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LONG-TERM DYNAMICS AND TERRITORIAL EPIDEMIOLOGICAL CHARACTERISTICS OF PULMONARY TUBERCULOSIS INCIDENCE IN ANDIJAN REGION (2015–2025)

Abdurashidova Zukhra Jasurbekovna
Department of Epidemiology, TSMU

Khamzayeva Nilufar Toshtemirovna
Senior Lecturer of the Department of Epidemiology, TSMU, PhD

Kurbaniyazova Malika Oralbayevna
Assistant of the Department of Epidemiology, TSMU

ABSTRACT

Pulmonary tuberculosis remains one of the major epidemiological and social problems of the global healthcare system. The risk of disease spread is especially high in densely populated regions with active migration processes. Andijan region is considered one of such territories with high population density and urbanization.

Aim. To conduct a retrospective analysis of the long-term dynamics and territorial epidemiological characteristics of pulmonary tuberculosis incidence in Andijan region during 2015-2025.

Materials and Methods. Retrospective epidemiological, statistical, and comparative analysis methods were used in the study. Official statistical data of the Sanitary-Epidemiological Service of Andijan region for 2015-2025 were analyzed. Incidence rates were calculated per 100,000 population, and territories were classified according to epidemiological risk levels.

Results and Discussion. The study revealed an overall decreasing trend in pulmonary tuberculosis incidence; however, epidemic increases were observed during 2015-2017 and in 2019. The incidence rates were unevenly distributed across territories. The highest indicators were recorded in Khanabad city, Kurgantepa, Andijan, and Jalakuduk districts. High incidence rates were associated with population density, migration activity, and socio-demographic factors.

Conclusions. Pulmonary tuberculosis incidence in Andijan region is characterized by territorial heterogeneity and persistent epidemic activity in high-risk areas. Strengthening early detection, targeted screening, contact monitoring, and preventive measures is essential for reducing morbidity.

KEYWORDS

Pulmonary tuberculosis, epidemiological analysis, morbidity dynamics, territorial characteristics, retrospective analysis, incidence rate, Andijan region.

Introduction

МНОГОЛЕТНЯЯ ДИНАМИКА И ТЕРРИТОРИАЛЬНЫЕ ЭПИДЕМИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ЗАБОЛЕВАЕМОСТИ ТУБЕРКУЛЁЗОМ ЛЁГКИХ В АНДИЖАНСКОЙ ОБЛАСТИ (2015-2025 гг)

Абдурашидова Зухра Жасурбек кизи
кафедра эпидемиологии ТГМУ

Хамзаева Нилуфар Тоштемировна
старший преподаватель кафедры эпидемиологии ТГМУ, PhD

Курбаниязова Малика Оралбаевна
ассистент кафедры эпидемиологии ТГМУ
Ташкентский государственный медицинский университет, г.
Ташкент, Республика Узбекистан

Аннотация

Туберкулёз лёгких остаётся одной из важнейших эпидемиологических и социальных проблем глобальной системы здравоохранения. Особенно высокий риск распространения инфекции сохраняется в густонаселённых и миграционно-активных регионах. Андижанская область относится к регионам с высокой плотностью населения и активными миграционными процессами.

Цель. Провести ретроспективный анализ многолетней динамики заболеваемости туберкулёзом лёгких и территориальных эпидемиологических особенностей в Андижанской области за 2015-2025 годы.

Материалы и методы. В исследовании использованы ретроспективный эпидемиологический, статистический и сравнительный методы анализа. Изучены официальные статистические данные Санитарно-эпидемиологической службы Андижанской области за 2015-2025 годы. Интенсивные показатели заболеваемости рассчитывались на 100 тысяч населения, а территории распределялись по уровням эпидемиологического риска.

Результаты и обсуждение. Результаты исследования показали, что, несмотря на общую тенденцию к снижению заболеваемости, в 2015-2017 и 2019 годах наблюдались эпидемические подъёмы. Показатели заболеваемости распределялись неравномерно по территориям. Наиболее высокие показатели зарегистрированы в городе Ханабад, Кургантепинском, Андижанском и Джалакудукском районах. Установлено, что высокая заболеваемость связана с плотностью населения, миграционными процессами и социально-демографическими факторами.

Выводы. Заболеваемость туберкулёзом лёгких в Андижанской области характеризуется территориальной неравномерностью и сохранением активности эпидемического процесса в отдельных районах высокого риска. Для снижения заболеваемости необходимо усиление раннего выявления, скрининга, мониторинга контактных лиц и профилактических мероприятий.

Ключевые слова: туберкулёз лёгких, эпидемиологический анализ, динамика заболеваемости, территориальные особенности, ретроспективный анализ, интенсивный показатель, Андижанская область.

Introduction

Pulmonary tuberculosis remains one of the most significant infectious diseases worldwide and continues to represent a major epidemiological and social challenge for global public health systems. According to the World Health Organization, tuberculosis is diagnosed in millions of individuals annually and remains associated with high rates of morbidity, disability, and mortality [1]. The risk of tuberculosis transmission remains particularly high in densely populated, highly urbanized regions and areas characterized by active migration processes [2].

In the countries of Central Asia, including the Republic of Uzbekistan, pulmonary tuberculosis continues to be an important epidemiological problem. Despite the strengthening of anti-tuberculosis preventive and epidemic control measures in recent years, the persistence of relatively stable incidence rates in certain territories indicates the complexity of the epidemic process [3]. Uneven territorial distribution of the disease may be associated with population density, socio-economic and living conditions, migration, the level of urbanization, and the effectiveness of early diagnostic systems.

The Andijan region is one of the most densely populated territories of the Fergana Valley. Intensive urbanization, active internal and external migration, high population density, and extensive transport connections create favorable conditions for the spread of airborne infections, including pulmonary tuberculosis [2]. Persistently elevated incidence rates in certain districts necessitate the identification of epidemiologically high-risk areas and the implementation of targeted preventive interventions. Therefore, a retrospective epidemiological analysis of the long-term dynamics and regional characteristics of pulmonary tuberculosis incidence in the Andijan region is of considerable scientific and practical importance.

Aim of the study: To conduct a retrospective epidemiological analysis of the long-term dynamics of pulmonary tuberculosis incidence in Andijan region during 2015-2025, regional distribution characteristics, and factors influencing the formation of the epidemic process.

Materials and methods. Retrospective epidemiological, statistical, and comparative analysis methods were used in the study. Official epidemiological and statistical data on pulmonary tuberculosis incidence in Andijan region during 2015-2025 were retrospectively analyzed. The study materials included annual reports of the Andijan Regional Department of Sanitary-Epidemiological Welfare and Public Health, district-level incidence indicators, and demographic statistical data.

Incidence rates were calculated per 100,000 population. Periods of epidemic increase and decline were assessed using long-term dynamic analysis. Regional differences were studied based on comparative epidemiological analysis. According to the epidemiological risk level, the territories were divided into three groups:

- high incidence rates (>30.0);
- moderate incidence rates (20.0–30.0);
- low incidence rates (<20.0).

Statistical processing included incidence indicators, mean values, and long-term trend analysis methods. The obtained results were presented using tables and diagrams.

During the study, bioethical principles were observed and no personally identifiable information was used.

Results. A retrospective epidemiological analysis of pulmonary tuberculosis incidence among the population of Andijan region was conducted. Comparison of incidence results during 2015-2025 based on intensive indicators per 100,000 population revealed that the incidence rates in 2015 were considerably higher than in subsequent years. Despite the general declining trend in incidence, several periods of epidemic increase and decrease were identified in the long-term dynamics of the epidemic process.

Two major epidemic increase periods were mainly observed in the incidence dynamics. The first epidemic increase was recorded during 2015-2017, when the incidence rate remained between 39.9 and 35.9 per 100,000 population. During this period, incidence indicators were relatively high and characterized by active epidemic transmission. Subsequently, the incidence rate decreased to 25.0 in 2018.

The second epidemic increase was observed in 2019, when the intensive incidence rate rose to 36.5 per 100,000 population. This was considered one of the highest repeated increases during the analyzed period. Following this increase, incidence sharply decreased in 2020–2021, reaching 18.1 and 16.4, respectively (Figure 1).

Beginning from 2022, a repeated increase in incidence was observed. In particular, the intensive incidence rate reached 21.5 in 2022, 23.2 in 2023, and 24.4 in 2024. In 2025, the incidence rate remained almost stable at 24.3 per 100,000 population. This situation indicates relative stabilization of the epidemic process.

The results of the long-term dynamic analysis demonstrated the presence of two major epidemic increase periods and a relatively stable trend of the epidemic process in subsequent years.

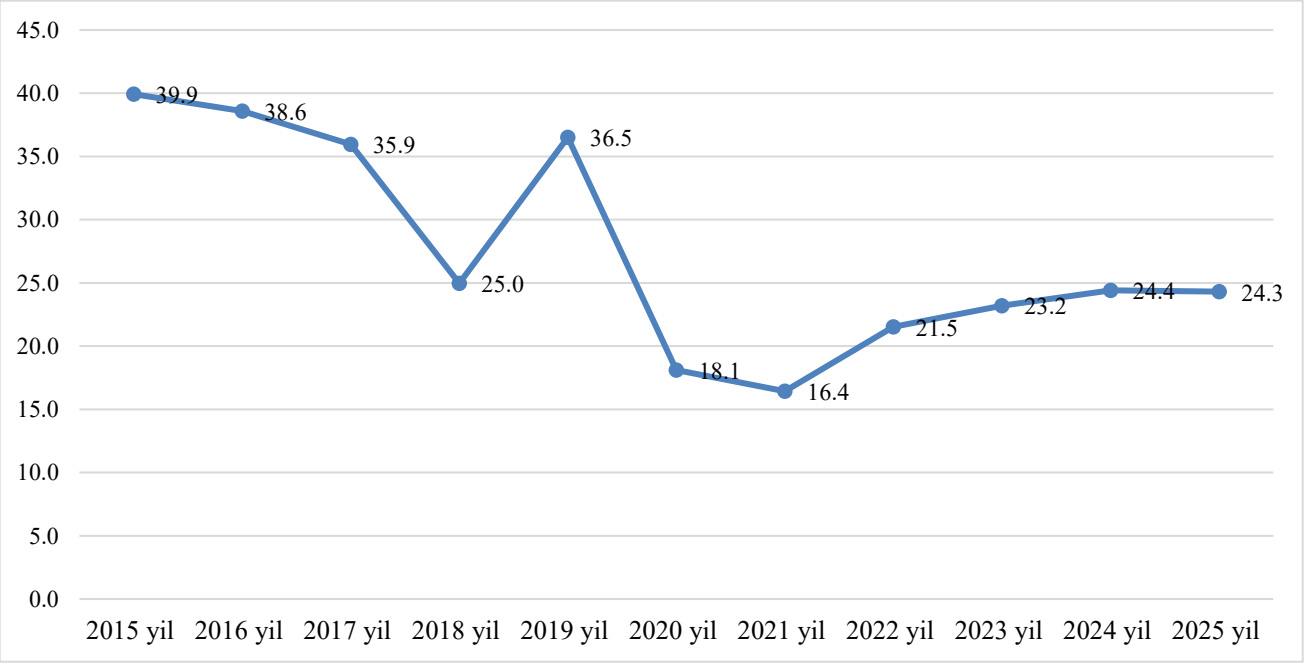

Figure 1. Long-term analysis of pulmonary tuberculosis incidence among the population of Andijan region during 2015-2025 (per 100,000 population).

At the next stage of the study, the following findings were identified during the district-level analysis of pulmonary tuberculosis incidence rates in the Andijan region.

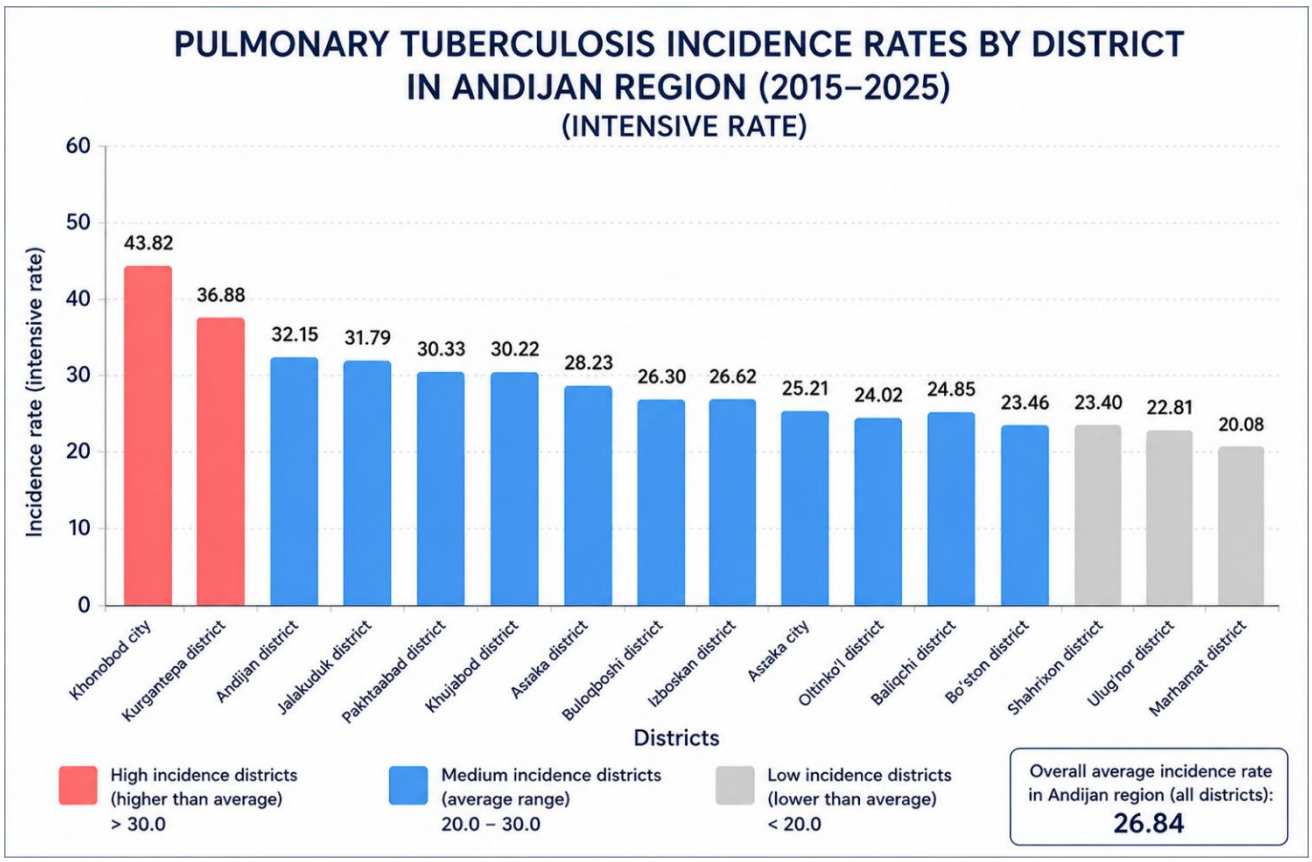

Figure 2. Results of the analysis of pulmonary tuberculosis incidence rates by districts in Andijan region during 2015-2025 (intensive indicators).

A retrospective epidemiological analysis of pulmonary tuberculosis incidence by districts in the Andijan region revealed an uneven territorial distribution of incidence rates. According to the analysis results, the intensive incidence rates in certain districts were found to be higher than the regional average indicators.

The highest average intensive incidence rates were recorded in Khanabad city (43.82), Kurgantepa district (36.88), Andijan district (32.15), Jalakuduk district (31.79), Pakhtaabad district (30.33), and Khojaabad district (30.22). In these territories, high epidemic activity and persistent incidence rates were identified. The high incidence indicators may be associated with high population density, active migration processes, socio-economic conditions, the presence of risk groups among the population, and in some cases, delayed diagnosis of the disease.

Moderate incidence rates were observed in Andijan city (28.23), Izboskan district (26.62), Buloqboshi district (26.30), Asaka district (25.21), Baliqchi district (24.85), Oltinkol district (24.02), Boz district (23.46), and Shahrixan district (23.40). Although the epidemiological situation in these territories was relatively stable, the persistent incidence rates indicate the need to strengthen preventive measures.

The lowest incidence rates were identified in Marhamat district (20.08) and Ulugnor district (22.81). These territories were characterized by lower incidence intensity compared to other districts.

The district-level analysis revealed that pulmonary tuberculosis incidence was unevenly distributed across the region, with higher epidemic activity observed in certain territories. The findings also demonstrated the necessity of strengthening targeted preventive measures and early detection activities in high-risk areas.

Discussion

In this study, the long-term dynamics and regional epidemiological characteristics of pulmonary tuberculosis incidence in the Andijan region during 2015-2025 were retrospectively analyzed. The obtained results demonstrated that despite the overall declining trend in incidence over the years, the epidemic process was characterized by uneven and periodic increases. In particular, epidemic increase periods were identified during 2015-2017 and in 2019.

The study results are consistent with both international and local research findings. International epidemiological studies have reported that tuberculosis occurs more frequently in densely populated, highly urbanized regions and territories characterized by active migration processes [1]. According to these studies, social inequality, urbanization, population density, and migration movements are important epidemiological factors contributing to the spread of tuberculosis. These factors maintain the continuous transmission of airborne infections [1].

The geographical and demographic characteristics of the Andijan region also play an important role in the formation of the epidemic process of pulmonary tuberculosis. The Andijan region is one of the most densely populated territories of the Fergana Valley, and the high population density together with active migration flows create favorable conditions for disease transmission [2]. In particular, the high incidence rates observed in Khanabad city and in Kurgantepa, Andijan, and Jalakuduk districts may be associated with high population density, as well as intensive transport and trade connections in these territories.

The district-level analysis demonstrated an uneven distribution of incidence rates. The highest average intensive incidence rates were recorded in Khanabad city (43.82), Kurgantepa district (36.88), Andijan district (32.15), and Jalakuduk district (31.79), whereas the lowest rates were observed in Marhamat district (20.08) and Ulugnor district (22.81). These findings indicate that the formation of the epidemic process is associated with the socio-demographic and economic characteristics of the territories.

Studies conducted by Uzbek researchers have also reported an uneven territorial distribution of tuberculosis incidence, with higher rates particularly observed in densely populated and highly urbanized areas [3]. Researchers have explained this phenomenon by socio-economic living conditions, migration processes, delayed diagnosis of the disease, and the presence of risk groups among the population.

Furthermore, the sharp decline in incidence rates during 2020-2021 may be associated with quarantine restrictions, reduced migration flows, and strengthened sanitary-hygienic measures during the COVID-19 pandemic. However, the subsequent increase in incidence beginning from 2022 may be explained by the restoration of medical consultations in the post-pandemic period, activation of latent reservoirs, and expansion of diagnostic coverage.

Conclusions

The retrospective epidemiological analysis of pulmonary tuberculosis incidence in the Andijan region demonstrated that the disease incidence was unevenly distributed across the territories and that the epidemic process was closely associated with socio-demographic and migration-related factors. Strengthening targeted screening, early detection, contact monitoring, and sanitary-educational activities in high-risk areas is of great importance for stabilizing the epidemiological situation.

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