidity showed a clear dominance of working-age groups. The largest share was women aged 35–44 – 7,310 (26.3%) cases. In this group, the absolute values ranged from 2,076 to 1,119 cases in different years, but its specific weight remained consistently high. The calculation of the coefficient of variation of the share of this group indicates the relative stability of its structural role compared to other age categories.

5,248 (18.9%) cases were registered in the 25–34 age group. The absolute reduction in this category exceeded 50% between high and low, and the share decreased by more than 6 percentage points. This became one of the key factors of the general redistribution of the age structure.

The 45–54-year-old group formed 5,054 (18.2%) cases. In contrast to the younger age categories, the share in this group grew to 20.0% in some years, which indicates a relative strengthening of its role. In the group of 55–64 years (3,280 (11.8%) cases), a gradual increase in specific gravity was also observed, despite fluctuations in absolute values.

The dynamics in the group of 65 years and older are especially indicative. During the period,

3,883 (14.0%) cases were registered, and the absolute number of cases in the final year exceeded the indicators of some previous years. The share of this category increased from 11.8% to 16.7%, which corresponds to a relative increase of 41.5% in the structural dimension. This indicates a significant shift in the age distribution towards older contingents.

The total share of women aged 25–54 was about 63–66%, depending on the year, which confirms the concentration of most cases in the working age. At the same time, the total share of women aged 55 and over increased from about 22–23% to more than 29%, an important structural change.

Children's age groups (0–17 years) accounted for a total of 1,641 (5.9%) cases. The largest share among children was formed by the groups of 5–9 years (502 cases) and 10–14 years (427 cases). In these categories, in the final year, an increase in absolute indicators was observed compared to the previous year. The share of teenagers aged 15–17 remained relatively stable (1.25–1.77%). The group of children under 1 year was characterized by minimum values that did not exceed 0.35% annually.

The comparative analysis showed that the decrease in the total number of cases occurred mainly at the expense of the younger working age groups (18–34 years), while in the older categories, the rate of decrease was less pronounced or an increase in specific weight was observed. This led to a change in the age profile of morbidity and the formation of a tendency towards «aging» of the structure.

Thus, the results of the study indicate the presence of both quantitative and structural changes in the incidence of tuberculosis among the female population. The dominance of the age group of 35–44 years, a gradual decrease in the share of younger able-bodied women and an increase in the specific weight of older age categories were established, which reflects the transformation of the age distribution of cases within the studied period.

The obtained results demonstrate a characteristic feature of many populations – the concentration of tuberculosis cases in the working age. This may be due to greater social activity, intensity of contacts, professional risks, and a combination of behavioral factors. The dominance of the 35–44 age group is consistent with the idea of the greatest exposure to socially determined risks precisely in the period of maximum economic activity [2,4,9].

At the same time, the trend towards an increase in the share of older age groups may reflect several in-

terrelated processes. Demographic aging of the population contributes to a relative increase in the number of older people in the population. In older age groups, the prevalence of chronic non-infectious diseases increases, which can reduce immune reactivity and increase the risk of reactivation of latent tuberculosis infection. The cumulative effect of long-term exposure to risk factors can manifest itself at an older age [5,7,8].

The decrease in the specific weight of younger groups of working age may be related to both a real reduction in the number of cases and demographic shifts or features of migration processes. At the same time, without additional analysis of intensive indicators (per 100,000 population), final conclusions regarding the level of risk in certain age groups require caution [6,7].

The low proportion of children's cases in the structure may indicate the relative effectiveness of preventive measures, but even single cases in this category indicate the preservation of sources of infection in the adult population [1,2,4]. Fluctuations in the total number of registered cases should be interpreted taking into account the possible influence of organizational factors, availability of diagnostics, and completeness of records. Structural indicators are a more stable indicator, which is why they allow a more objective assessment of age-related changes [1,5,9].

The results of the study indicate the preservation of the leading role of able-bodied women in the formation of the general incidence of tuberculosis, with a simultaneous gradual increase in the share of older age groups. The identified structural features emphasize the expediency of further in-depth analysis, taking into account demographic and socio-economic factors, as well as the need for continuous monitoring of the age structure to optimize preventive and organizational work in the field of public health.

Conclusions

As a result of the analysis, it was established that in the years 2019–2023, the incidence of tuberculosis among the female population of Ukraine was characterized by a general tendency to decrease the absolute number of registered cases with pronounced fluctuations of indicators within the studied period. It was revealed that the main burden of morbidity falls on working age groups, primarily on women aged 35–44, whose share in the structure of

cases remained the highest. The 25–34 and 45–54 age groups also played a significant role in shaping the overall structure.

At the same time, a gradual increase in the specific weight of older age categories, in particular women aged 55 and older, was established, which indicates a shift in the age profile of morbidity towards the older contingent. The share of children and adolescents remained relatively low in the overall structure of cases; however, the presence of morbidity in these

age groups confirms the persistence of infection circulation in the population.

The obtained results reflect the structural features of the incidence of tuberculosis among women and can be used for further improvement of the epidemiological monitoring system, planning of preventive measures, and optimization of the organization of medical care, taking into account the age characteristics of the population.

The author declares no conflict of interest.

References/Література

1. Cao W, Fu X, Li H, Bei J, Li L, Wang L. (2024, Jun 6). Tuberculosis in pregnancy and assisted reproductive technology. *Drug Discov Ther.* 18(2): 80-88. doi: 10.5582/ddt.2024.01007.
2. Chiang SS, Murray MB, Kay AW, Dodd PJ. (2025, Mar 5). Factors driving adolescent tuberculosis incidence by age and sex in 30 high-tuberculosis burden countries: a mathematical modelling study. *BMJ Glob Health.* 10(3): e015368. doi: 10.1136/bmjgh-2024-015368.
3. Dabito D, Bishai WR. (2023). Sex and Gender Differences in Tuberculosis Pathogenesis and Treatment Outcomes. *Curr Top Microbiol Immunol.* 441: 139-183. doi: 10.1007/978-3-031-35139-6_6.
4. Gupta M, Srikrishna G, Klein SL, Bishai WR. (2022, Aug). Genetic and hormonal mechanisms underlying sex-specific immune responses in tuberculosis. *Trends Immunol.* 43(8): 640-656. doi: 10.1016/j.it.2022.06.004.
5. Harikumar Parvathy G, Hertz D, Bhandiwad D, Eggers L, von Borstel L, Behrends J et al. (2025, Nov 14). Sex Differences in Vaccine-Induced Immunity and Protection Against Mycobacterium tuberculosis. *J Infect Dis.* 232(5): 1187-1197. doi: 10.1093/infdis/jiaf277.
6. Ramos Robles B, Valdez RA, Hernández Almaraz M, Castañeda Mayorga SR, Mata Espinosa D, Barrios Payan J et al. (2023, Jan). Immunoendocrine abnormalities in the female reproductive system, and lung steroidogenesis during experimental pulmonary tuberculosis. *Tuberculosis (Edinb).* 138: 102274. doi: 10.1016/j.tube.2022.102274.
7. Min J, Park JS, Kim HW, Ko Y, Oh JY, Jeong YJ et al. (2023, Apr 13). Differential effects of sex on tuberculosis location and severity across the lifespan. *Sci Rep.* 13(1): 6023. doi: 10.1038/s41598-023-33245-5.
8. Neudecker D, Altpeter E, Ritz N, Fritschi N. (2025, May 29). Sex distribution in tuberculosis disease in children, adolescents, and adults in a low-incidence country: a retrospective population-based cohort study. *Swiss Med Wkly.* 155: 4187. doi: 10.57187/s.4187.
9. Yang H, Ruan X, Li W, Xiong J, Zheng Y. (2024, Nov 11). Global, regional, and national burden of tuberculosis and attributable risk factors for 204 countries and territories, 1990–2021: a systematic analysis for the Global Burden of Diseases 2021 study. *BMC Public Health.* 24(1): 3111. doi: 10.1186/s12889-024-20664-w.

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