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QUALIFICATION WORK

on the topic: **«STUDY OF SOCIO-ECONOMIC APPROACHES TO IMPLEMENTING TUBERCULOSIS PREVENTION MEASURES»**

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ANNOTATION

The paper presents the results of a comprehensive assessment of socio-economic approaches to tuberculosis prevention measures.

The work is presented on 50 pages of typewritten text and consists of an abstract, introduction, three chapters, general conclusions, a list of used literary sources, which contains 33 items. The work is illustrated with 7 figures and 5 tables.

Key words: tuberculosis, prevention, vaccination, preventive treatment, awareness, sociological research.

АНОТАЦІЯ

У роботі представлені результати комплексної оцінки соціально-економічним підходам до проведення заходів профілактики туберкульозу.

Робота представлена на 50 сторінках машинописного тексту та складається із анотації, вступу, трьох розділів, загальних висновків, переліку використаних літературних джерел, якій містить 33 пункти. Робота проілюстрована 7 рисунками та 5 таблицями.

Ключові слова: туберкульоз, профілактика, вакцинація, профілактичне лікування, обізнаність, соціологічне дослідження.

CONTENT

ABBREVIATIONS

BCG – Bacille Calmette-Guérin

EU – European Union

LTBI – latent tuberculosis infection

PLT – preventive treatment

RCT – randomized controlled trial

TB – tuberculosis

WHO – World Health Organization

INTRODUCTION

Actuality of topic. According to the World Health Organization (WHO), tuberculosis TB is one of the most dangerous infectious diseases, claiming millions of lives every year [29, 33]. The high incidence and mortality rates of TB, as well as the spread of drug-resistant strains of Mycobacterium tuberculosis, indicate an urgent need to strengthen preventive measures [26, 32]. Tuberculosis remains a serious public health threat in Morocco, despite ongoing efforts to control it. Although the state provides access to free treatment, effective prevention requires an interdisciplinary approach that covers not only medical but also socio-economic factors.

TB prevention makes it possible to significantly reduce the transmission of the pathogen from sick to healthy people, especially in risk groups (contact persons, patients with immunodeficiencies, people with chronic diseases, etc.). Thanks to timely preventive measures, it is possible to avoid or at least reduce the likelihood of mass outbreaks of the disease. TB often affects the working-age population, resulting in additional economic losses. One of the greatest complications of TB treatment is the spread of strains of M. tuberculosis resistant to standard anti-TB drugs. Ensuring adequate prevention (including screening, BCG vaccination, and prophylactic treatment of individuals with latent infection) helps reduce the number of new cases and, consequently, reduces the likelihood of irrational use of drugs that can contribute to the development of resistance [31].

Preventive measures - vaccination, regular medical examinations, and screening - are an effective investment of resources, which can reduce the costs of treatment and rehabilitation of patients. Preventing the disease is cheaper and easier than long-term treatment and combating complications, so prevention is beneficial from both medical and economic points of view [19, 30, 31].

Therefore, TB prevention is a key element in the fight against the disease, as it prevents its occurrence, reduces the transmission of the pathogen and contributes to the preservation of the health of the population. Systematic implementation of

preventive measures, timely diagnosis, treatment of latent forms of infection and active participation of the public can significantly reduce the spread of TB and minimize losses from this dangerous disease.

Research on socio-economic approaches to tuberculosis prevention in Morocco is extremely relevant, as it allows to identify weaknesses in the health system, increase the effectiveness of national strategies and strengthen intersectoral cooperation. The results obtained can become the basis for recommendations for the implementation of targeted social programs that will reduce the risk of infection among vulnerable groups of the population.

The purpose of the study – conduct a study of socio-economic approaches to implementing tuberculosis prevention measures.

Research objectives*:* To achieve this goal, we have identified and solved the following tasks:

- • to describe the current state of the organization of tuberculosis prevention activities;
- • to assess the state of anti-tuberculosis care for the population in Morocco and Ukraine;
- • to assess the coverage of the child population with BCG vaccination and preventive treatment in Morocco and Ukraine;
- • to develop a questionnaire and conduct a survey to determine the level of awareness of the population on TB prevention issues.

Subject of study. Organization of the process of carrying out TB prevention measures.

Research objects. Data from scientific literature, legislation, official data from the Ministry of Health of Morocco, results of population surveys conducted during February-March 2025.

Research methods. The research process used system analysis, generalization, comparative analysis, sociological (questionnaire), and mathematical and statistical methods of data processing.

Practical significance of the work lies in the possibility of using the results obtained in the development of effective directions for increasing the level of public awareness on TB prevention issues.

Elements of scientific research – the paper presents for the first time the results of a comprehensive assessment of TB prevention measures and a sociological survey was conducted to determine the population's awareness of TB prevention issues..

Approbation of research results. The results obtained were presented on April 24, 2025 during the X International Scientific and Practical Distance Conference «Social Pharmacy: Status, Problems and Prospects», which took place in the city of Kharkiv.

Structure and scope of qualification work. The work is presented on 50 pages of typewritten text and consists of an abstract, introduction, three chapters, general conclusions, a list of used literary sources, which contains 33 items. The work is illustrated with 7 figures and 5 tables.

CHAPTER 1
OVERVIEW OF THE CURRENT STATUS OF THE ORGANIZATION OF TUBERCULOSIS PREVENTION MEASURES

1.1 International strategies to combat tuberculosis

According to WHO, 1.25 million people died from TB in 2023, including 161,000 people living with HIV [27]. TB has once again become the leading cause of death from infectious diseases, surpassing even HIV/AIDS, after a three-year decline caused by the coronavirus (COVID-19) pandemic. In 2023, an estimated 10.8 million people worldwide were diagnosed with TB, of whom 6.0 million were men, 3.6 million were women, and 1.3 million were children [33].

A review of the literature suggests that global efforts to combat TB have saved an estimated 79 million lives since 2000 [8]. To achieve the global target by 2027, approved by the UN TB meeting in 2023, it is necessary to allocate 22 billion US dollars annually for TB prevention, diagnosis, treatment and care [4, 27, 33]. Ending the TB epidemic by 2030 is one of the key health goals in accordance with the UN Sustainable Development Goals (SDGs). For example, Goal 3 of the UN 2030 Agenda for Sustainable Development, which provides for “Ensure healthy lives and promote well-being for all at all ages”, is closely linked to overcoming TB, as effective control of this disease has a direct impact on population health and well-being [5, 23, 27, 33]. By 2030 In the context of TB, this goal includes the following key aspects, which are shown in Figure 1.1.

Therefore, achieving this goal requires enhanced international cooperation, increased funding, the introduction of innovative treatment and prevention methods, and the activation of early diagnosis and treatment programs, especially in vulnerable population groups [1, 8, 14, 18].

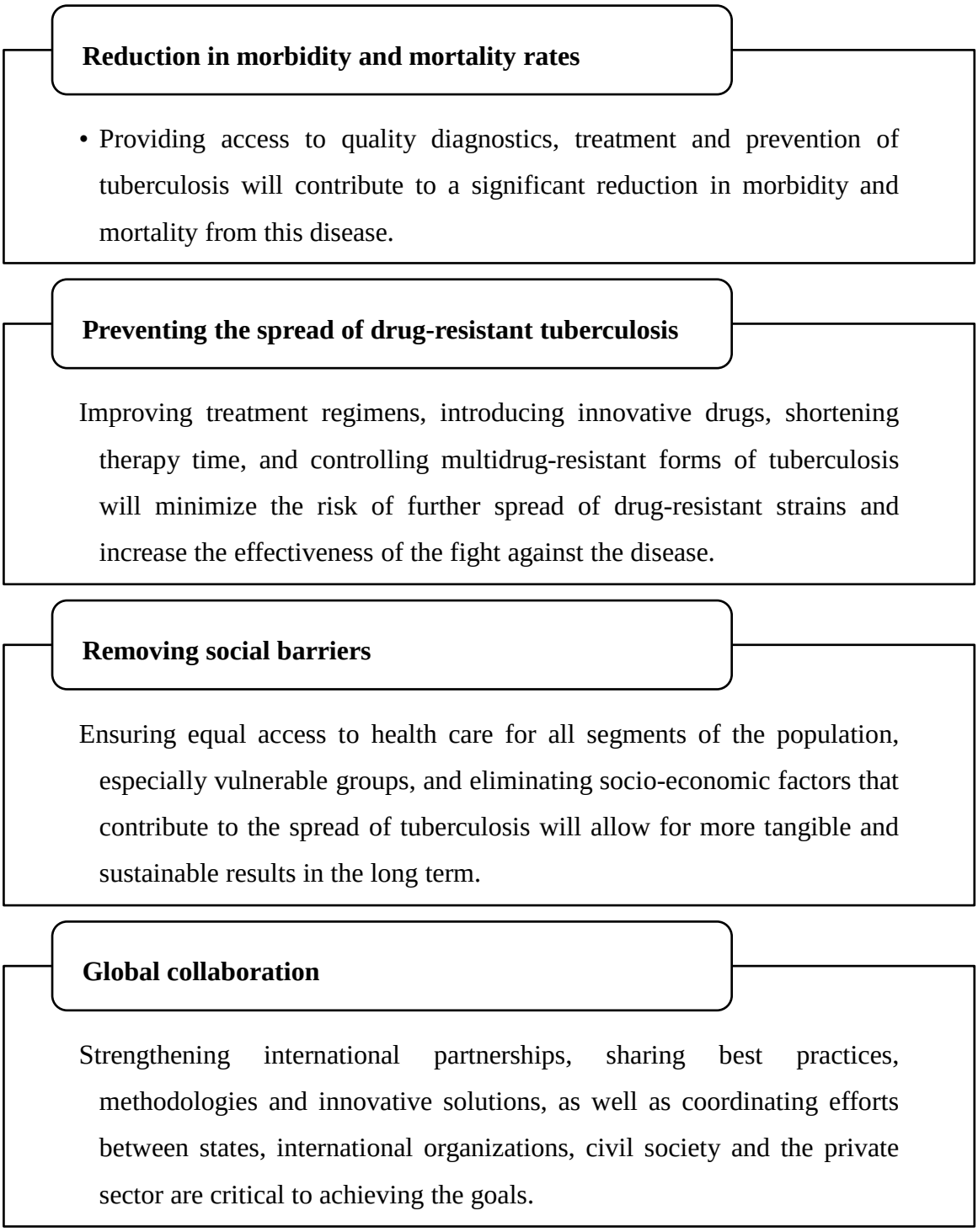

Fig. 1.1 Key aspects of achieving Sustainable Development Goal 3 by 2030

Taking into account the achievements of the previous period, the UN has defined new tasks that are planned to be achieved by 2027 (Fig. 1.2). Thus, it is planned to develop individual goals for each specific country. This will require the adaptation of national strategies, considering compliance with the UN goals and the

development of roadmaps with the definition of target annual indicators in accordance with national priorities [14, 20, 33].

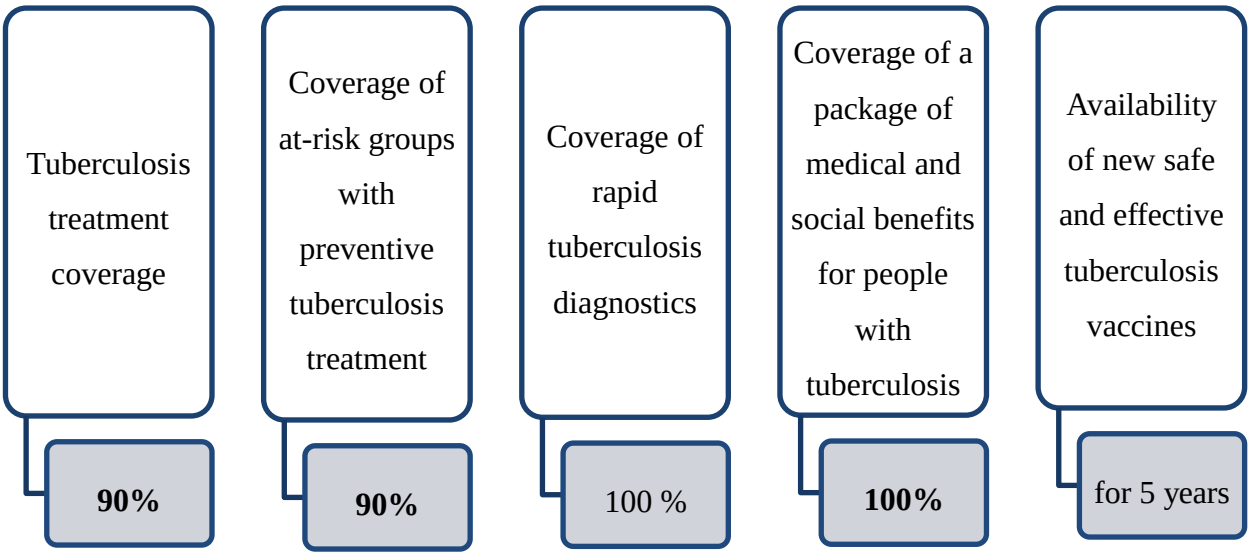

Fig. 1.2 Updated UN targets for 2027

In May 2014, the World Health Assembly adopted the Global Strategy to End TB 2016–2035. Its main goals are to rid the world of TB, achieve zero morbidity and mortality, and avoid catastrophic costs for affected families [17, 20, 33].

The WHO strategy to end TB aims to achieve a large-scale reduction in morbidity and mortality from the disease, as well as its complete eradication in the long term. The main directions of the strategy are presented in Table 1.1. The WHO strategy is consistent with the Global Strategy for Sustainable Development and provides for the achievement of intermediate goals by 2030, including a reduction in morbidity and mortality from TB, as well as the gradual complete elimination of the disease as a public health problem [13, 17, 29, 31].

The WHO strategy is closely linked to the Global Strategy for Sustainable Development and aims to achieve a number of intermediate goals by 2030. These goals include significantly reducing TB morbidity and mortality, improving access to quality preventive, diagnostic and treatment services, and addressing the social, economic and environmental factors that contribute to the spread of the disease [3,

13, 20]. Such an approach will contribute not only to improving the health of the population, but also to the sustainable development of society as a whole [26, 33].

To achieve this goal, targets have been set: to reduce the incidence of TB to less than 10 cases per 100,000 population, to reduce the number of deaths from TB by 95% compared to 2015, and to reduce the incidence by 90% compared to 2015 [20, 33].

Table 1.1

Key areas of the Global Strategy to End TB 2016-2035

Direction	Directional characteristics
Patient-centered prevention and treatment	Provides for the development and implementation of accessible, high-quality services for the prevention, diagnosis, treatment and care of patients with tuberculosis. This includes improving methods of detecting the disease, timely and effective therapy, and strengthening the role of primary health care.
Multi-sectoral approach and effective management	Involving different sectors of society, government structures, civil society organizations, the private sector, as well as international partners. This approach contributes to a comprehensive solution to the socio-economic factors that influence the spread of TB.
Stimulating research, innovation and the introduction of new technologies	Supporting scientific developments aimed at creating new diagnostic methods, more effective drugs and vaccines, developing modern prevention and care strategies, and implementing innovative models of providing services to patients.

Such a comprehensive, systemic approach to overcoming tuberculosis will contribute not only to reducing the burden of the disease, but also to the sustainable development of societies, especially in low- and middle-income countries.

1.2 Overview of modern approaches to tuberculosis prevention

Tuberculosis remains one of the leading causes of death from infectious diseases worldwide, affecting millions of people each year, particularly in low- and middle-income countries. Effective prevention of this disease is a prerequisite for achieving the Sustainable Development Goals (SDGs), in particular SDG 3, which aims to ensure healthy lives for all. Modern approaches to TB prevention go beyond purely medical interventions and include socio-economic, behavioral, educational, policy and technological components. Modern medicine offers a set of tools to prevent new cases of the disease, among which the following are of particular importance [29]:

BCG vaccination. This is the only currently available vaccine against tuberculosis, which is particularly effective in children. BCG reduces the risk of developing severe forms of TB, such as meningitis and miliary tuberculosis. Although its effectiveness in adults is limited, vaccination remains an important component of national prevention programs in most countries.

Preventive treatment of latent tuberculosis infection (LTBI). Individuals infected with Mycobacterium tuberculosis, but without clinical signs of the disease, are at high risk of transitioning to the active form. Modern regimens include short-term preventive treatment with isoniazid or its combination with rifampicin, which significantly reduces the risk of developing active TB.

Early detection and screening. The use of modern molecular diagnostic technologies (GeneXpert, LAMP) allows for the rapid detection of TB and even the determination of drug resistance. Screening of vulnerable groups (HIV-infected, healthcare workers, prisoners, migrants) helps prevent the spread of infection in society.

Infection control. In hospitals, schools, dormitories and other places of mass stay, it is important to observe infection control: ventilation of premises, separation of patient flows, use of personal protective equipment, training of personnel.

Tuberculosis is not only a medical but also a social disease. According to numerous studies, the risk of the disease is directly related to social vulnerability factors [3, 17, 31]:

Poverty, malnutrition, unemployment and lack of housing create conditions for the rapid spread of infection. Therefore, modern prevention strategies should include social interventions: provision of food, housing programs, assistance to the unemployed.

Educational campaigns. Raising awareness of TB symptoms, the importance of early referral to a doctor, and preventing self-interruption of treatment are the basis for successful prevention. Such campaigns are especially important in rural areas and among vulnerable populations.

Anti-discrimination measures. Stigma against TB patients is one of the main reasons for late detection and refusal of treatment. Programs to reduce discrimination and psychological support for patients are an integral part of modern prevention.

Modern approaches cannot be imagined without the use of digital technologies and innovations in the field of health:

- mobile applications and SMS reminders contribute to better adherence to treatment;
- electronic DOT-supervised treatment (eDOT) allows patients to record their medication intake remotely;
- data analytics allows for outbreak prediction, identification of risk groups, and monitoring of program effectiveness.

There is also active research underway into new vaccines that could be more effective than BCG in adults, as well as the development of drugs for shorter and less toxic prevention regimens.

The WHO Global Strategy to End TB, as well as the UN Sustainable Development Goals, set ambitious targets for the eradication of tuberculosis by 2030–2035. Within the framework of this strategy, special attention is paid to:

- Development of national action plans;

- Ensuring financing for prevention programs;
- International partnerships (Global Fund, UNICEF, UNIAIDS, etc.);
- Integration of TB programs with other health initiatives, in particular in the field of combating HIV/AIDS and noncommunicable diseases.

TB infection control is a set of organizational, anti-epidemic and preventive measures established by the central executive body that forms and implements state health policy [5, 17]. These measures are regulated by TB infection control standards and are aimed at:

• preventing the occurrence of TB among healthy people;

• reducing the risk of transmission of TB mycobacteria from patients with active forms to healthy people;

• preventing superinfection among people who already have tuberculosis.

This system of measures allows minimizing the risks of spreading infection and ensuring effective control over the epidemiological situation in the field of TB.

Anti-TB measures are a set of socio-economic, organizational, medical and preventive and medical and sanitary measures aimed at protecting the population from TB and overcoming it in Ukraine. The main components of these measures include prevention, diagnostics, treatment, rehabilitation, palliative care. These measures are an integral part of the state strategy to combat TB, aimed at reducing morbidity, mortality and social consequences of this disease [20].

Achievements of world tuberculosis science have allowed the development of a number of measures and programs for TB control, among which prevention occupies a significant place [3]. TB prevention includes a complex of various measures and covers specific (vaccination and revaccination), chemoprophylaxis, as well as sanitary and social aspects (Table 1.2).

The effectiveness of TB prevention is significantly increased by a comprehensive approach and a combination of all the above measures with early detection of patients [30]. The earlier the diagnosis of TB is established, the lower the risk of further infection of healthy individuals. By implementing these measures in close cooperation, it is possible to significantly reduce the epidemiological

indicators of TB and ensure effective control over the spread of the disease [3, 29, 31].

An important component of TB prevention is the BCG vaccination, named after its developers, A. Calmette and C. Guerin. This live vaccine contains attenuated mycobacteria of the bovine strain. Its first version was obtained in 1921 after many years of passage of the bovine strain isolate, which led to the emergence of different vaccine strains with certain phenotypic and genetic features [4].

Table 1.2

Main types and content of TB prevention

Types of prevention	Contents
1	2
Social prevention	consists of state measures aimed at improving material well-being, nutrition, living conditions, and eliminating social factors that contribute to the spread of TB. This makes it possible to reduce the incidence, prevalence, and mortality not only from TB, but also from other diseases.
Sanitary prevention	aimed at preventing infection with TB mycobacteria. It involves measures in foci of infection (disinfection, isolation of patients with bacterial excretion, improvement of sanitary culture). It is important to divide foci of tuberculosis infection by the degree of epidemic safety (groups I, II, III) to determine the scope of necessary preventive measures.
Specific prevention (vaccination)	provides for vaccination and revaccination of children with BCG to develop immunity against TB. In Ukraine, the BCG-1 vaccine is used for intradermal administration.

continued table 1.2

1	2
	Primary vaccination is carried out for newborns on the 3rd–5th day of life, and revaccination is carried out at 7 and 14 years for children with a negative Mantoux reaction.
Chemoprophylaxis	use of anti-tuberculosis drugs to prevent the disease in risk groups. There are primary (for uninfected individuals who have been in contact with patients) and secondary (for infected individuals without clinical manifestations). Isoniazid is used, and if necessary, other anti-tuberculosis drugs, depending on the sensitivity of mycobacteria. Chemoprophylaxis is carried out in courses lasting 2–3 months and can be repeated twice a year.

WHO policy on the use of BCG vaccine is based on the epidemiological situation and the risk of tuberculosis infection in a particular country or region. WHO recommends [29, 32]:

• universal vaccination of newborns with BCG in countries with a high incidence of tuberculosis or a significant risk of infection. This makes it possible to reduce the incidence of severe and widespread forms of the disease in children, such as tuberculous meningitis or disseminated tuberculosis;

• vaccination of high-risk groups in countries with a low incidence, where tuberculosis is not a widespread problem. Such groups may include children in contact with patients with active TB, members of vulnerable social groups, or health workers working with risk groups;

• periodic review of vaccination policy taking into account changes in the epidemic situation, the results of monitoring the effectiveness of BCG, as well as the

emergence of new scientific data on the effectiveness, safety and duration of immunity induced by the vaccine.

Therefore, the WHO policy on BCG is flexible and dynamic, it takes into account regional characteristics, the state of public health, available resources and global recommendations for the purpose of effective control and prevention of TB.

It should be noted that BCG immunization is mandatory in 64 countries of the world and officially recommended in 118 countries. In European countries, where BCG is used for all children, vaccination is mandatory in 29 countries and voluntary in 7 countries. [3, 17, 24].

BCG vaccine has high immunogenicity. Thus, 95% of children vaccinated with the BCG vaccine have a positive tuberculin test. The vaccine does not contain harmful additives, which minimizes the risk of allergic and toxic reactions. Despite the high safety of the vaccine, both serious and non-serious serious adverse reactions are possible: Yes, common in almost all children and include a slight swelling at the injection site, which usually disappears within 30 minutes. Two weeks after vaccination, a red ulcer forms, which heals over time, leaving a small scar with a diameter of approximately 5 mm. Generalized infection occurs rarely, occurring in approximately one case per 230,000–640,000 doses of vaccine administered, mainly in HIV-infected or severely immunocompromised individuals. Other serious adverse events, such as edema and abscesses, occur in approximately one case per 1,000–10,000 doses and are often associated with incorrect vaccine administration or the use of unsterile instruments [5, 32]. The BCG vaccine is supplied as a lyophilized powder. It must be reconstituted with a diluent before use. After reconstitution, the BCG vaccine should be stored at +2°C to +8°C. It is worth noting that it has a convenient form of release, in particular, the vials are made of dark glass to protect the vaccine from light. The vials are sterile and have a low risk of damage. The vaccine is easily and safely reconstituted by inverting the vial before each subsequent injection, which ensures uniform distribution [32].

1.3 Overview of modern approaches to the prevention of latent tuberculosis infection

Latent tuberculosis infection (LTBI) is a condition in which the body has a persistent immune response to Mycobacterium tuberculosis antigens but no clinical signs of active TB [6, 7, 12]. About a quarter of the world's population is infected with LTBI. To combat this problem, WHO has developed recommendations that include TB preventive treatment (TPT), which is a key measure in the strategy to defeat TB [6, 31]. It is worth noting that TPT is part of a complex of preventive measures that include screening for active TB, infection control, treatment of comorbidities such as HIV, and social support. TPT is aimed at reducing the risk of LTBI progressing to active TB [29, 31].

Target groups for TPT include [5, 6]:

- people with HIV;
- household contacts of patients with active TB;
- other risk groups identified on the basis of the epidemiological situation.

The WHO recommendations on TB prevention were first published in 2011. The systematic review conducted to develop the previous guidelines included two studies conducted in South Africa. One of these studies suggested a significant reduction in mortality and protection against TB in HIV-infected children treated with isoniazid for 6 months. However, other randomized controlled trials (RCTs) have not shown positive results of preventive treatment in infants with HIV infection detected in the first 3–4 months of life who had no known contact with active TB. In these cases, antiretroviral treatment (ART) was started immediately with careful monthly monitoring for new contacts with TB or other diseases. Only a few RCTs included children receiving ART. One study of 167 children receiving ART and preventive treatment (PLT) reported a lower incidence of TB compared with children not receiving PLT, but the difference was not statistically significant (Hazard ratio: 0.51; 95% confidence interval: 0.15–1.75). A cohort study showed an additional protective effect of PLT in children receiving ART [6, 12].

Due to limited evidence on the effectiveness of preventive treatment (PLT) in infants, WHO recommends that children living with HIV under 12 months of age receive PLT only if they have had previous exposure to TB in the absence of clinical signs of disease, in accordance with national guidelines. However, despite the low-quality evidence, WHO strongly recommends that all children with HIV who do not have symptoms of active TB should receive PLT, given the high likelihood of benefit based on outcomes for adults and the increased risk of developing active disease in such children.

Children over 12 months of age who have symptoms or have been in contact with TB should undergo a complete clinical evaluation to confirm or rule out active TB or latent TB infection (LTBI). Despite the lack of direct evidence of the effectiveness of TPT in children with HIV receiving antiretroviral therapy (ART), WHO considers it appropriate to conduct it, citing positive results in adult HIV patients receiving ART. Therefore, TPT is recommended for all children living with HIV, regardless of whether they are receiving ART.

Although there is currently insufficient evidence of the effectiveness of TPT in children with HIV after successful completion of treatment for active TB, WHO recognizes that such children who continue to live at high risk of re-infection may benefit from a second course of prophylaxis. In this regard, the organization provides a conditional recommendation to conduct TPT in this category of patients, starting the course immediately after completion of primary treatment or later - at the discretion of the clinician.

According to current WHO recommendations, TPT is advisable to be carried out using short-term regimens containing rifampicin or rifapentine, as they are more effective and convenient for patients. Alternative regimens include daily rifapentine with isoniazid for one month or rifampicin monotherapy for four months. In addition, updated approaches include the possibility of prescribing TPT during pregnancy, including isoniazid with rifapentine. It is important to ensure adequate monitoring of treatment progress, detection of complications and completion of the full course of therapy [12, 29].

Statistics show a gradual increase in global TPT coverage: from 1 million people in 2015 to 3.6 million in 2019, with a further decrease to 2.9 million in 2020–2021 due to the impact of the COVID-19 pandemic. However, in 2022, this figure recovered to 3.9 million, and in 2023 it increased to 4.7 million people. The number of households covered by TPT has grown particularly rapidly, from 0.76 million in 2021 to 2.7 million in 2023.

In 2023, one million patients in 86 countries started treatment with shortened rifampicin-based regimens. Of these, 76 countries used the three-month daily combination of rifampicin with isoniazid (3HR) and 41 countries used the four-month regimen with rifampicin (4R) [10]. Thus, the introduction of shorter treatment regimens significantly increases the effectiveness of TPT and expands access to it globally.

Conclusions to chapter 1

1. In summary, global efforts to combat tuberculosis have saved an estimated 79 million lives since 2000. To achieve the global target by 2027, approved at the UN TB Summit in 2023, it is necessary to allocate US$22 billion annually for TB prevention, diagnosis, treatment and care. The goal of ending the TB epidemic by 2030 is one of the key health goals in accordance with the UN Sustainable Development Goals.
2. It has been determined that the effective implementation of preventive treatment for TB is an important element in achieving the goals of overcoming TB at the global level. These measures can significantly reduce the burden of the disease, prevent the development of active forms of TB and reduce mortality from this disease. WHO calls on countries to strengthen prevention and treatment measures, ensuring the availability of the necessary resources and financing.
3. The BCG vaccine has been shown to be an important tool in the control of tuberculosis, providing high levels of immunization in children with minimal

risks of adverse reactions. However, to avoid serious complications, it is necessary to carefully follow the contraindications and technique of vaccine administration. Further research and improvement of vaccinological methods will contribute to increasing the effectiveness and safety of vaccination, which is critical for public health.

4. It has been determined that for effective treatment of TB, it is necessary to integrate preventive treatment into the overall strategy for combating infectious diseases, especially in the context of comorbid conditions such as HIV. WHO continues to recommend the implementation of TPT in children. Strengthening the TPT program, implementing short-term treatment regimens and ensuring access to effective prevention methods are critical. Thus, a comprehensive approach that includes strengthening preventive measures, international cooperation, innovative treatment methods and effective management of TPT programs is key to successfully controlling tuberculosis and ensuring public health.

CHAPTER 2
ASSESSMENT OF THE STATUS OF PROVISION OF ANTI-TUBERCULOSIS ASSISTANCE TO THE POPULATION

2.1 Research on public policy in the field of combating tuberculosis and financing models for anti-tuberculosis assistance to the population in Morocco

Morocco, a middle-income country with a high population density in urban areas, faces complex challenges in the fight against tuberculosis (TB). According to reports from WHO and the National Program for the Control of Tuberculosis (PNLT), Morocco has shown progress in reducing mortality rates, but the incidence rate remains consistently high. The government has identified the fight against TB as a priority in the health sector, and has therefore implemented a multi-level public policy focusing on prevention, diagnosis, treatment and social support for patients [15, 16].

The National Program for the Control of Tuberculosis (PNLT) has been in operation since 1991 and has undergone significant modernization in recent years. Its strategic documents are synchronized with the WHO Global Strategy to End TB 2016–2035. The program covers the entire territory of the country, has centralized coordination through the Ministry of Health and decentralized implementation at the regional level. The main objectives of the program are: to detect at least 90% of expected TB cases, to achieve a 90% treatment success rate among new cases, and to ensure access to diagnostics in all provinces [23].

The National Strategy for Tuberculosis Control (PSNLT) in Morocco was developed by the Ministry of Health in response to the challenges of maintaining high rates of morbidity and the need to adapt approaches to WHO global standards. According to 2021 data, more than 30,000 new cases of tuberculosis are registered in Morocco each year, the majority of which are in the 15-45 age group [16].

The strategy is implemented within the framework of Sustainable Development Goal 3.3 (end the epidemics of AIDS, tuberculosis and other diseases

by 2030) and is supported by the Global Fund, the STOP TB Partnership, and other partners.

Key objectives of the strategy by 2025 Reduce tuberculosis morbidity and mortality by 25% (compared to 2015). Achieve coverage of 90% of active tuberculosis cases with effective treatment. Expand preventive treatment of latent tuberculosis among contacts. Raise public awareness of the routes of transmission, prevention and the need for tuberculosis treatment [16, 23].

Key components of the strategy

1. Prevention (Prévention)

This is a priority component of the strategy, which includes:

- immunoprophylaxis - BCG vaccination remains the main method of specific prevention. The strategy ensures a stable supply of the vaccine, coverage of more than 95% of newborns and monitoring the effectiveness of vaccinations. Detection of latent tuberculosis infection (LTI) - testing of contact persons in families of patients and high-risk individuals (people with HIV, diabetics, prisoners) is provided. Since 2022, the active implementation of the IGRA test (interferon-gamma-release test) has begun as a more accurate method for diagnosing LTBI.
- Chemoprophylaxis - persons with a positive LTBI test but without symptoms of active tuberculosis are prescribed a preventive course using isoniazid or the combination of isoniazid + rifapentine (3HP regimen). Health and educational activities - campaigns are being developed to disseminate information through the media, schools, mosques, and public organizations. Special emphasis is placed on combating social stigmatization.

2. Early detection of the disease

The strategy provides for the expansion of screening among the high-risk population.

Mobile diagnostic points (mobile clinics) operating in rural areas have been introduced.

Priority is given to the use of GeneXpert MTB / RIF, which allows detecting tuberculosis and rifampicin resistance within a few hours.

Digital technologies are used for remote registration, contact tracing, and the creation of a national case registry.

3. Ensuring quality treatment

Treatment protocols are harmonized with WHO recommendations.

Directly Observed Treatment (DOT) has been introduced, especially in cases of multidrug-resistant tuberculosis.

The strategy is purchasing new drugs: bedaquiline, delamanid.

Social support for patients is provided, including food, travel tickets, and psychological assistance.

4. Integration with other health programs

Particular attention is paid to joint management of HIV/TB cases (co-infection). The tuberculosis component is integrated into general primary health care services. The qualifications of medical personnel are improved through regular training.

5. Monitoring and Evaluation (Suivi et évaluation)

An electronic monitoring system (Tubercule) is used, which allows for real-time analysis of the effectiveness of measures.

Annual epidemiological studies, sociological surveys, and external audits of programs are conducted.

Innovations in the PSNLT Strategy 2021–2025

Individualization of approaches to prevention - development of patient risk profile maps.

Inclusion of public organizations - participation of public activists, opinion leaders, and religious figures in communicating information about tuberculosis.

Intersectoral cooperation - the strategy covers not only the Ministry of Health, but also the Ministry of Education, the Prison Service, system, local government.

The National Strategy for the Control of Tuberculosis in Morocco for 2021-2025 is a well-structured and scientifically based document that aims not only to

combat the consequences of the disease, but also to eliminate its social causes and barriers to treatment. Preventive measures, such as vaccination, detection of latent forms, chemoprophylaxis and active education, play a key role in reducing the prevalence of the disease. This strategy is an example of how a middle-income country can implement modern, effective public health policies.

Public health and surveillance legislation

Although Morocco does not have a separate law dedicated exclusively to tuberculosis, the general principles of the fight against infectious diseases are regulated by the Health Code and a number of decrees and circulars of the Ministry of Health. They provide for [16]:

- Mandatory sanitary and epidemiological control;
- Regular medical examinations of workers in certain areas (education, medicine, food industry);
- Legal mechanisms for isolation and treatment of patients with infectious forms of tuberculosis;
- Rights and obligations of patients, in particular in terms of compliance with the treatment regimen.

3. Immunization Program (Programme Élargi de Vaccination – PEV)

One of the most important components of tuberculosis prevention is BCG vaccination. It is included in the list of mandatory vaccinations in the national vaccination calendar, which is provided by the state free of charge. BCG is vaccinated against newborns in the first days of life. The vaccination procedure is regulated by orders of the Ministry of Health and is carried out in all medical institutions in the country.

4. Clinical protocols and standards for tuberculosis treatment

The Ministry of Health regularly updates clinical recommendations for the management of patients with tuberculosis. They are based on WHO guidelines and contain provisions on:

- Performing sputum microscopy and genetic tests (GeneXpert);

- Differentiation of forms of tuberculosis (pulmonary, extrapulmonary, multidrug-resistant);
- Standard and extended treatment courses (6–20 months);
- Monitoring adherence to treatment (through health intermediaries or digital platforms);
- Organization of social support, including food assistance for low-income patients.

5. International partnership and regulatory harmonization

Morocco actively cooperates with international structures such as WHO, UNICEF, UNAIDS and the Global Fund. All national programs are coordinated with international standards:

- Participation in global initiatives such as the STOP TB Partnership;
- Harmonization of legislative acts with the WHO Strategic Framework on Tuberculosis;
- Technical assistance in the form of expert assessments, grant support, supply of medicines.

The program is financed on the basis of a three-year budget framework within the framework of a sector-wide approach. The state budget covers staff salaries, logistics, maintenance of diagnostic centers, and purchase of drugs. In addition, international assistance (Global Fund, USAID, UNDP, KOICA) finances training programs, digital reporting, mobile clinics for hard-to-reach areas, and molecular diagnostics laboratories (GeneXpert). Over the period 2019–2023, more than 30% of the TB program budget was provided by external sources.

Particular attention is paid to the fight against multidrug-resistant TB (MDR-TB). There are 6 reference laboratories in the country that are capable of performing PCR diagnostics to detect resistance. Patients with MDR-TB are provided with high-cost second-line drugs completely free of charge. The state also finances inpatient and outpatient treatment, including psychosocial support and transport compensation.

Primary health care plays an important role in the TB financing system in Morocco. Most cases are treated on an outpatient basis, which reduces the burden on hospitals. At the same time, primary care physicians are actively involved in the processes of active detection, monitoring of adherence to treatment regimens, and reporting. The system covers more than 2,000 health centers that collaborate with laboratories to confirm the diagnosis.

Innovative approaches to financing include pilot projects with result-based financing (RBF), especially in the southern regions. Also, in 2020, the integration of HIV/TB databases to optimize the patient's route, supported by the Global Fund and domestic IT companies, was launched. Thanks to this, the monitoring system has become more transparent, and the allocation of resources is oriented towards the epidemiological map of the regions.

Challenges in the financing system remain: limited fiscal space, insufficient participation of insurance mechanisms, low level of coverage of the informal sector by social guarantees. Morocco is in the process of reforming its general health insurance (AMO) system, which should eventually include compensation for indirect costs related to TB treatment.

Overall, Morocco’s TB policy demonstrates a high level of integration.

2.2 Research on the main epidemiological indicators of tuberculosis

WHO classifies TB, along with HIV, viral hepatitis, and malaria, as one of the most dangerous socially dangerous infectious diseases. Thus, TB is among the ten leading causes of death in the world from infectious diseases [4, 27, 33]. According to WHO experts, the epidemiological situation regarding TB in the world will decline if effective measures are not taken [33]. According to the Global Tuberculosis Report 2023, 7.5 million cases of TB were diagnosed in the world in 2022. This indicates a significant burden of the disease, which continues to pose a serious threat to public health at the global level [21, 23].Experts estimate that about 25% of the world's population is infected with mycobacteria, with the risk of

developing active disease being highest in the first two years after infection (approximately 5%), and then decreasing significantly.

In some cases, the body can clear the infection on its own. Most new cases of TB are diagnosed each year in adults, with men being more likely to get the disease than women. Although the disease mainly affects the lungs (pulmonary TB), other organs can also be affected [23, 27, 33].

Without proper treatment, the mortality rate from TB is high, around 50%. With the WHO-recommended anti-TB therapy for 4–6 months, up to 85% of patients can be completely cured [4].

Access to health care and adequate coverage of the population with treatment are key conditions for reducing the burden of the disease. Intersectoral interaction in overcoming the social determinants of tuberculosis: poverty, malnutrition, HIV infection, smoking and diabetes is also important.

Significant progress has already been achieved in a number of countries - less than 10 new cases and less than one death per 100,000 population per year. Political support for overcoming the tuberculosis epidemic has strengthened in recent years. In particular, the first ever high-level UN General Assembly on tuberculosis was held in 2018, and the second in 2023, which ended with the adoption of an updated political declaration with new goals for the period 2023–2027 [4, 33].

In 2022, 7.5 million new cases of tuberculosis were registered, the highest since WHO began global monitoring in 1995. This is due to both a real increase in incidence and delayed diagnosis due to the COVID-19 pandemic, which has significantly affected access to health services [33].

Mortality in 2022 was approximately 1.3 million, a decrease from 1.4 million in 2020–2021. At the same time, the COVID-19 pandemic is estimated to have caused about 500,000 additional deaths from TB in 2020–2022, indicating a significant indirect impact [23, 27].

The total number of people with TB in 2022 reached 10.6 million, exceeding the levels in 2021 (10.3 million) and 2020 (10.0 million) [4, 27].

The estimated incidence rate in 2022 is 133 cases per 100,000 population.

The decrease in this indicator from 2015 to 2022 is only 8.7%, while the WHO Global Strategy target is 50% by 2025.

The 30 countries with the highest burden of TB account for 87% of all cases in the world. Among them, the largest burden falls on: India - 27%, Indonesia - 10%, China - 7.1%, Philippines - 7%, Pakistan - 5.7%, Nigeria - 4.5%, Bangladesh - 3.6%, DR Congo - 3% [2, 22, 27]

In 2022: 55% of new cases were recorded among men; 33% among women; 12% among children under 14 years of age.

In 2022, about 410,000 people fell ill with multidrug-resistant tuberculosis (MDR-TB). Only 175,650 people received appropriate treatment, which is less than half of those who need it. This is still below the level of 2019 (181,533 cases).

Despite some progress, the UN targets set for 2018–2022 have not been met [4, 27, 33]:

- Only 34 million people have received treatment (84% of the planned 40 million);
- Only 15.5 million people have started preventive treatment (52% of the target of 30 million);
- Financing in 2022 amounted to 5.8 billion US dollars, which is less than half of the required (13 billion);
- Investment in scientific research - less than 1 billion per year, against a need of 2 billion.

More than 50% of TB patients and their families face catastrophic costs exceeding 20% of annual household income. This indicates an urgent need to strengthen social protection systems.

In low- and middle-income countries, which includes Morocco, tuberculosis remains an extremely urgent problem. The success of the fight against this disease largely depends on effective epidemiological monitoring, assessment of key indicators, timely diagnosis, treatment and prevention.

In 2023, the incidence of tuberculosis in Morocco was 92 cases per 100,000 population. This indicator indicates the maintenance of a stable epidemiological situation, however, the incidence rate remains higher than the average in European countries. In 2021, 29,327 new cases were registered in the country, of which about 60% were in men of working age. The treatment success rate exceeds 89%, which indicates the effective implementation of the national TB control program. However, the spread of multidrug-resistant forms remains a serious problem [23].

The epidemiological situation varies significantly between regions of the country. The most affected are densely populated areas, in particular the northern regions of Tangier-Tetouan-Al Hoceima and large cities such as Casablanca, Marrakech, Rabat. In 2019, Helmim had an incidence rate of 92.6 cases per 100,000, close to the national average. Extrapulmonary TB in the region accounted for over 64% of all cases, well above the average [33].

Incidence, mortality, treatment success and the prevalence of multidrug-resistant TB are key indicators for assessing the epidemic. In 2023, the TB mortality rate in Morocco was estimated at 5 cases per 100,000 population. The MDR-TB rate was 0.5%, in line with the global average. Effective detection and follow-up of such cases is essential to prevent the spread of drug-resistant forms.

The COVID-19 pandemic has severely impacted the implementation of TB interventions. Due to restrictions on movement, disruptions in the provision of health services and the reorientation of health systems to the fight against COVID-19, the number of detected TB cases has decreased. In 2020, a significant decrease in new case notifications was recorded, in particular in the city of Tetouan, the incidence rate decreased to 112 per 100,000, which is explained by the reduction in access to diagnostic and therapeutic services.

Analysis of the socio-demographic structure of patients shows that TB affects young adult men aged 15–44 years the most. This is due to the higher level of social activity, the risk of infection in the workplace and in crowded places. Among children and the elderly, the incidence rate is lower, but the prognosis of the disease is often worse due to concomitant conditions and a reduced immune response [33].

In Morocco, pulmonary forms of TB prevail - 61% of cases. Among extrapulmonary, the most common are pleurisy (41.3%) and lymphadenitis (31.5%). This distribution is due to both clinical and socio-epidemiological factors. Extrapulmonary forms are often more difficult to diagnose, which requires additional resources.

Morocco has implemented a national TB control program, financed by the state budget with the support of international donors, including the Global Fund. It provides for early detection, access to treatment, prevention and epidemiological surveillance measures. One of the program's goals is to achieve a 90% treatment success rate for new TB cases.

The main challenges remain timely detection, combating multidrug-resistant TB, involving vulnerable groups in treatment and maintaining achievements after the COVID-19 pandemic. An important direction is the development of digital monitoring, telemedicine and mobile teams for examination in remote areas. It is also necessary to improve intersectoral interaction between health, social services and education.

According to the Center for Public Health of the Ministry of Health of Ukraine, from 2019 to 2023, the incidence of tuberculosis, including cases with relapses, had fluctuating indicators (Table 2.1).

Table 2.1

Results of analysis of TB incidence rates (new cases and relapses) for the period 2019–2023

Year	Intensive rate per 100,000 population	Growth rate
2019	60,1	-
2020	42,2	-29,8
2021	44,0	4,3
2022	45,1	2,5
2023	48,1	7,3

It was found that in 2020 the intensive rate was up to 42.2 cases per 100,000 population, and the growth rate was 29.8%, which indicates a significant decrease in morbidity compared to 2019. In 2021-2023, there was a tendency for the morbidity rate to increase. This may be a consequence of increased risk factors, such as a worsening economic situation, reduced funding for healthcare systems, or an increase in the number of relapse cases.

Conclusions to chapter 2

1. The regulatory framework for tuberculosis prevention in the Kingdom of Morocco is characterized by a high level of integration of national and international approaches. From strategic planning to practical implementation, all stages are regulated by clear regulations that ensure the integrity of the prevention system. The main challenge remains to ensure equal access to services for all segments of the population, in particular marginalized groups. Expanding social protection, digitalizing surveillance, and intersectoral cooperation remain priorities in the future development of tuberculosis policy in Morocco.
2. The global tuberculosis epidemic remains a serious threat to the health of millions of people. Although there has been a recovery in the level of diagnosis and treatment after the COVID-19 pandemic, the gap with the WHO and UN targets is significant. To effectively overcome tuberculosis, it is necessary not only to ensure access to health care, but also to take a multisectoral approach to combat the social determinants of the disease. Political will, financial support, technological innovation and international solidarity will play a crucial role.
3. The epidemiological situation of tuberculosis in Morocco remains under control, but requires constant attention and improvement of programs. It is necessary to ensure the sustainable development of the TB control system, modernize approaches to detection, diagnosis, treatment and rehabilitation of patients, and adapt strategies to new challenges, including infectious threats, social crises and economic instability.

CHAPTER 3
COMPREHENSIVE EVALUATION OF TUBERCULOSIS PREVENTION MEASURES

3.1 Results of the assessment of BCG vaccination coverage of the child population

Vaccination is one of the most effective ways to protect public health and prevent the spread of infectious diseases. Vaccination provides immunity against dangerous diseases by introducing weakened or inactivated pathogens. Mass immunization programs play a crucial role in the control and elimination of many infectious diseases [19, 32].

BCG vaccination is an important preventive measure in the fight against TB, especially in countries with a high prevalence of the disease.

BCG vaccination is carried out in many countries of the world, but its use depends on the epidemiological situation with tuberculosis. Based on the analysis of national vaccination programs, we have identified countries where BCG vaccination is mandatory. Thus, in Ukraine, BCG is included in the national vaccination calendar and is carried out on the 3rd–5th day after birth. In India, Bangladesh, Pakistan, Indonesia, Brazil, Peru, Mexico, due to the high prevalence of TB, BCG vaccination is mandatory for newborns. In many African countries, BCG is part of the national immunization schedule due to the high incidence of tuberculosis [2, 25]. However, there are countries where BCG vaccination is recommended. For example, in the USA, vaccination is not part of the general program, but is recommended for high-risk groups, for example, health workers who come into contact with tuberculosis patients. In Canada, vaccination is carried out for indigenous people and other groups where the risk of infection is high. In European countries with low levels of TB, such as Germany, the Netherlands, Denmark, Sweden, and the United Kingdom, only people from risk groups are vaccinated, in particular. In some countries with very low levels of TB, in particular Iceland and Finland, BCG vaccination is not

included in the national vaccination schedule, and the emphasis is on the diagnosis, treatment, and isolation of active TB cases [29, 31].

Therefore, BCG vaccination is most often carried out in countries with medium and high levels of TB prevalence, where it helps prevent severe forms of the disease, especially in children. In countries with low levels of TB, its use is limited to certain risk groups.

The implementation of state policy to combat the spread of TB is based on the principles of ensuring universal and equal access to quality prevention, diagnostic and treatment services for the population.

At the same time, vaccination coverage of the child population is a key indicator of the effectiveness of immunization programs. According to WHO recommendations, to control vaccine-preventable infections, it is necessary to achieve a coverage level of > 95% with vaccinations against each disease.Morocco has consistently had high BCG vaccination coverage over the past decade. According to a joint WHO/UNICEF assessment (WUENIC), 99% of newborns were vaccinated against tuberculosis in 2023. Similar rates were recorded annually from 2012 to 2022 (Table 3.1).

These data indicate the effective functioning of the national immunization program, the coordinated work of the primary health care system and the high level of public trust in the vaccination system. Given that BCG vaccination is carried out in the first days of a child’s life, these indicators are also an indicator of the availability of medical care at birth. Thus, the experience of Morocco is a positive example of stable control over one of the key components of tuberculosis prevention and can be used as a benchmark for countries with lower vaccination coverage.

The vaccination program in Morocco dates back to 1981, when the National Expanded Program on Immunization (Programme Elargi de Vaccination – PEV) was launched. BCG vaccination was included in the basic vaccination package for newborns, and since then the state has demonstrated a strong commitment to ensuring the availability of this vaccine throughout the country.

Table 3.1

BCG vaccination coverage rate in Morocco, 2012–2023

Year	BCG coverage (%)
2012	99
2013	99
2014	99
2015	99
2016	99
2017	99
2018	99
2019	99
2020	99
2021	99
2022	99
2023	99

Vaccination is mandatory in accordance with national legislation. The Moroccan Ministry of Health has clearly defined guidelines on the procedure, timing and protocols for vaccination. BCG vaccination is provided free of charge, is funded by the state and supported by a number of international partners.

BCG is administered during the first day of life of the child - this is provided in every maternity hospital at both urban and rural levels. A personal medical diary ("Carnet de Santé") is opened for each newborn, in which all vaccinations, including BCG, are recorded.

Vaccination in Morocco is carried out according to an annual mobilization plan considering the demographic forecast, the needs of each region, historical data and the availability of a logistical base.

Mobile teams of health workers are active in rural areas, planning vaccination routes, conducting outreach sessions, and integrating immunization with basic health care.

Morocco maintains an effective cold chain system for storing and transporting BCG vaccine. The entire system includes refrigeration units in health centers, portable containers for mobile teams, and centralized temperature control.

Much attention is paid to changing the population's behavior through information campaigns. National immunization weeks are held annually, meetings are held in communities, and work with mothers in schools and health facilities.

Key partners supporting the vaccination program in Morocco include GAVI, UNICEF, WHO, USAID, and CDC. They provide vaccine supplies, staff training, and technical support.

The data collection system is gradually moving to electronic form. This allows for verification of coverage, coordination of mobile campaigns, and quarterly reports.

Despite the high coverage, there are challenges: geographical barriers, internal migration, the need for digitalization, and individual refusals to vaccinate. The BCG vaccination coverage system in Morocco is an example of an effective approach that combines government policy, partnership support, and active community participation. This ensures sustainable coverage at 99% and can serve as a model for other countries in the region.

Next, we analyzed the BCG vaccination coverage rate (%) among the child population of Ukraine for the period 2020-2022 (Table 3.2).

It was determined that the national vaccination coverage rate decreased from 88.8% in 2020 to 71.0% in 2022, which indicates a significant decrease in the number of planned vaccinations among children. It is worth noting that in 2023 there is a recovery of the coverage rate to 83.5%, which is a positive indicator after a significant drop in previous years.

The analysis shows that the largest decline in coverage is observed in Donetsk region. Thus, a significant decrease in coverage from 80.0% in 2021 to 29.9% in 2022 (-62.63%), with a subsequent sharp increase to 89.8% in 2023 (+200.33%). In Kherson region, coverage decreased from 84.0% in 2021 to 28.2% in 2022 (-66.43%), after which it increased to 96.7% in 2023 (+242.91%). In Luhansk region,

a significant drop in coverage is observed from 76.6% in 2021 to 6.9% in 2022 (-90.99%).

Table 3.2

Results of calculations of the growth rates of BCG vaccination coverage by regions of Ukraine

Name of region/city	2020	2021	2022	2023	2021/2020	2022/2021	2023/2022
	Coverage, %				growth rate		
1	2	3	4	5	6	7	8
Vinnytsia	84,0	74,4	82,2	79,9	-11,43	10,48	-2,80
Volynskaya	95,8	85,6	90,7	89,4	-10,65	5,96	-1,43
Dnipropetrovsk	87,2	76,4	69,3	83	-12,39	-9,29	19,77
Donetsk	84,8	80,0	29,9	89,8	-5,66	-62,63	200,33
Zhytomyr	93,7	82,7	71,8	74,7	-11,74	-13,18	4,04
Zakarpattia	88,2	71,9	64,0	77,7	-18,48	-10,99	21,41
Zaporizhzhia	84,0	81,7	64,7	78,8	-2,74	-20,81	21,79
Iv.-Frankivsk	84,3	79,3	76,2	81,4	-5,93	-3,91	6,82
Kyiv	84,6	83,7	72,8	76,7	-1,06	-13,02	5,36
Kirovohrad	92,3	92,6	82,8	87,9	0,33	-10,58	6,16
Luhansk	75,6	76,6	6,9	0	1,32	-90,99	-
Lviv	91,4	83,4	77,4	79,8	-8,75	-7,19	3,10
Mykolaiv	92,2	86,3	82,5	91,4	-6,40	-4,40	10,79
Odessa	88,6	77,6	66,3	81,5	-12,42	-14,56	22,93
Poltava	95,6	88,7	91,1	79,7	-7,22	2,71	-12,51
Rivne	89,0	82,2	83,5	89,1	-7,64	1,58	6,71
Sumyskaya	90,9	88,5	91,9	96,2	-2,64	3,84	4,68
Ternopil	84,6	77,0	65,7	90,5	-8,98	-14,68	37,75
Kharkiv	82,4	77,3	76,9	86,2	-6,19	-0,52	12,09
Kherson	88,8	84,0	28,2	96,7	-5,41	-66,43	242,91

continued table 3.2

1	2	3	4	5	6	7	8
Khmelnytskyi	92,7	88,1	73,3	94,8	-4,96	-16,80	29,33
Cherkasy	88,5	88,1	85,2	88,4	-0,45	-3,29	3,76
Chernivtsi	89,5	85,9	89,9	80,1	-4,02	4,66	-10,90
Chernigiv	81,9	80,1	86,3	86,8	-2,20	7,74	0,58
Kyiv city	95,7	87,0	55,7	84,4	-9,09	-35,98	51,53
Ukraine	88,8	81,8	71,0	83,5	-7,88	-13,20	17,61

In our opinion, this is due to military operations in the eastern regions of Ukraine (Donetsk, Luhansk regions), which led to the destruction of healthcare infrastructure, population displacement and disruption of medical services, which significantly affected the level of vaccination. In Kyiv, coverage decreased from 87.0% in 2021 to 55.7% in 2022 (-35.98%), and then increased to 84.4% in 2023 (+51.53%). In Zhytomyr region, coverage decreased from 93.7% in 2020 to 82.7% in 2021 (-11.74%), and then to 74.7% in 2022 (-13.18%) with a slight recovery to 74.7% in 2023 (+4.04%). Kirovohrad region saw a slight increase in coverage from 92.3% in 2020 to 92.6% in 2021 (+0.33%), a decrease to 82.8% in 2022 (-10.58%), and then an increase to 87.9% in 2023 (+6.16%).

BCG vaccination in Morocco and Ukraine has a common strategic goal - the prevention of tuberculosis among newborns. Both countries recognize vaccination as one of the main tools for protecting the child population from severe forms of TB, including meningitis and miliary tuberculosis.

However, the implementation of immunization programs is carried out in different socio-economic, geographical and political conditions. While Morocco operates in a stable environment and centralized healthcare, Ukraine has been facing the challenges of a full-scale war since 2022, which directly affects access to medical services, including vaccination.

According to 2023 data, the BCG vaccination coverage rate in Morocco was 99% and has remained stable for more than a decade. This indicates the effective

operation of the national immunization program, public trust in vaccination and the presence of effective control mechanisms. In Ukraine, the similar indicator was about 88%, which, given the war circumstances, is still relatively high, although it needs to be strengthened.

in both countries, BCG vaccination is regulated by national regulations. In Morocco, through the National Immunization Program (PNI), and in Ukraine, through the National Calendar of Preventive Vaccinations and relevant orders of the Ministry of Health. In both cases, vaccination is mandatory and free of charge, which creates formal conditions for wide coverage of the population.

The organizational mechanisms for implementing vaccination also have common features, in particular, vaccinations are carried out in maternity hospitals and primary health care facilities. At the same time, Morocco has already switched to electronic monitoring of vaccinations, while in Ukraine a significant part is still carried out in paper form, and the eHealth system only partially covers this area. Also, the age for the introduction of BCG in Morocco is the first 24–48 hours, in Ukraine it is 3–5 days or later in case of medical indications.

The main challenges in both countries are different in nature. In Morocco, they are due to geography (mountains, deserts), but the system of mobile teams allows them to be overcome. In Ukraine, the main barriers are war, migration, destroyed infrastructure and power outages, which directly affect the stability of the "cold chain" and the availability of vaccines in some regions. In addition, Ukraine has seen a growth in the anti-vaccination movement, while in Morocco the level of resistance to vaccination remains minimal. Overall, the analysis shows that both countries demonstrate political will and regulatory support for immunoprophylaxis, but the effectiveness of the BCG program depends on the ability to adapt to external conditions: from geography to the military-political situation. The experience of Morocco is an example of a stable and centralized system, while Ukraine needs additional support, investment in digitalization and flexibility in times of crisis.

3.2 Research on the level of public awareness on tuberculosis prevention issues

In February-March 2025, we organized and conducted a sociological survey to determine the level of adherence to TB prevention. The object of the study was the population of Morocco aged 18 and over. According to analytical studies, it was identified as an area with high rates of tuberculosis. A total of 160 people were interviewed. Before each interview, the respondent was given verbal consent to participate in the survey.

Among the respondents, 65% were women and 35% were men. Distribution by age group: 18-24 years old made up 30% of respondents, 25-34 years old – 35%, 35-44 years old – 25%, 45-59 years old: from 5% to 25%, 60 years old and older – 5%. The majority of respondents (63%) live in the city, the remaining 37% - in rural areas. The respondents were distributed as follows by level of education: 40% have incomplete higher education, 48% - higher, 12% - secondary. Among the survey participants, 60% assess their financial situation as below average, 39% - within average, and 1% - as above average.

According to the respondents' answers to the question about the sources of primary information on TB prevention, several main channels were identified. For 70% of the respondents, the most important resource was the Internet (in particular, social networks), and for 57% - television. The second group of sources consists of radio, printed publications and close environment (relatives, friends, neighbors, colleagues), as well as specialists - pharmacists and medical workers.

It is worth noting that such ways of obtaining health information as public or charitable organizations, specialized publications, educational institutions, materials in transport, pharmacies, clinics, hospitals fell into the third group and have a lower priority than contact with a pharmacist (pharmacist). The results of the study show that the greatest trust of the population is caused by the Internet environment, pharmacists (pharmacists) and medical workers (39%), information materials in pharmacies, clinics and hospitals (25%).

During the survey, respondents were asked to independently determine their level of awareness of TB prevention. According to the results of this self-assessment, 19% noted that they are very well informed about TB issues, 46% - know in general terms, 26% - know very little and only 7% - do not know anything.

86% of respondents believe that a cough for 2-3 weeks is a symptom of TB, and 51% noted that an elevated temperature may indicate the presence of the disease. Also, such an indicative symptom as coughing up blood is known only to slightly more than half of the population (43%) (Fig. 3.1).

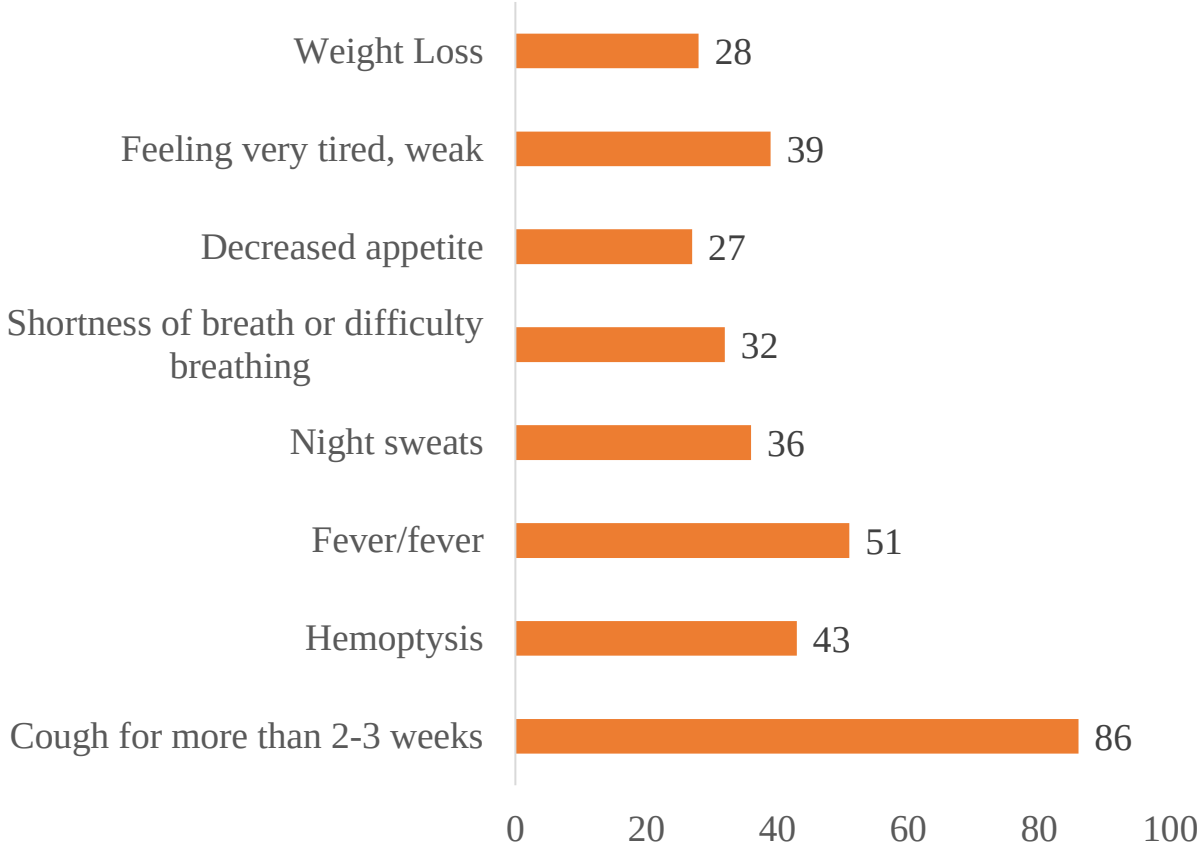

Fig. 3.1. Distribution of answers to the question: “What, in your opinion, are the most common symptoms of tuberculosis?”

Very interesting answers were received from respondents to the question: "Do you know about the existence of preventive examinations for tuberculosis (fluorography, X-ray, tuberculin test, etc.)?". Thus, only 25% of respondents know about preventive examinations and regularly undergo them, 60% have heard, but do not always undergo them, and 15% have not heard at all.

During the survey, it was determined that 85% of respondents are aware that TB is transmitted by airborne droplets, 5% do not know at all, and 10% found it difficult to answer the question.

During the survey, we found out the attitude towards BCG vaccination. Thus, 78% of respondents noted that this preventive BCG vaccination is absolutely necessary and important for everyone, 12% believe that it is useful, but doubt its effectiveness, 5% do not see the point and 5% find it difficult to answer.

The results of the respondents' answers regarding the frequency of fluorography/X-rays over the last 2 years are shown in Fig. 3.2.

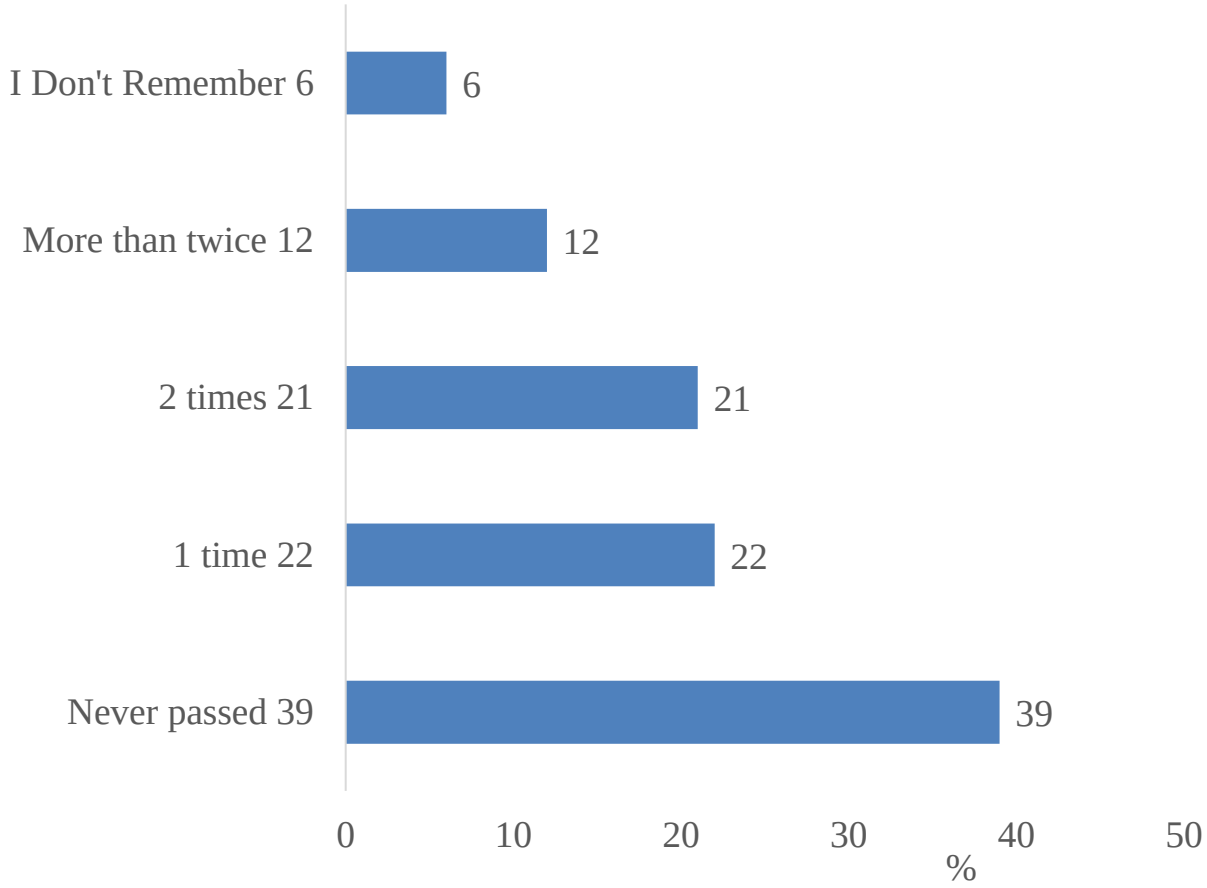

Fig. 3.2. Distribution of answers to the question: “How often have you undergone a fluorography examination or X-ray in the last 2 years?”

Next, we identified the motives that encourage people to undergo regular TB examinations. Respondents were able to choose several options at the same time (Fig. 3.3). The largest number of survey participants indicated that professional

advice or referral for examination by a medical professional is the most convincing factor. This indicates a high level of trust in the competence of doctors in TB prevention issues. The second most important motive is the economic accessibility of diagnostics. The absence of additional costs or the availability of discounts makes the decision to undergo examination easier, especially for people with limited financial resources. A relatively small part of respondents noted that they do not need additional motivation. Some already have an established habit of undergoing examination, while others, on the contrary, believe that "nothing will force" them to undergo examinations more often.

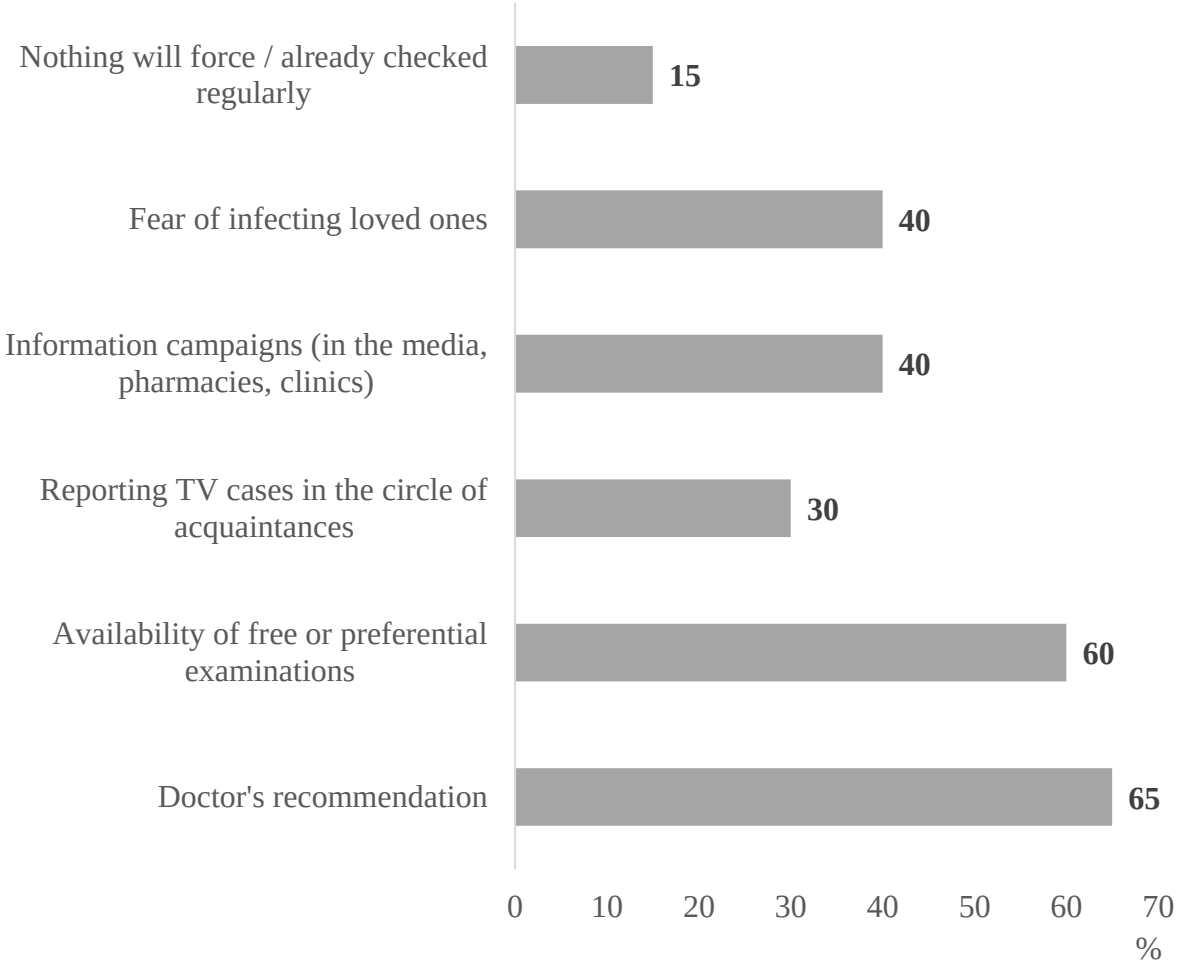

Fig. 3.3. Distribution of answers to the question: "What might motivate you to get checked for TB regularly?"

Next, we assessed the level of awareness and attitude of respondents to TPT. Half of the respondents (50%) noted that TPT is an important measure. This indicates a relatively high percentage of people who understand the importance of preventive treatment for preventing or preventing the development of active TB. A third of the respondents (32%) have a general idea of TPT, but they lack a deeper understanding of the mechanism of action, indications or features of preventive therapy. That is, these people have heard that such TPT exists, but they need additional clarification or consultation from medical professionals. 18% of respondents had no information about TPT at all before the survey. This group needs basic information about what preventive TB treatment is and under what circumstances it is needed.

Figure 3.4 shows the most common actions that, according to respondents, help reduce the risk of TB infection. Thus, the survey participants most often mentioned the importance of regular lung examinations. This shows that people understand the importance of screening and early detection of TB using fluorography or X-ray. Almost three quarters of respondents consider healthy habits (good nutrition, adequate sleep, quitting smoking and alcohol) to be an important factor in preventing tuberculosis. This indicates awareness of the connection between general immunity and the risk of TB. More than half of people emphasize that basic hygiene measures help avoid many infections, including TB. About 57% of respondents noted that it is important to minimize the likelihood of infection by limiting direct contact with people who have signs of the disease or are at risk. A significant proportion of respondents (more than three quarters) recognize that vaccination is one of the key measures for preventing TB, which can reduce the spread and severity of the disease.

Fig. 3.5 shows whose opinion and advice respondents rely on most in matters of health and TB prevention. Participants could select several options at the same time.

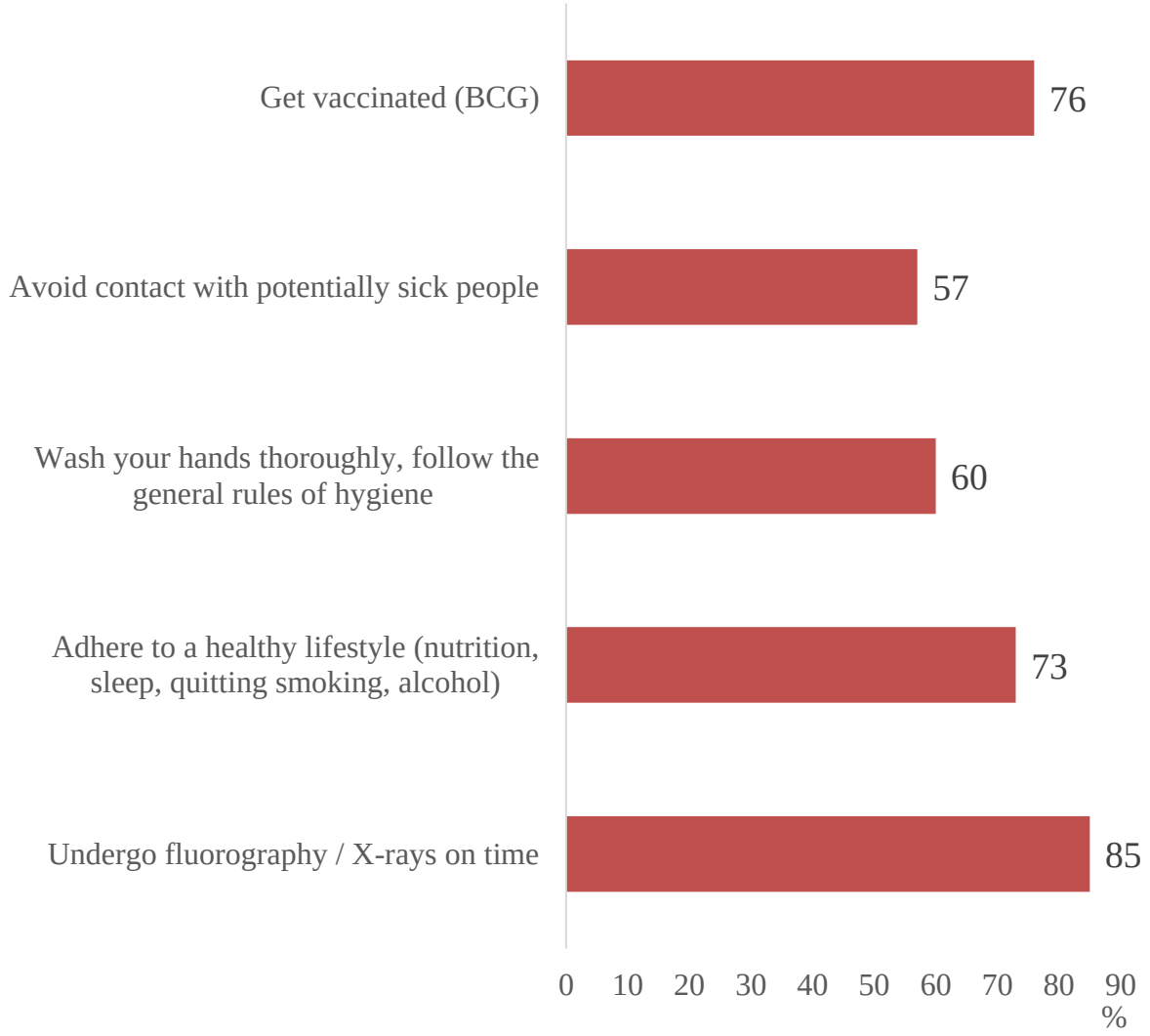

Fig. 3.4. Distribution of answers to the question: “What steps, in your opinion, should be taken to reduce the risk of contracting TB?”

The largest proportion of respondents indicated trust in specialists who are directly involved in the diagnosis and treatment of pulmonary diseases and TB. This indicates high respect for narrow-profile doctors and recognition of their professional experience in the context of TB. More than 40% of respondents trust family doctors, who are most often the patient's first contact with the medical system. This indicator confirms the importance of primary health care in the prevention and early detection of TB. Approximately a quarter of respondents indicated that they consult pharmacy workers on prevention and treatment.

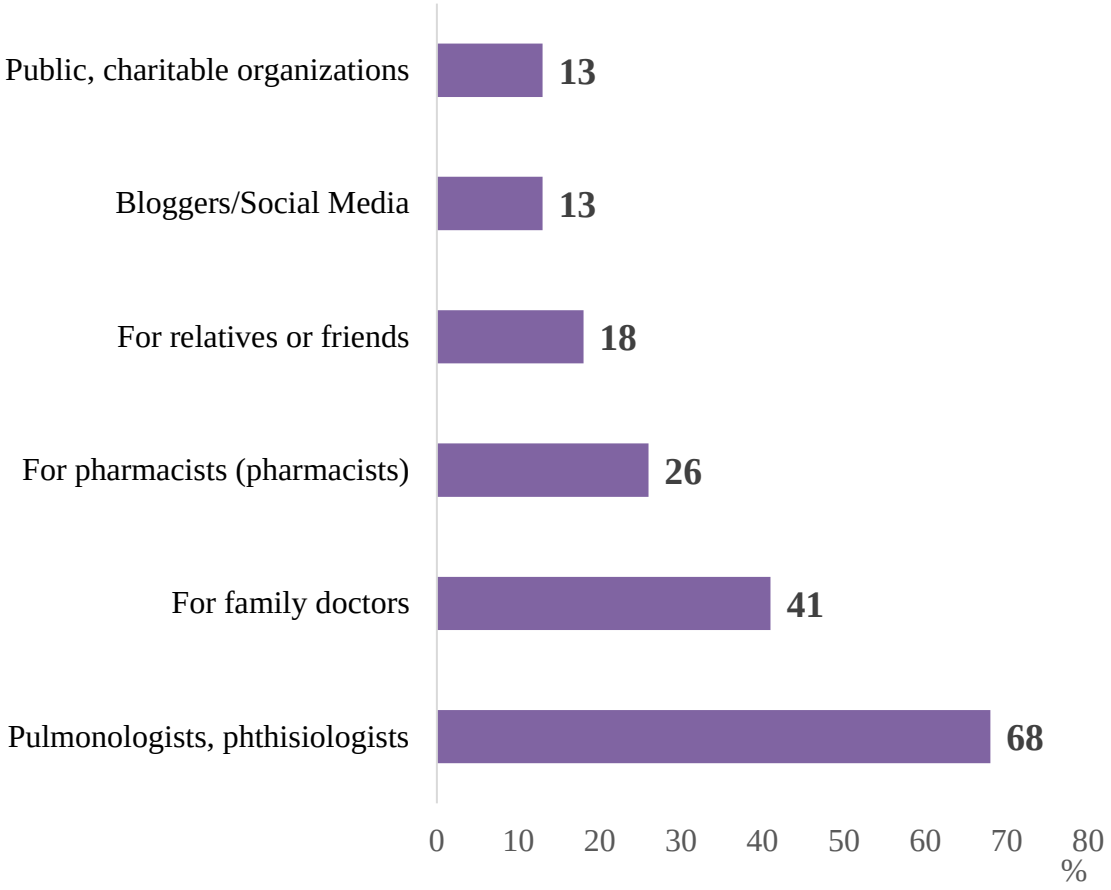

Fig. 3.5. Distribution of answers to the question: “Who do you trust the most in matters related to health and TB prevention?”

Despite lower trust than in doctors, pharmacists are also considered a source of useful information. In a fifth of cases, respondents tend to seek advice from friends and relatives. Such interaction often reflects the everyday level of communication and sharing of personal experiences. Only 13% of respondents seriously trust content from opinion leaders or bloggers. Despite the general popularity of social networks, in areas that require expertise (such as TB prevention), respondents are more likely to rely on professional sources. The same number of respondents (13%) trust organizations that are engaged in public health or social projects in the field of combating tuberculosis. This indicator indicates a certain level of recognition of the activities of non-governmental organizations, but it is still low compared to trust in doctors.

Respondents' answers to the question of whether they consider the current quantity and quality of information activities on TB in our country to be sufficient demonstrate that more than half of the respondents (52%) believe that the level of public awareness about tuberculosis through available information sources is quite sufficient. Almost a fifth of the survey participants (18%) admit that in general there is enough information, but note the presence of certain areas or topics where public information needs improvement (for example, more detailed explanatory work on preventive treatment, vaccination, etc.). 11% of respondents believe that information activities on TB issues in various communication channels (media, social networks, printed materials) are insufficient. They need additional explanatory materials or more frequent coverage of the topic of prevention and treatment. 13% of respondents are convinced that the volume and quality of information are so low that it is impossible to speak of a sufficient level. A small portion (6%) could not decide on their own position.

Conclusions to chapter 3

1 BCG vaccination remains one of the main means of preventing severe forms of tuberculosis among children, especially in regions with high epidemiological risk.
2 Morocco demonstrates exemplary stability and consistency in covering the child population with BCG vaccination: the coverage rate has remained at 99% for more than a decade. Ukraine, despite significant challenges caused by war and migration, maintains a relatively high coverage rate of 89% in 2023, but needs to strengthen mobile coverage and electronic monitoring.
3 The comparison revealed common features in the regulatory framework, but also significant differences in coordination, digitalization, logistics and work with the population. Morocco's experience can serve as a guide for Ukraine in developing mobile teams, cold chains, partnership initiatives and educational campaigns.

4 The study results confirm that high vaccination coverage is possible with targeted policies, strategic planning, and intersectoral collaboration.

5 The survey (160 respondents aged 18 and over) in Morocco found that the general level of awareness about TB prevention is not high enough, although the majority of respondents (46%) rated their knowledge as average, and 19% as high.

6 The survey results demonstrate a moderate level of awareness of the population about preventive TB treatment. Although half of the respondents (50%) recognize its importance, a third (32%) have only a general idea and need additional explanations, and 18% heard about TPT for the first time during the survey. This indicates the need for broader information and counseling of the population on the essence, mechanism of action and indications for preventive therapy in order to increase the level of adherence and effectiveness of measures to prevent the development of active TB.

GENERAL CONCLUSIONS

1. Tuberculosis remains the leading cause of death from infectious diseases worldwide, requiring a strengthened international response. Despite progress made through global efforts and WHO strategies, TB morbidity and mortality rates remain high. To achieve the Sustainable Development Goals by 2030, it is necessary to ensure sustainable financing, expand access to effective prevention, early diagnosis and treatment, and adapt national strategies to updated international commitments. One of the key elements of prevention is BCG vaccination, which continues to play an important role in reducing severe forms of tuberculosis among children. An integrated approach combining social, sanitary and medical interventions should become the basis for effective control of the spread of TB in global and national contexts.
2. It is determined that in modern conditions, tuberculosis remains one of the most acute challenges for the global health system, requiring not only medical interventions, but also a holistic intersectoral approach. Despite the partial recovery of diagnostic and treatment indicators after the COVID-19 pandemic, the world community is significantly lagging behind the goals set by WHO and the UN. Effective control of tuberculosis requires a combination of political will, sustainable financing, technological innovations and international partnerships. In the case of Morocco, the controlled epidemiological situation indicates the effectiveness of existing mechanisms, however, given the new challenges, the country needs to continue improving the national TB control program, adapting it to changing conditions - including social, economic and infectious risks.
3. The analysis shows that Morocco demonstrates a high and stable level of BCG vaccination coverage (99%), which is the result of effective public administration, centralized control and the implementation of electronic monitoring systems. In Ukraine, despite the difficult security situation, destroyed infrastructure and migration processes, the coverage rate (88%)

remains relatively high, but requires strengthening of logistical chains, digital tools and countering anti-vaccination sentiment. In both countries, vaccination is mandatory and free of charge, but the effectiveness of implementation depends on the ability of health systems to adapt to the specifics of external challenges.A sociological survey was organized and conducted to assess the level of awareness of the population on TB prevention issues.

4. It was determined that the level of awareness and commitment to TB prevention among the Moroccan population remains heterogeneous. Most respondents understand the importance of regular examinations and BCG vaccination, but more active coverage of the topic of preventive treatment PLT and TB symptoms is needed. The most effective channels for disseminating information are the Internet (social networks) and consultations with health professionals, in particular family doctors and pharmacists. It is advisable to strengthen educational activities, targeted motivational campaigns and expand the availability of free or subsidized examinations in order to increase the level of early detection and prevention of TB.

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APPENDICES

APPENDICES A

QUESTIONNAIRE

Dear Respondent!
This questionnaire was created to determine your awareness and attitude towards the prevention and detection of tuberculosis. We ask you to answer as honestly as possible. The results of the survey will be used exclusively in a generalized form..

1. **Become**
   - ☐ Male
   - ☐ Female
2. **Age**
   - ☐ 18–24 Years
   - ☐ 25–34 Years
   - ☐ 35–44 Years
   - ☐ 45–59 Years
   - ☐ 60 years and older
3. **Residence**
   - ☐ Town
   - ☐ Urban-type settlement / Village
4. **Education level**
   - ☐ Average
   - ☐ Unfinished Higher
   - ☐ Higher (bachelor's, master's)
   - ☐ Other (please specify)_____
5. **How do you assess your financial condition?**
   - ☐ Below average
   - ☐ Medium
   - ☐ Above average
6. **Do you think you are sufficiently informed about TB?**
   - ☐ knowledgeable
   - ☐ In general terms
   - ☐ I know very little
   - ☐ Нічого не знаю
7. **From what sources do you usually get information about tuberculosis and its prevention? (you can choose several)**
   - ☐ Internet (websites, social networks)
   - ☐ TV
   - ☐ Printed publications (newspapers, magazines)

- ☐ Medical professionals (doctors, nurses)
- ☐ Pharmacists (pharmacist assistant) in pharmacies
- ☐ Relatives, acquaintances, colleagues
- ☐ Public, charitable organizations
- ☐ Specialized literature, educational institutions
- ☐ Other (specify)_____

8. **What, in your opinion, are the most common symptoms of tuberculosis? (you can choose several)?**
   - ☐ Cough for more than 2–3 weeks
   - ☐ Hemoptysis
   - ☐ Fever/high temperature
   - ☐ Night sweats
   - ☐ Shortness of breath or difficulty breathing
   - ☐ Decreased appetite
   - ☐ Feeling of extreme fatigue, weakness
   - ☐ Weight loss
   - ☐ Other (specify) _____
9. **Do you know about the existence of preventive examinations for tuberculosis (fluorography, X-ray, tuberculin test, etc.)?**
   - ☐ Yes, I go regularly
   - ☐ I heard, but I don't always get through
   - ☐ No, I have not heard of such examinations
10. **Did you know that tuberculosis can be transmitted through the air when an infected person coughs or sneezes?**

- ☐ Yes
- ☐ No
- ☐ It's hard to say

11. **What is your opinion on BCG vaccination (against tuberculosis) and its necessity?**

- ☐ I believe this is necessary and important for everyone
- ☐ I suppose it's useful, but I have some doubts
- ☐ I don't see the point in this
- ☐ It's hard to answer

12. **Do you think that regular examinations (fluorography or chest X-ray) are important for the timely detection of TB?**

- ☐ Definitely yes

- ☐ Rather so
- ☐ Probably not
- ☐ Definitely not
- ☐ It's hard to say

13. **How often have you had a fluorography examination or lung X-ray in the last 2 years?**

- ☐ Never passed
- ☐ 1 time
- ☐ 2 times
- ☐ More than two times
- ☐ I don't remember

14. **What would motivate you to get tested for TB regularly? (you can choose more than one)**

- ☐ Doctor's recommendation
- ☐ Availability of free or discounted examinations
- ☐ Notification of TB cases among acquaintances
- ☐ Information campaigns (in the media, pharmacies, clinics)
- ☐ Fear of infecting loved ones
- ☐ Nothing will make me / I already get tested regularly
- ☐ Other (specify)_____

15. **What steps do you think should be taken to reduce the risk of contracting TB? (you can choose more than one)**

- ☐ Get a fluorography/X-ray on time
- ☐ Maintain a healthy lifestyle (diet, sleep, quitting smoking, alcohol)
- ☐ Wash your hands thoroughly and follow general hygiene rules
- ☐ Avoid contact with potentially sick people
- ☐ Get vaccinated (BCG)
- ☐ Other (specify) _____

16**. Who do you trust the most in matters related to health and TB prevention? (you can choose more than one)**

- ☐ For pulmonologists, phthisiologists
- ☐ Family doctors

- ☐ Pharmacists (assistant pharmacist)
- ☐ To relatives or friends
- ☐ Bloggers / social networks
- ☐ Public and charitable organizations
- ☐ Other (specify) _____

17. **Do you think that enough information is being done about tuberculosis in Morocco?**

- ☐ Yes, there is enough information
- ☐ Rather yes, but there are some gaps
- ☐ Probably not, there is not enough information
- ☐ Definitely not
- ☐ It's hard to say

18. **Please express your opinion on how to improve public awareness of TB prevention and early detection**?(Open-ended question: write down main thoughts)

Thank you for participating!

Your answers are very important to us

Ф А 2.2.1–32-366

National University of Pharmacy

Faculty pharmaceutical

Department of social pharmacy

Level of higher education master's

Specialty 226 Pharmacy, industrial pharmacy
Educational and professional program Pharmacy

APPROVED
The Head of Department
of Social Pharmacy

_____
Alina VOLKOVA
"11" of September 2024

ASSIGNMENT
FOR QUALIFICATION WORK
OF AN APPLICANT FOR HIGHER EDUCATION

Ahallou OUALID

1. Topic of qualification work: «Study of socio-economic approaches to implementation of tuberculosis prevention measures», supervisor of qualification work: Lyubov TERESHCHENKO, PhD, associated professor, approved by order of NUPh from "27" of September 2024 № 237

2. Deadline for submission of qualification work by the applicant for higher education: May 2025.

3. Outgoing data for qualification work: data from scientific literature, legislation, official data from the Ministry of Health of Morocco, results of population surveys conducted during February-March 2025.

4. Contents of the settlement and explanatory note (list of questions that need to be developed):
to describe the current state of the organization of tuberculosis prevention activities; to assess the state of anti-tuberculosis care for the population in Morocco and Ukraine; to assess the coverage of the child population with BCG vaccination and preventive treatment in Morocco and Ukraine; to develop a questionnaire and conduct a survey to determine the level of awareness of the population on TB prevention issues.

5. List of graphic material (with exact indication of the required drawings):
Tables – 5, schemes – 7.

6. Consultants of chapters of qualification work

Chapters	Name, SURNAME, position of consultant	Signature, date	
		assignment was issued	assignment was received
1	Lyubov TERESHCHENKO, associate professor of higher education institution of department of social pharmacy	11.09.2024	11.09.2024
2	Lyubov TERESHCHENKO, associate professor of higher education institution of department of social pharmacy	21.11.2024	21.11.2024
3	Lyubov TERESHCHENKO, associate professor of higher education institution of department social of pharmacy	24.12.2024	24.12.2024

7. Date of issue of the assignment: «11 » of September 2024

CALENDAR PLAN

№ з/п	Name of stages of qualification work	Deadline for the stages of qualification work	Notes
1	Analysis of data from scientific and periodical literature in accordance with the tasks of the qualification work.	October 2024	**done**
2	Overview of the current state of organizing tuberculosis prevention activities.	October / November 2024 p.	**done**
3	Assessment of the status of tuberculosis care provision to the population in Morocco and Ukraine	November / December 2024	**done**
4	Comprehensive assessment of tuberculosis prevention measures	January / February 2025	**done**
5	Generalization of the obtained data. Qualification of the qualification work. Preparation of the report and multimedia presentation in official protection of a master's thesis	March / April/May 2025	**done**

An applicant of higher education _____ Ahallou OUALID

Supervisor of qualification work _____ Lyubov TERESHCHENKO

ВИТЯГ З НАКАЗУ № 237

По Національному фармацевтичному університету

від 27 вересня 2024 року

Затвердити теми кваліфікаційних робіт здобувачам вищої освіти 5-го курсу Фм20(4,10д) 2024-2025 навчального року, освітньо-професійної програми – Фармація, другого (магістерського) рівня вищої освіти, спеціальності 226 – Фармація, промислова фармація, галузь знань 22 Охорона здоров'я, денна форма здобуття освіти (термін навчання 4 роки 10 місяців), які навчаються за контрактом (мова навчання англійська та українська) згідно з додатком № 1.

Прізвище, ім'я здобувача вищої освіти	Тема кваліфікаційної роботи		Посада, прізвище та ініціали керівника	Рецензент кваліфікаційної роботи
по кафедрі соціальної фармації				
Ахаллу Уалід	Дослідження соціально-економічних підходів до проведення заходів профілактики туберкульозу	Study of socio-economic approaches to implementation of tuberculosis prevention measures	Доцент Терещенко Л.В.	Доцент Бондарєва І.В.

Ректор

Вірно. Секретар

ФА2.8-03-317

ВИСНОВОК

експертної комісії про проведену експертизу
щодо академічного плагіату у кваліфікаційній роботі

здобувача вищої освіти

«05» травня 2025 р. № 331121089

Проаналізувавши кваліфікаційну роботу здобувача вищої освіти Ахаллу Уалід, групи Фм20(4,10)англ-05, спеціальності 226 Фармація, промислова фармація, освітньої програми «Фармація» навчання на тему: «Дослідження соціально-економічних підходів до проведення заходів профілактики туберкульозу / Study of socio-economic approaches to implementation of tuberculosis prevention measures», експертна комісія дійшла висновку, що робота, представлена до Екзаменаційної комісії для захисту, виконана самостійно і не містить елементів академічного плагіату (компіляції).

Голова комісії,
проректор ЗВО з НПР,
професор **Інна ВЛАДИМИРОВА**

Ф А 2.2.1-32-353

REVIEW

of scientific supervisor for the qualification work of the master's level of higher education of the specialty 226 Pharmacy, industrial pharmacy

Ahallou OUALID

on the topic: **«Study of socio-economic approaches to implementing tuberculosis prevention measures»**

Relevance of the topic. Morocco remains a country with high rates of tuberculosis morbidity and mortality, particularly among socially vulnerable populations. This requires rethinking approaches to preventive measures and finding optimal solutions. Effective prevention should combine medical, social and economic measures to identify risk groups and conduct health education, as well as ensure free access to examinations and treatment. According to WHO and EU standards, the fight against tuberculosis involves the implementation of modern preventive programs and social support for patients, which requires the adaptation of Ukrainian practices to international requirements. Thus, research into the socio-economic aspects of tuberculosis prevention will allow not only to optimize existing preventive measures, but also to develop effective recommendations to reduce the incidence rate, especially among vulnerable groups, and contribute to the sustainable development of the healthcare system.

Practical value of conclusions, recommendations and their validity. The results of applied research presented in the paper can be used to formulate practical recommendations for developing effective strategies to increase the level of public awareness of tuberculosis prevention. Increasing public awareness will contribute to the popularization of vaccination and the prevention of new cases of the disease.

Assessment of work. The work was carried out at a high scientific level, using modern tools used in organizational and economic research in pharmacy. The main goal was achieved and the research tasks were solved, the scientifically substantiated results obtained are a completed scientific work. The material is presented

consistently and logically, the conclusions are substantiated. When writing the work, a sufficient number of modern sources of information were processed.

General conclusion and recommendations on admission to defend. The qualification work on the topic «Study of socio-economic approaches to implementing tuberculosis prevention measures» represents research work, meets all necessary requirements and can be recommended for defense at a meeting of the Examination Committee of the NUPh.

Scientific supervisor _____ Lyubov TERESHCHENKO

«08» of May 2025

Ф А 2.2.1-25-356

REVIEW

for qualification work of the master's level of higher education, specialty 226 Pharmacy, industrial pharmacy

Ahallou OUALID

on the topic: «**Study of socio-economic approaches to implementing tuberculosis prevention measures**»

Relevance of the topic. Tuberculosis remains one of the most serious threats to public health both in the world in general and in Morocco in particular. According to the World Health Organization (WHO), this disease continues to be one of the leading causes of morbidity and mortality. Millions of new cases of infection and thousands of deaths are recorded every year, mainly in countries with low levels of socio-economic development. Social determinants of health, in particular income level, access to health services, working conditions and social support, play a crucial role in the spread of tuberculosis. Therefore, effective counteraction to this disease requires a comprehensive, intersectoral approach that takes into account the influence of socio-economic factors. The presented study has important practical and social significance, as it aims to study tuberculosis as a problem that requires integrated solutions at the level of health and social policy.

Theoretical level of work. The research was carried out at a high theoretical level, as evidenced by the diversity of the analysis conducted and the sufficient volume of modern sources of information processed.

Author's suggestions on the research topic. The proposed areas provide an opportunity to develop effective vaccine prevention strategies and increase the level of awareness of the population on tuberculosis prevention issues.

Practical value of conclusions, recommendations and their validity. The presented applied research can become the basis for the development of practical measures aimed at popularizing vaccination and reducing the number of new cases of the disease. Increasing public awareness will contribute to strengthening public

health and reducing the spread of tuberculosis through the active implementation of preventive measures and information campaigns.

Disadvantages of work. There are some spelling errors in the text of the work, but this does not affect the quality of the research performed.

General conclusion and assessment of the work. On structure the specified work conforms to requirements to qualification work in "Pharmacy" and can be presented to protection to EC of NUPh.

Reviewer _____ Irina BONDAREVA

«09» of May 2025

Ф А2.5-32-231

ВИТЯГ
з протоколу засідання кафедри соціальної фармації
№ 21 від «16» травня 2025 року

ПРИСУТНІ: зав. каф. доц. Аліна ВОЛКОВА, проф. Ганна ПАНФІЛОВА, проф. Вікторія НАЗАРКІНА, доц. Галина БОЛДАРЬ, доц. Наталія ГАВРИШ, доц. Тетяна ДЯДЮН, доц. Юлія КОРЖ, асист. Альміра НОЗДРІНА, доц. Вікторія МІЩЕНКО, доц. Ірина ПОПОВА, доц. Олександр СЕВРЮКОВ, доц. Ірина СУРІКОВА, доц. Любов ТЕРЕЩЕНКО, доц. Наталія ТЕТЕРИЧ.

ПОРЯДОК ДЕННИЙ:

Про представлення до захисту в Екзаменаційній комісії кваліфікаційних робіт.

СЛУХАЛИ: завідувачку кафедри доц. Аліну ВОЛКОВУ з рекомендацією представити до захисту в Екзаменаційній комісії кваліфікаційну роботу здобувача вищої освіти спеціальності 226 Фармація, промислова фармація Ахаллу Уалід на тему: «Дослідження соціально-економічних підходів до проведення заходів профілактики туберкульозу».
Науковий керівник к. фарм. н., доцент кафедри СФ Любов ТЕРЕЩЕНКО.
Рецензент к. фарм. н., доцент кафедри ММЗЯФ Ірина БОНДАРЄВА.

УХВАЛИЛИ: Рекомендувати до захисту в Екзаменаційній комісії кваліфікаційну роботу здобувача вищої освіти Ахаллу Уалід на тему: «Дослідження соціально-економічних підходів до проведення заходів профілактики туберкульозу».

Завідувачка каф. СФ, доцент Аліна ВОЛКОВА

Секретар, доцент Наталія ТЕТЕРИЧ

Ф А2.2.1-32-042

НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

ПОДАННЯ
ГОЛОВІ ЕКЗАМЕНАЦІЙНОЇ КОМІСІЇ
ЩОДО ЗАХИСТУ КВАЛІФІКАЦІЙНОЇ РОБОТИ

Направляється здобувач вищої освіти Ахаллу Уалід до захисту кваліфікаційної роботи за галуззю знань 22 Охорона здоров'я
спеціальністю 226 Фармація, промислова фармація
освітньої-професійної програми Фармація
на тему: «Study of socio-economic approaches to implementing tuberculosis prevention measures».

Кваліфікаційна робота і рецензія додаються.

Декан факультету _____ / Микола ГОЛІК /

Висновок керівника кваліфікаційної роботи

Здобувач вищої освіти Ахаллу Уалід під час виконання кваліфікаційної роботи вивчив і проаналізував значний обсяг літератури та нормативно правових актів по темі. Проведений аналіз підтверджує актуальність обраного напряму дослідження та обґрунтовує доцільність його подальшого розвитку.

Таким чином, кваліфікаційна робота може бути рекомендована до офіційного захисту в Екзаменаційній комісії Національного фармацевтичного університету.

Керівник кваліфікаційної роботи _____ Любов ТЕРЕЩЕНКО

«08» травня 2025 р.

Висновок кафедри про кваліфікаційну роботу

Кваліфікаційну роботу розглянуто. Здобувач вищої освіти Ахаллу Уалід допускається до захисту даної кваліфікаційної роботи в Екзаменаційній комісії.

Завідувачка кафедри
соціальної фармації _____ Аліна ВОЛКОВА

«16» травня 2025 р.

Qualification work was defended

of Examination commission on

« » June 2025

With the grade _____

Head of the State Examination commission,

DPharmSc, Professor

_____ / Volodymyr YAKOVENKO/