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QUALIFICATION WORK

on the topic: **«RESEARCH ON APPROACHES OF IMPLEMENTING A TUBERCULOSIS CONTROL PROGRAM IN MOROCCO»**

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ANNOTATION

The qualification work analyzes global and national approaches to tuberculosis control, with a focus on Morocco's strategy. It explores the epidemiological situation, the structure of the national TB program, and the potential role of pharmacists. Key areas for improvement are identified in line with WHO standards.

The qualification work consists of an introduction, 3 chapters, conclusions, a list of used sources and is laid out on 45 pages of printed text. The work is illustrated with 9 figures and 5 tables. The bibliography includes 52 information sources.

Keywords: tuberculosis, WHO strategy, pharmacists, Morocco, prevention, treatment, public health.

АНОТАЦІЯ

Кваліфікаційна робота присвячена аналізу глобального та національного досвіду боротьби з туберкульозом, з акцентом на стратегію Марокко. Досліджено епідеміологічну ситуацію, національну програму контролю ТБ та можливості залучення фармацевтів. Визначено напрями вдосконалення відповідно до стандартів ВООЗ.

Кваліфікаційна робота складається зі вступу, 3 розділів, висновків, списку використаних джерел та розміщена на 45 сторінках друкованого тексту. Робота ілюстрована 9 рисунком та 5 таблицями. Бібліографія містить 42 джерела.

Ключові слова: туберкульоз, стратегія ВООЗ, фармацевти, Марокко, профілактика, лікування, громадське здоров'я

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CONTENT

LIST OF ABBREVIATIONS

CDTMR – Centers for Diagnosis and Treatment of Respiratory Diseases

COVID – Coronavirus Disease

DOT – Directly Observed Treatment

DOTS – Directly Observed Treatment, Short-course

EPTB – Extra-pulmonary Tuberculosis

IPC – Infection Prevention and Control

LMICs – low- and middle-income countries

LTBI – latent tuberculosis infection

MDR-TB – multidrug-resistant TB

NGOs – Non-Governmental Organizations

NCTP – National Tuberculosis Control Program

NSP – National Strategic Plan

PPE – Personal Protective Equipment

PHCF – Primary Health Care Facilities

PLHIV – Person Living with HIV

TB – Tuberculosis

UHC – Universal health coverage

VOT – video-observed therapy

WHO – World Health Organization

WRDs – WHO-recommended rapid diagnostics

INTRODUCTION

Tuberculosis (TB) remains one of the most pressing global public health challenges, affecting millions of individuals each year. In 2022 alone, an estimated 10.6 million people developed TB, while approximately 1.3 million died from the disease, underscoring the urgent need for more effective control strategies. Pharmaceutical care plays a crucial role in TB treatment and management, particularly in the context of rising resistance to conventional therapies.

Understanding the current state of pharmaceutical care for TB patients is essential for identifying treatment gaps and improving therapeutic outcomes. TB therapy often involves complex, prolonged drug regimens that demand careful oversight. Pharmacists, as highly accessible healthcare professionals, are uniquely positioned to promote treatment adherence, manage drug interactions, and monitor adverse effects – ultimately contributing to more effective and safer treatment protocols. Research in this field not only enables the evaluation of current pharmaceutical care practices but also informs improvements that can mitigate drug resistance and enhance health outcomes.

Additionally, investigating pharmaceutical care models can support the development of standardized clinical guidelines and policies, thereby promoting consistency and quality in care delivery. Clear protocols related to medication management, adverse event monitoring, and patient counseling are essential for ensuring evidence-based, patient-centered care.

Alongside pharmaceutical care, early and accurate diagnosis constitutes a cornerstone of effective TB control. Despite the availability of advanced technologies, many regions still lack access to WHO-recommended rapid diagnostic tools. In response to this gap, the World Health Organization (WHO) introduced the Standard for Universal Access to Rapid Tuberculosis Diagnostics in 2023. This framework is intended to facilitate global access to rapid diagnostics, enabling timely detection of TB and drug-resistant strains. Broad implementation of such

tools is critical to initiating appropriate treatment early, limiting transmission, and improving overall outcomes.

Equitable and timely access to both pharmaceutical services and diagnostic technologies is essential to achieving the objectives of the WHO's End TB Strategy. Together, high-quality pharmaceutical care and early, accurate diagnosis form the backbone of TB control efforts. By investing in both research and implementation, health systems can improve patient safety, reduce the burden of drug resistance, and move closer to the elimination of tuberculosis as a public health threat.

The purpose of the study is to analyze to investigate the current approaches to implementing tuberculosis control programs in Morocco, evaluate their alignment with global standards, and explore the potential expansion of pharmacists' roles in TB prevention, diagnosis, and treatment

Research objectives:

- to analyze the global public health burden of tuberculosis and the evolution of TB control strategies;
- to examine international experiences and WHO guidelines on the implementation of TB control programs;
- to generalize key components and stakeholders of effective TB control and elimination programs;
- to assess Morocco's current epidemiological situation regarding tuberculosis;
- to evaluate the structure and effectiveness of the National Tuberculosis Control Program (NCTP) in Morocco;
- to compare Morocco's national TB strategy with the WHO's End TB Strategy and best global practices;
- to explore opportunities for strengthening the role of pharmacists in TB control efforts and develop recommendations.

The object of the research became literary sources on the development of tuberculosis treatment and prevention, the regulatory and legal framework, WHO policies and guidelines, national TB control and elimination program statistical data.

The subject of the study is the organization, implementation, and evaluation of tuberculosis control strategies in Morocco, in the context of global TB control frameworks.

Research methods. The study applies a combination of analytical, comparative, and systemic methods; content analysis of strategic documents and statistical data; graphic visualization; and abstract modeling and generalization techniques.

The scientific novelty and practical significance of this research lie in its comprehensive evaluation of Morocco's tuberculosis control program within the context of international standards, particularly the WHO's End TB Strategy. The study systematically identifies the strengths and gaps in Morocco's current approach, including epidemiological trends, strategic planning, and multisectoral coordination. A distinctive contribution of this work is the exploration of pharmacists' underutilized potential in TB control – an aspect that has received limited attention in national policy discussions. The findings provide evidence-based recommendations for enhancing the effectiveness of Morocco's TB response and offer practical insights for integrating pharmacists into national TB strategies, thereby contributing to more equitable, decentralized, and patient-centered care.

The study results were approved at the XXXI International scientific and practical conference of young scientists and students "TOPICAL ISSUES OF THE NEW MEDICINES DEVELOPMENT" held on April 23-25, 2025.

Structure and scope of qualification work. The qualification work consists of the introduction, three chapters, conclusions to each chapter, a general conclusion, and list of used sources. The results of the study are presented on 45 pages of text, the number of figures – 9, the number of tables – 5, and the list of references – 52 titles.

CHAPTER I.
A STUDY OF THE LITERATURE ON THE SOCIAL BURDEN OF TUBERCULOSIS

1.1 Tuberculosis as a global public health challenge

Tuberculosis (TB) is a communicable disease caused by the bacterium Mycobacterium tuberculosis. While it primarily affects the lungs (pulmonary TB), it can also impact other parts of the body (extrapulmonary TB), including the lymphatic system, bones, kidneys, and the central nervous system. Despite being curable and preventable, TB remains one of the deadliest infectious diseases worldwide. According to the World Health Organization (WHO), in 2022 alone, an estimated 10.6 million individuals developed TB, and approximately 1.3 million died from the disease, making it the second leading cause of death from an infectious agent after COVID-19 [14].

The global distribution of TB is highly uneven, with the majority of cases occurring in low- and middle-income countries (LMICs), where health systems are often under-resourced and social determinants of health, such as poverty, malnutrition, and overcrowding, create conditions conducive to transmission. High-burden countries include India, Indonesia, China, the Philippines, Nigeria, and Pakistan, while Sub-Saharan Africa remains heavily affected due to the co-epidemic of TB and HIV [14, 43]. The immunosuppressive effect of HIV significantly increases susceptibility to TB and complicates diagnosis and treatment.

Transmission occurs through airborne particles expelled when an infected person coughs, sneezes, speaks, or sings. These microscopic droplets, once inhaled, allow the bacilli to enter the alveoli in the lungs, where they may initiate infection. The progression of TB typically follows three stages: primary infection, latent TB infection (LTBI), and active TB disease. Most immunocompetent individuals contain the infection at the latent stage, but around 5–10% will go on to develop

active disease during their lifetime, especially if immunocompromised due to conditions such as HIV, diabetes, or malnutrition [2, 43].

TB can be pulmonary or extrapulmonary. Pulmonary TB is more common and is the main driver of transmission, while extrapulmonary TB (EPTB) affects organs outside the lungs, including the pleura, lymph nodes, abdomen, bones, and meninges. EPTB is particularly prevalent among immunocompromised patients, especially those with HIV. TB meningitis and spinal TB (Pott's disease) are among the most severe forms, often resulting in disability or death if not promptly treated [22].

Children represent a vulnerable population with distinct clinical and diagnostic challenges. Pediatric TB often presents with nonspecific symptoms such as low-grade fever, weight loss, irritability, and developmental delays. Infants are particularly susceptible to severe manifestations, including TB meningitis and miliary TB. Diagnosis is difficult due to the paucibacillary nature of childhood TB and the difficulty in obtaining sputum samples. As a result, many pediatric cases go undiagnosed or are diagnosed late, leading to poor outcomes [2, 27].

The social burden of TB extends well beyond clinical morbidity and mortality. TB disproportionately affects people in their most productive years, disrupting education, employment, and household stability. The economic impact on households can be catastrophic, especially in settings where social protection is weak or absent. Many patients lose their jobs or experience reduced income due to prolonged illness, frequent clinic visits, and stigma. Women and children are especially vulnerable to secondary consequences, including exclusion from education, domestic instability, and long-term poverty [43].

Stigma remains a pervasive challenge, contributing to diagnostic delay, treatment interruption, and social isolation. In many settings, individuals with TB – especially women – face discrimination, marital breakdown, and exclusion from community life. Public health interventions must therefore address not only medical treatment but also stigma reduction and social support [6, 14].

Diagnosis of TB has evolved considerably in recent decades. While sputum smear microscopy has been the cornerstone of TB diagnosis for over a century, it

has limited sensitivity, particularly in HIV-positive patients and in cases of EPTB. Modern molecular diagnostics such as GeneXpert MTB/RIF and Truenat offer rapid and accurate detection of TB and rifampicin resistance within hours [22]. WHO recommends these tests as the first-line diagnostic tool. However, access to these technologies remains limited in many resource-constrained settings [1].

Treatment of drug-susceptible TB requires a six-month regimen comprising isoniazid, rifampicin, pyrazinamide, and ethambutol. While the regimen is highly effective, its length and the risk of side effects can hinder adherence. Inadequate adherence can lead to treatment failure and the development of drug-resistant TB, which requires longer, more toxic, and more expensive treatments. New drugs such as bedaquiline, delamanid, and pretomanid offer hope for shorter and safer regimens for multidrug-resistant TB (MDR-TB), though their availability remains limited in many high-burden countries [13, 14].

To address adherence challenges, various strategies have been implemented, including directly observed therapy (DOT), community-based DOT, video-observed therapy (VOT), digital adherence monitoring, and family-supported models. Evidence suggests that patient-centered approaches, coupled with social and psychological support, improve adherence and treatment outcomes [31, 29].

Beyond medical interventions, TB control depends heavily on addressing the structural and social determinants of health. Poverty, malnutrition, inadequate housing, weak health infrastructure, and limited access to education all play roles in TB transmission and outcomes. WHO's End TB Strategy calls for eliminating catastrophic costs to TB-affected households and prioritizing universal health coverage, social protection, and integrated service delivery [14].

Despite decades of progress, TB remains a global health emergency. The persistence of high incidence and mortality rates – particularly in LMICs – underscores the need for sustained political commitment, investment in innovation, and inclusive, community-driven approaches. TB is not merely a biomedical issue but a profound development, equity, and human rights challenge that demands comprehensive and compassionate public health action [14, 43].

1.2 History and evolution of tuberculosis control strategies

Tuberculosis has afflicted humanity for millennia. Archaeological evidence of spinal TB, also known as Pott's disease, has been found in Egyptian mummies dating back to 3000–2400 BCE, reflecting the ancient presence of this disease [14]. Historically referred to as "consumption," TB was often misunderstood, associated with hereditary predisposition or moral weakness, and surrounded by stigma. Until the late 19th century, strategies for TB management were largely empirical, focusing on long-term isolation in sanatoria, where patients were treated with rest, clean air, sunlight, and nutrition.

The scientific revolution in TB control began in 1882 when Robert Koch identified Mycobacterium tuberculosis as the causative agent of the disease. This discovery laid the foundation for bacteriological diagnosis, public health surveillance, and eventually pharmacological treatment [17]. With this breakthrough, the focus of TB control shifted from environmental and symptomatic management to pathogen-targeted intervention.

The 20th century brought remarkable progress in TB therapy. The discovery of streptomycin in 1944 marked the beginning of effective antimicrobial treatment. This was followed by the development of isoniazid (1952), pyrazinamide (1954), ethambutol (1961), and rifampicin (1963) [17]. These drugs formed the basis of combination therapy, which was essential for preventing resistance and ensuring long-term cure. By the 1970s, short-course chemotherapy regimens lasting six months became the global standard, dramatically improving cure rates and reducing relapse.

Despite early success, the global TB burden resurged in the 1980s and 1990s. Contributing factors included the emergence of the HIV/AIDS epidemic, which significantly increased TB susceptibility and complicates treatment; the collapse of health systems in several low-income countries; and increased urbanization and poverty [14, 20]. Recognizing the deteriorating situation, WHO declared TB a global public health emergency in 1993 [14].

In 1995, the Directly Observed Treatment, Short-course (DOTS) strategy was launched. It emphasized five core elements: political commitment, bacteriological diagnosis through sputum microscopy, standardized short-course chemotherapy under direct observation, uninterrupted drug supply, and robust monitoring and evaluation [18]. DOTS was instrumental in scaling up TB care in many resource-limited countries and in re-establishing control over rising incidence.

As TB control evolved, new challenges emerged. These included the growing incidence of MDR-TB and extensively drug-resistant TB, co-infection with HIV, and the need to address pediatric TB. In response, WHO introduced the Stop TB Strategy in 2006, which built on DOTS and introduced additional components: TB/HIV integration, health system strengthening, research promotion, and the empowerment of affected communities [18, 14].

Between 2011 and 2015, the Global Plan to Stop TB aimed to expand access to diagnostics and treatment, reduce mortality and incidence, and address gaps in case detection, particularly among marginalized groups. This period marked increased investment in new tools, including molecular diagnostics, mobile outreach units, and digital health platforms [13].

A transformative moment came in 2014 with the launch of WHO's End TB Strategy. With a vision to eliminate TB as a global public health threat by 2035, the strategy set bold targets: a 90% reduction in TB deaths and an 80% reduction in incidence by 2030 (compared to 2015 levels), and the elimination of catastrophic health expenditures due to TB [36]. The strategy is structured around three key pillars:

1. Integrated, patient-centered care and prevention, including early diagnosis, universal drug-susceptibility testing, and preventive therapy for at-risk populations;

2. Bold policies and supportive systems, promoting universal health coverage, social protection, and intersectoral accountability;

3. Intensified research and innovation, aimed at accelerating the development and adoption of new diagnostics, treatment regimens, and vaccines [36].

Despite progress, the COVID-19 pandemic severely disrupted TB services worldwide. In 2020 and 2021, TB case notifications declined dramatically, and mortality increased for the first time in over a decade. Lockdowns, health system reallocation, and fear of infection prevented many people from seeking care [5, 14]. The pandemic exposed the fragility of TB control infrastructure and underscored the need for resilient, integrated systems capable of managing multiple public health threats simultaneously.

Recent years have witnessed important advancements. Novel all-oral regimens for drug-resistant TB – using drugs such as bedaquiline, delamanid, and pretomanid – have been introduced, reducing treatment duration and toxicity [13]. Digital adherence tools such as VOT, SMS reminders, and mobile applications have improved monitoring while respecting patient privacy and autonomy [31]. Community-based delivery models, including involvement of pharmacists and civil society, have proven effective in expanding access to care [29, 30].

In parallel, there is ongoing investment in vaccine development. The current Bacillus Calmette–Guérin (BCG) vaccine offers limited protection, particularly against pulmonary TB in adults. Several new vaccine candidates are now in clinical trials, offering hope for improved prevention strategies in the near future [14].

The evolution of TB control strategies illustrates a shift from vertical, biomedical approaches to holistic, multisectoral, patient-centered interventions. The increasing focus on human rights, equity, and community empowerment marks an important departure from earlier models that prioritized containment over care.

Nevertheless, challenges remain: underdiagnosis, treatment gaps, funding shortfalls, and drug resistance threaten progress. Global efforts must now focus on scaling up effective interventions, ensuring equitable access, integrating TB services into primary care, and maintaining high-level political commitment. Only through coordinated, well-resourced, and inclusive strategies can the vision of a TB-free world be realized.

Conclusions to Chapter I

1. Tuberculosis remains a major global health threat, particularly in low- and middle-income countries, where it is sustained by poverty, overcrowding, and weak healthcare infrastructure. The disease affects both pulmonary and extrapulmonary systems and disproportionately impacts vulnerable groups such as children, people living with HIV, and those with chronic conditions like diabetes.

2. While the discovery of Mycobacterium tuberculosis and the development of combination drug therapies have marked milestones in TB control, the emergence of multidrug-resistant TB and co-infections with HIV have significantly complicated treatment efforts. Historical strategies such as DOTS provided the foundation for standardized care, but evolving challenges required broader, more integrated approaches.

3. The WHO's End TB Strategy represents a paradigm shift toward patient-centered, equity-based, and multisectoral interventions. However, global progress has been uneven, and recent setbacks caused by the COVID-19 pandemic underscore the need for resilient health systems and renewed political commitment. Future efforts must focus on timely diagnosis, effective treatment, social protection, and community-based care to achieve global elimination targets.

CHAPTER II.
STUDY OF INTERNATIONAL EXPERIENCE IN THE IMPLEMENTATION OF TUBERCULOSIS CONTROL PROGRAMS

2.1 Overview of WHO guidelines and global initiatives on TB control

Tuberculosis remains one of the leading causes of death from infectious diseases globally, necessitating robust and coordinated international efforts. The WHO has taken a central role in developing strategic guidance and supporting national TB programs to enhance diagnosis, treatment, surveillance, and cross-sector collaboration.

To modernize TB diagnostic practices, WHO promotes the use of WHO-recommended rapid diagnostics (WRDs), such as GeneXpert MTB/RIF and Truenat. These tools allow for rapid and accurate TB detection, including drug resistance, thereby enabling early treatment and improved patient outcomes. WHO emphasizes the integration of WRDs into national diagnostic algorithms and the establishment of robust quality assurance systems, while addressing logistical challenges such as infrastructure, training, and procurement [1, 14, 22].

The study involved a desk review of key WHO documents including “Benchmarks for Universal Access to Rapid Tuberculosis Diagnostics” (2023), the WHO Shiny benchmarking tool, and selected national reports. The review focused on the conceptual structure of the diagnostic cascade, the role of benchmarks in improving equity and access, and the policy recommendations for implementation.

To guide this process, WHO developed a standard that organizes the diagnostic journey into four sequential steps along the patient care pathway. These steps help identify where delays or drop-offs in the diagnostic cascade occur. Each step is associated with specific actions and benchmarks for countries to evaluate and improve their diagnostic performance. Table 2.1 presents a summary of the four core steps and key focus areas within the WHO standard for universal access to rapid TB diagnostics.

Table 2.1

Key Steps and Focus Areas in the WHO Standard for Universal Access to Rapid TB Diagnostics

Step	Description	Key Focus Areas
Step 1: Identifying presumptive TB	Active and passive case finding to recognize individuals with TB symptoms.	Symptom screening at health facilities; active case finding among high-risk groups.
Step 2: Accessing testing	Ensuring individuals can access WHO-recommended rapid diagnostics without delay.	Availability of WRDs at primary care and specialized services; reliable specimen referral systems.
Step 3: Being tested	Performing WRD testing promptly on identified presumptive TB cases.	High testing coverage; minimized time between presentation and sample collection.
Step 4: Receiving a diagnosis	Providing diagnostic results quickly and initiating linkage to care.	Fast turnaround of test results; prompt communication to patients.

These four steps are operationalized through 12 specific performance benchmarks. The WHO standard encourages countries to apply patient pathway analysis, facility surveys, and diagnostic network mapping to monitor progress and identify system bottlenecks. In addition, the standard outlines policy enablers and practical interventions – including training, task-shifting, and community engagement – to improve WRD implementation across different levels of the health system.

Initial global assessments show that while many countries have increased WRD availability at national or referral centers, equitable access at primary care and rural levels remains limited. In Morocco, notable progress has been achieved in urban TB diagnostic centers, with the deployment of GeneXpert systems and integration into national protocols. However, full compliance with WHO benchmarks – especially regarding timely access in remote regions – requires further scale-up and systemic reinforcement [24, 25].

To support laboratory capacity, WHO's Global Laboratory Initiative provides technical guidelines for biosafety, equipment maintenance, sample handling, and

digital connectivity. Countries with infrastructure gaps (e.g., power supply or network limitations) are encouraged to adopt innovations such as solar-powered equipment, mobile testing units, and digital data entry tools [1, 14]. Video-based training and subsidies for lab technicians have also improved performance in resource-limited settings.

Beyond diagnostics, WHO supports countries in building data platforms and real-time surveillance dashboards to improve transparency, policy responsiveness, and programmatic monitoring. These systems enable national TB programs to track test coverage, turnaround times, and treatment linkage while enabling global comparisons through standardized indicators [14].

WHO also highlights the importance of sustainable financing. Its investment case emphasizes the economic return of scaling up WRDs – not only in health gains but in broader economic productivity and health system efficiency. Price reductions through global procurement partnerships, such as the Global Drug Facility, have made WRDs more affordable in public and private sectors [14].

Multisectoral collaboration remains a cornerstone of WHO's TB response strategy. The organization convenes global and regional forums such as the EndTB Forum, supports technical working groups, and facilitates partnerships between ministries of health, non-governmental organizations (NGOs), academia, civil society, and the private sector [13, 18]. These efforts reinforce shared accountability and promote innovative, context-sensitive solutions.

Furthermore, the use of cloud-based laboratory information systems and digital messaging platforms has enhanced communication between public and private facilities, enabling faster notification of test results, improved case management, and stronger patient follow-up – particularly among high-risk and mobile populations.

In addition to technical benchmarks, WHO has demonstrated strong normative leadership through a wide range of strategic, operational, and policy-oriented publications. These documents collectively form the foundation for national and global TB control efforts.

Overall, it can be concluded that WHO has made substantial and sustained contributions to the global TB response, which are systematically presented in the following key documents:

1. WHO Global Tuberculosis Report 2023 – annual epidemiological and programmatic review [14];
2. WHO Standard for Universal Access to Rapid TB Diagnostics (2023) – conceptual and operational guidance for diagnostic scale-up [1];
3. Shiny Benchmarking Tool – interactive digital platform for tracking national diagnostic coverage [41];
4. Global Strategy for TB Research and Innovation – priority setting for research and development [13];
5. Multisectoral Accountability Framework to End TB – mechanisms to engage non-health sectors [20];
6. The End TB Strategy (2014–2035) – core WHO strategy outlining goals, pillars, and targets [36];
7. Global Plan to End TB 2023–2030 – advocacy and investment roadmap [14];
8. Implementing the WHO Stop TB Strategy – operational manual for national TB programs [18];
9. Ethics Guidance for the End TB Strategy – ethical considerations in TB care and policy [10].

Together, these documents not only define the global vision to end TB but also provide concrete tools and standards that support country-level implementation in both high- and low-incidence contexts.

In conclusion, WHO provides a comprehensive global framework for TB control that spans diagnostics, laboratory systems, data infrastructure, financing, and stakeholder engagement. Its benchmarks, tools, and strategic guidance aim to support countries in expanding access to rapid TB diagnostics and achieving equity across all levels of care. While Morocco has made important strides in aligning with WHO recommendations, further efforts are needed to fully meet the diagnostic benchmarks and extend WRD coverage to underserved populations.

2.2 Summary of key components and principles of effective TB control programs

Tuberculosis remains a major public health concern worldwide, particularly in low- and middle-income countries. The complexity of TB control is amplified by the emergence of MDR-TB and extensively drug-resistant strains, requiring comprehensive, multisectoral, and evidence-based responses. In line with the End TB Strategy, the WHO emphasizes early case detection, patient-centered care, integration with other health services, and coordinated governance mechanisms.

Effective TB control programs are based on a set of interrelated components that together create a resilient and responsive health system. These components address the entire continuum of care – from surveillance and diagnosis to treatment adherence, community engagement, and human rights protection.

The foundations of a successful TB control program include political commitment, strategic governance, and multisectoral collaboration. Strong leadership ensures effective coordination between national TB programs, ministries, regional authorities, NGOs, civil society, and donors. Surveillance systems based on timely and accurate data are essential for identifying trends, detecting outbreaks, and evaluating interventions. Integrated data platforms, such as electronic TB registers, enhance transparency and inform programmatic adjustments.

Early detection is central to interrupting transmission. National programs are encouraged to adopt active case-finding strategies and scale up access to rapid molecular diagnostics. Prompt diagnosis not only improves individual outcomes but also prevents further community spread. Following diagnosis, uninterrupted treatment and adherence support are critical to achieving high cure rates. Strategies such as Directly Observed Treatment, digital adherence technologies, and psychosocial counseling can significantly enhance patient engagement.

Equally important is the application of infection prevention and control (IPC) measures in health facilities. These include adequate ventilation, administrative protocols, and the use of personal protective equipment (PPE) to protect healthcare

workers and patients. Efficient procurement and distribution systems must guarantee continuous access to quality-assured first- and second-line drugs, particularly in resource-constrained settings.

Community engagement represents another essential pillar of effective TB control. Partnerships with local organizations, community health workers, and former TB patients help promote awareness, reduce stigma, and improve treatment adherence. Innovative approaches, including peer education, mobile outreach, and incentive-based adherence models, have demonstrated impact in various contexts.

Research, digital technologies, and innovation are integral to program success. New TB drugs, shorter regimens, mobile health applications, and artificial intelligence tools for chest X-ray interpretation are increasingly transforming service delivery. Operational research at the local level also helps tailor interventions to specific populations or geographies.

Finally, effective TB programs must be grounded in human rights, gender equity, and social justice. Vulnerable populations – such as migrants, prisoners, people living with HIV, and the urban poor – require targeted approaches that address social determinants of health and ensure access to diagnosis and care without discrimination.

To illustrate how these components are operationalized in different national contexts, Table 2.2 summarizes the essential elements of effective TB control programs and presents selected international examples of best practices.

These examples demonstrate that while the principles of effective TB control are consistent across settings, successful implementation depends on the adaptability of interventions to local epidemiological, social, and institutional contexts. Countries that align national programs with WHO's strategic pillars – while embracing innovation and community-driven approaches – tend to achieve better outcomes and more resilient TB systems.

Table 2.2

Generalization component of an effective TB control program with examples

Component	Description	Practice Example
1	2	3
1. Policy and Governance	National TB programs should be guided by strong political commitment, legal frameworks, and multi-level coordination with stakeholders.	Ukraine (2021–2023): Adopted a multisectoral accountability framework within its "National TB Strategy 2021–2023." The strategy prioritizes decentralization of TB services, integrates human rights principles, and includes performance indicators monitored by the Public Health Center of the Ministry of Health.
2. Surveillance and Monitoring	Continuous collection, analysis, and use of epidemiological data to guide programmatic decisions and monitor progress.	Estonia: Developed the e-TB Manager, a web-based application integrated with the national health system. It allows healthcare workers to register TB cases, monitor treatment adherence, and generate automated reports. The system is also used for contact tracing and supports drug-resistant TB surveillance.
3. Early Detection and Diagnosis	Integration of molecular diagnostic tools and active case finding strategies to ensure timely identification of TB cases.	South Africa: Deployed over 300 GeneXpert machines nationwide through the National Health Laboratory Service, ensuring that >90% of TB suspects are tested with molecular diagnostics. Mobile vans equipped with X-ray and GeneXpert machines reach rural areas. This led to reduced diagnostic delay and increased detection of rifampicin-resistant TB.
4. Treatment and Patient Support	Provision of standardized treatment regimens, adherence support (e.g., DOT), psychosocial assistance, and management of comorbidities.	India: Through the NIKSHAY Poshan Yojana, TB patients receive monthly direct benefit transfers (~500 INR/month) during treatment. The NIKSHAY platform tracks patient registration, treatment milestones, and adverse drug events, and sends SMS reminders to support adherence.

Continuation Table 2.2

1	2	3
5. Infection Prevention and Control	Implementation of IPC protocols in health facilities, including ventilation, use of PPE, and administrative controls.	Georgia: Integrated TB IPC into national hospital accreditation standards. All TB-designated hospitals must meet ventilation requirements and train staff in IPC protocols. The country also piloted ultraviolet germicidal irradiation systems in TB wards, leading to reduced hospital-based transmission.
6. Drug Supply and Management	Reliable procurement and distribution systems to prevent stock-outs and ensure access to quality-assured TB medicines.	Philippines: Implemented QuanTB, a forecasting tool developed by USAID and MSH. The tool is used by the National TB Program to avoid stock-outs and overstocking of TB medications, including for MDR-TB. It enables quarterly monitoring and real-time adjustment of procurement plans.
7. Community Engagement and Partnerships	Inclusion of civil society, community health workers, and patients in advocacy, awareness, and service delivery.	Cambodia: The Community DOT program, coordinated by local NGOs and village health volunteers, ensures that TB patients receive daily treatment support at home. TB survivors act as peer educators. This approach increased treatment success rates above 90% in rural areas.
8. Research, Innovation, and Digital Tools	Use of digital adherence technologies, operational research, and pilot programs to enhance service delivery and policy.	United Kingdom: Launched VOT pilots using smartphones and encrypted platforms (e.g., myDOT). VOT reduced patient travel time, maintained adherence rates above 85%, and saved health system costs. NHS England has since integrated VOT into routine care for selected patients.
9. Human Rights, Gender, and Equity	Addressing stigma, ensuring equitable access to care for vulnerable populations, and adopting gender-sensitive approaches.	Brazil: The TB program actively integrates TB and HIV services, prioritizing access for people living in favelas, migrants, and transgender individuals. The Family Health Strategy ensures household visits, and legal frameworks guarantee access to care regardless of socioeconomic or legal status.

2.3 Study on Key stakeholders in the implementation of TB control programs

The effective implementation of TB control programs relies on the coordinated efforts of a diverse array of stakeholders operating at global, national, and community levels. These actors vary in their roles, authority, resources, and proximity to affected populations. Understanding their contributions and interactions is essential to building coherent, patient-centered, and sustainable TB responses. It also enables more effective policy design, funding allocation, and accountability [45].

Governmental bodies and public health authorities form the core of TB control programs. Ministries of health, national TB programs, and regional health departments lead the development of strategies, allocate resources, set legal and policy frameworks, and coordinate implementation. They also ensure compliance with national and international standards and monitor performance indicators.

International organizations and global donors, including WHO, the Global Fund, USAID, and UNDP, provide technical guidance, financial assistance, and global policy alignment. These actors play a critical role in supporting countries to scale up TB services, introduce innovation, and build resilient health systems. Their involvement often includes strategic planning, procurement support, and independent evaluations.

Non-governmental organizations (NGOs) and civil society contribute to community mobilization, health education, and service delivery. Their close engagement with local populations allows for culturally appropriate interventions and helps reduce stigma and discrimination. NGOs often serve as trusted intermediaries between patients and formal health systems, especially in underserved or conflict-affected areas.

Academic and research institutions generate critical evidence through operational research, clinical trials, and epidemiological studies. They contribute to evaluating the impact of interventions, optimizing service delivery models, and

building the capacity of healthcare professionals. Their role is also essential in translating innovations into practice.

Private healthcare providers and pharmacies are often the first point of contact for patients with TB symptoms. Their integration into TB programs – through training, surveillance reporting, and referral networks – is vital to achieving early diagnosis and adherence to standard treatment regimens. Moreover, their involvement in pharmacovigilance ensures quality and safety in TB medication use.

Community health workers and patient support groups represent the frontline in TB care delivery. They facilitate contact tracing, monitor treatment adherence, and provide psychosocial support. Community health workers are often recruited from local communities and play a key role in increasing trust and access, particularly for marginalized or mobile populations.

The media and public communication channels influence public perceptions of TB. Their capacity to raise awareness, counter stigma, and disseminate accurate information makes them a vital ally in national TB campaigns. Social media, in particular, has been used to promote testing, share patient stories, and provide treatment reminders.

Legal institutions and the judiciary safeguard the rights of TB-affected populations. Their roles include enforcing anti-discrimination laws, ensuring access to care regardless of status, and supporting the implementation of public health measures within ethical and legal frameworks.

To provide a structured overview of these diverse actors, Table 2.3 summarizes the main stakeholder categories, their primary functions in TB control, representative examples, and general level of influence.

Successful TB control depends on the effective collaboration of all these stakeholders within a coordinated governance framework. Countries that establish multi-stakeholder coordination platforms – such as national TB councils or intersectoral committees – tend to exhibit greater policy coherence, stronger accountability, and more sustainable results.

Table 2.3

Generalization Key Stakeholders in TB Control Programs: Roles, Examples, and Influence

Type of Stakeholder	Primary Roles in TB Control	Examples	Level of Influence
Government and Public Health Authorities	Policy development, funding allocation, program coordination, regulatory oversight	Ministries of Health, National TB Programs, Regional Health Departments	High
International Organizations and Donors	Technical guidance, funding support, global policy alignment, monitoring and evaluation	WHO, Global Fund, USAID, UNDP	High
NGOs and Civil Society	Community outreach, treatment support, advocacy, education, stigma reduction	Médecins Sans Frontières (MSF), PATH, national TB NGOs	Medium to High
Academic and Research Institutions	Operational research, clinical trials, policy evaluation, capacity building	London School of Hygiene & Tropical Medicine, Desmond Tutu Health Foundation	Medium
Private Sector and Pharmacies	Case detection, treatment delivery, patient referral, pharmacovigilance	Private clinics, general practitioners, retail pharmacies	Medium
Community Health Workers and Patient Groups	Direct patient support, adherence monitoring, awareness, rights advocacy	Community DOT providers, TB survivor networks (e.g., TB Proof)	Medium
Media and Public Communication Channels	Public awareness, destigmatization, health promotion campaigns	National broadcasters, social media platforms, health influencers	Low to Medium
Judiciary and Legal Institutions	Protection of patient rights, enforcement of non-discrimination laws, public health legislation	Health ombudsman, constitutional courts, legal aid groups	Variable (context-dependent)

Therefore, strategic stakeholder mapping and engagement must be integral components of TB program planning and evaluation. By aligning the contributions of each actor, health systems can leverage their respective strengths to ensure universal access to timely, equitable, and high-quality TB care.

Based on the reviewed practices and strategic frameworks, it was generalized that sustainable TB control requires a combination of strong leadership, multisectoral collaboration, equitable access to services, and continuous innovation. These insights form the foundation for evaluating Morocco's national TB response.

Conclusions to Chapter II

1. As a result of the analysis, it was determined that the World Health Organization plays a leading role in coordinating the global TB response by providing countries with evidence-based diagnostic standards, performance benchmarks, and technical support mechanisms. Particular attention was given to the WHO's 2023 standard for universal access to rapid TB diagnostics, which defines a structured four-step diagnostic cascade supported by 12 performance indicators.

2. Key components of effective TB control programs were summarized and categorized, including political governance, surveillance, early detection, treatment support, IPC, drug management, digital innovation, and human rights. It was found that countries demonstrating success in TB control typically integrate these components through national strategies that are both evidence-based and locally adapted.

3. Additionally, the roles of different stakeholder groups were identified and systematized, including government agencies, international organizations, NGOs, private providers, academic institutions, community actors, media, and the judiciary. The analysis confirmed that cross-sectoral coordination and stakeholder engagement significantly improve policy coherence, service delivery, and accountability.

CHAPTER III
STUDY OF APPROACHES TO IMPLEMENTING A TUBERCULOSIS CONTROL PROGRAM IN MOROCCO

3.1 Current epidemiological situation of tuberculosis in Morocco

Morocco is classified as a country with a moderate tuberculosis incidence. In 2021, an estimated 35,000 TB cases were reported, corresponding to an incidence rate of approximately 94 per 100,000 population. The burden of TB-HIV co-infection remains relatively low, with 410 registered cases, or 1.1 per 100,000 [25]. Since 2000, the TB incidence rate has shown a gradual decline – from 115 per 100,000 in 2000 to 92 in 2023 – with an average annual reduction of only 1% between 2015 and 2021. This pace of decline is insufficient for Morocco to meet the End TB Strategy 2030 targets or the Sustainable Development Goals (SDGs), as illustrated in Fig. 3.1.

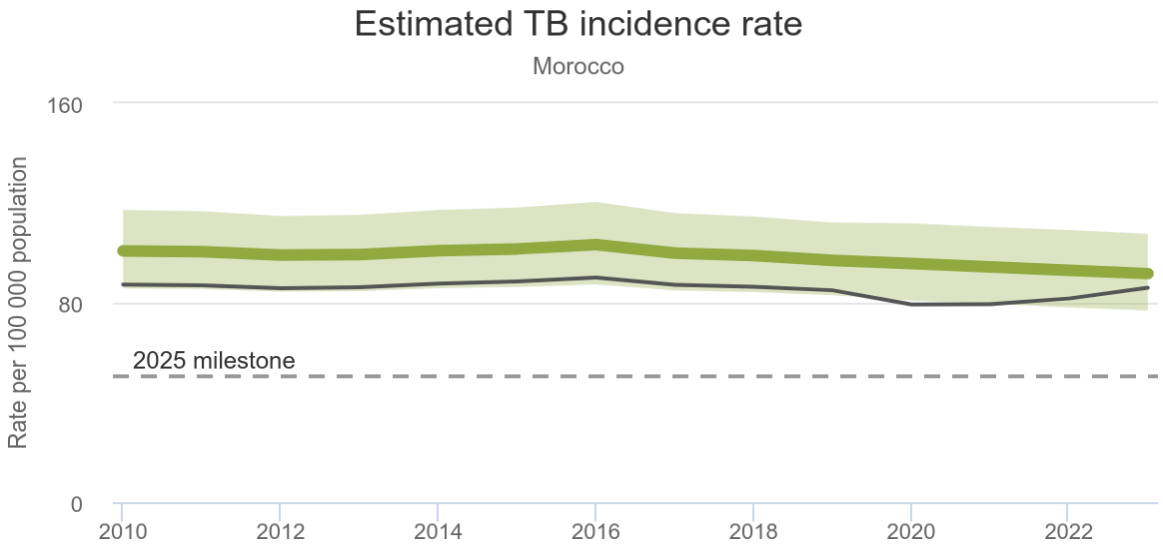


Fig. 3.1. WHO estimate of TB incidence rate and notification rate of new cases and relapses, Morocco, 2010–2023 [25]

Comparatively, the global TB incidence was higher, peaking at over 200 per 100,000 population in 2010 and declining to 133 by 2023. While the global trend showed a sharper reduction until 2019, the COVID-19 pandemic caused a noticeable reversal, interrupting TB services and case detection (Fig. 3.2).

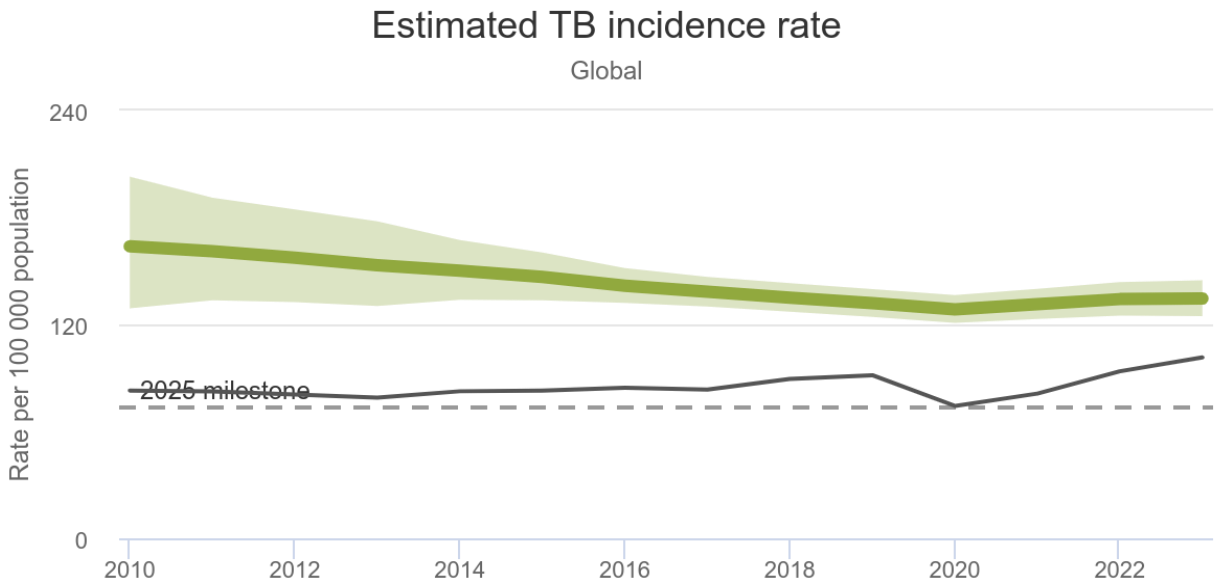


Fig. 3.2. WHO estimate of global TB incidence rate and notification rate of new cases and relapses, 2010–2023

Demographic analysis shows that TB continues to affect men more than women in Morocco. In 2021, the most affected group was individuals aged 25–34. A significant proportion of unreported or undetected cases was concentrated among younger populations. The age-sex distribution is shown in Fig. 3.3 [25].

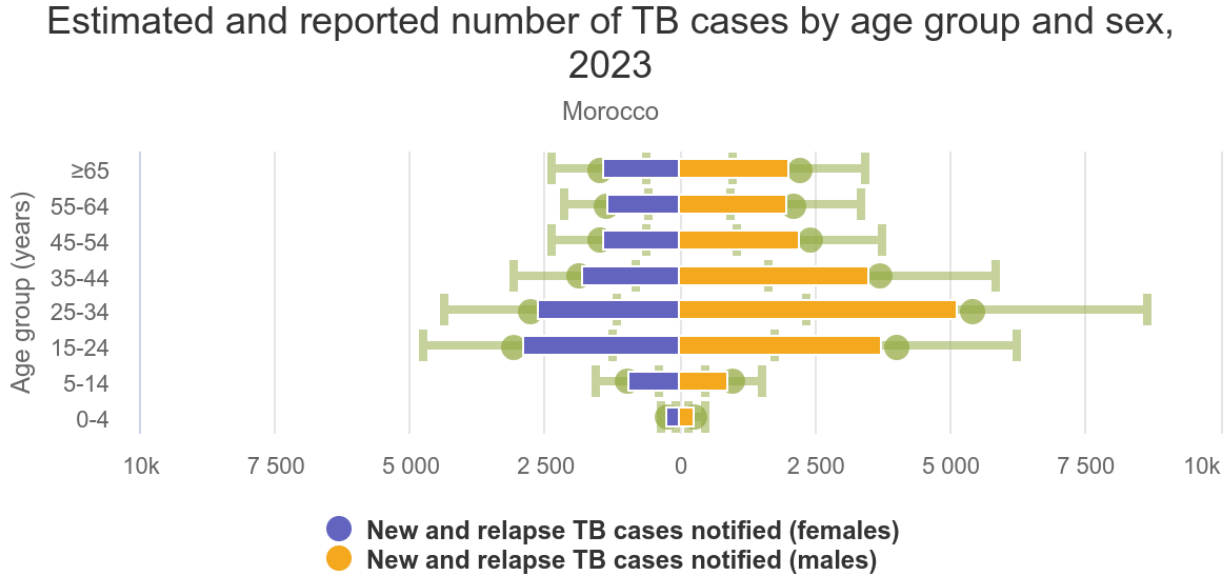


Fig. 3.3. Estimated and reported number of TB cases by age group and sex, Morocco, 2023 [25]

TB-related mortality, excluding HIV co-infection, was estimated at 3,300 deaths (8.8 per 100,000), while TB-HIV co-infection resulted in 84 deaths (0.23 per 100,000). The overall case fatality rate for TB is 10%, increasing to 20% among HIV-positive patients. Fig. 3.4 presents the trend in mortality over the past decade.

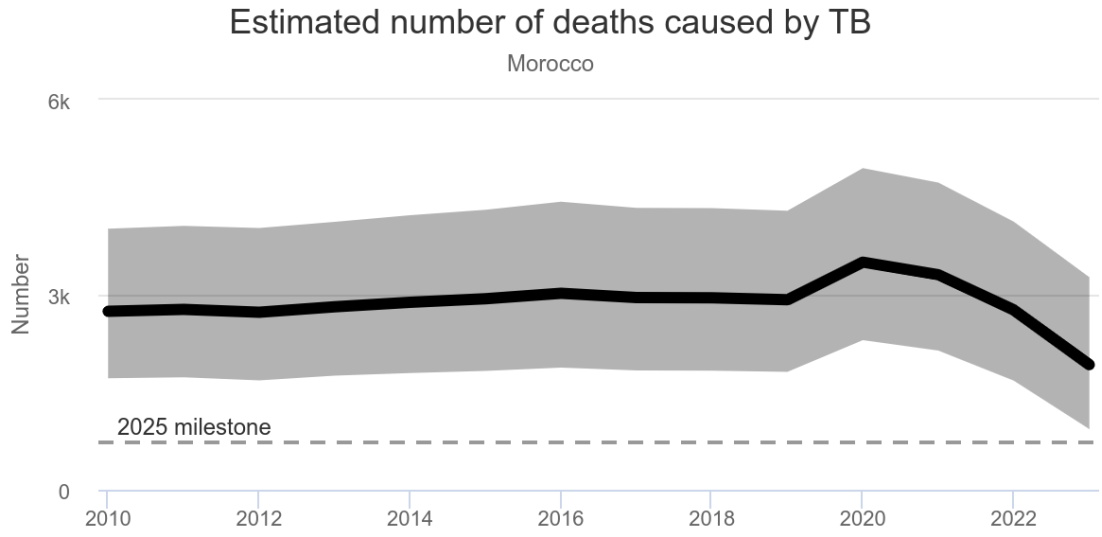


Fig. 3.4. WHO estimate of TB mortality (excluding HIV+TB) with uncertainty interval in Morocco, 2010–2023

In 2021, 29,327 TB cases were reported, with a notification rate of 80 per 100,000 population. Men accounted for 59% of cases, while women represented 41%. Notification trends from 2015 to 2021 are shown in Fig. 3.5.

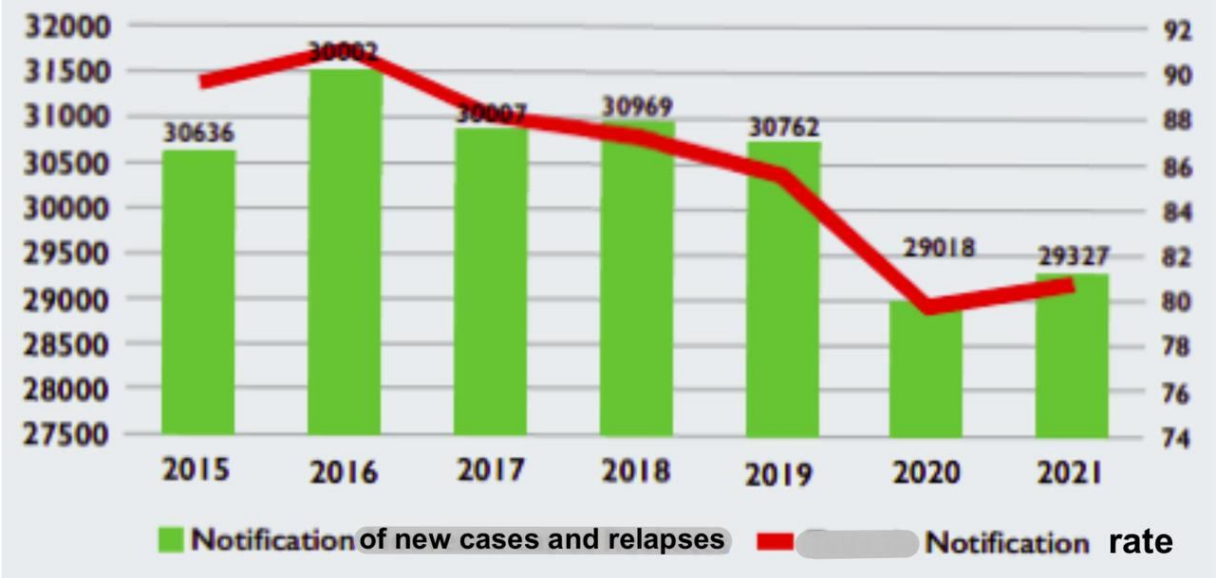
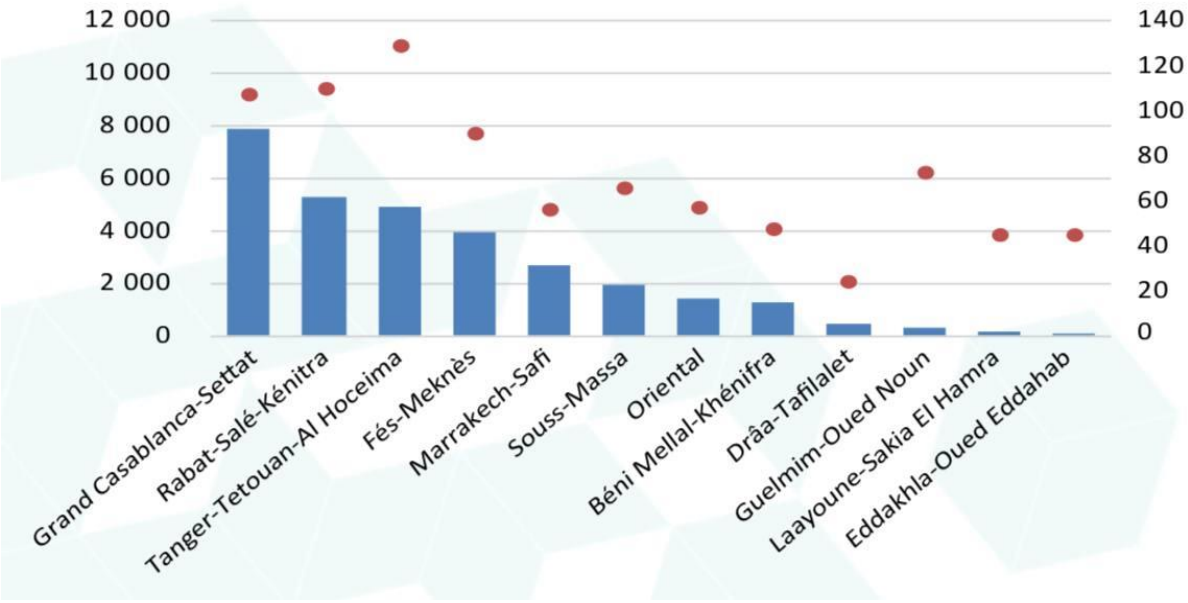


Fig. 3.5. Trends in notifications of new TB cases and relapses in Morocco, 2015–2021

The spatial distribution of cases is uneven. Six regions, home to 78% of the population, reported 87% of total TB cases: Casablanca-Settat (26%), Rabat-Salé-Kénitra (18%), Tanger-Tétouan-Al Hoceima (15%), Fès-Meknès (13%), Marrakech-Safi (9%), and Souss-Massa (6%). Regional incidence ranges from 28 to 125 per 100,000, as shown in Fig. 3.6. [24].



- number of incident cases
- incidence / 100,000 inhabitants

Fig. 3.6. Reported TB incidence rate and number of incident cases by region, Morocco, 2019

The share of extrapulmonary TB has steadily increased – from 28% in 1990 to 48% in 2019. The most common EPTB forms are lymphatic and pleural, comprising 70% of extrapulmonary cases. EPTB is more frequent in females, whereas pulmonary TB predominates in males.

Longitudinal analysis by the National TB Control Program (NCTP) reveals a slow decline in bacteriologically confirmed pulmonary TB. There has also been a decrease in cases among children under 15 and a rise among those over 45. The average age at diagnosis increased from 28.3 years in 1980 to 36.7 in 2019, indicating an aging TB patient population and declining transmission among youth.

Additionally, cases of clinically diagnosed primary TB complexes have become increasingly rare [24].

Although the general HIV prevalence in Morocco remains low (0.8%), TB-HIV co-infection presents a non-negligible challenge. With 21,500 people estimated to be living with HIV, and a 20–50 times increased TB risk among this group, HIV may account for between 1.9% and 4.7% of the national TB burden.

Diabetes is another major comorbidity. With a national prevalence of 10.6%, and a 2–3-fold increased TB risk, diabetes is estimated to contribute to 11–20% of Morocco's TB morbidity. Integrated care for TB and non-communicable diseases is thus a growing policy priority.

Case detection efforts prioritize symptomatic individuals, especially those with cough lasting over two weeks. Systematic screening is conducted among contacts of TB patients, people living with HIV, transplant candidates, dialysis patients, recipients of immunosuppressive therapies (e.g., TNF-α inhibitors), miners, prisoners, migrants, and the homeless [24].

As of 2023, five major risk factors for TB in Morocco have been identified: HIV, diabetes, undernutrition, smoking, and air pollution. Their estimated burden is presented in Fig. 3.7.

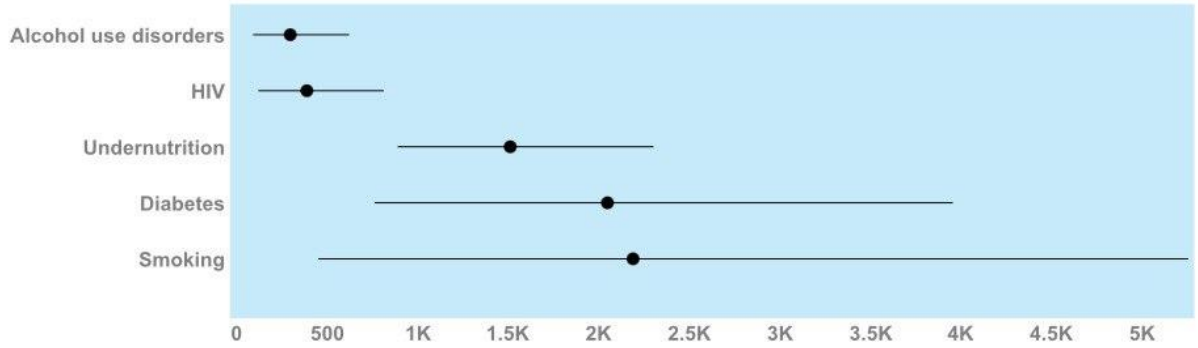


Fig. 3.7. Number of TB cases attributable to five key risk factors, Morocco, 2023

By clinical form, TB is nearly evenly split: 51% pulmonary and 49% extrapulmonary. Regional variations in notification rates are shown in Fig. 3.8.

Region	Notification rate for 100000
Tanger-Tetouan-Al Hoceima	111
Rabat-Salé-Kénitra	106
Grand Casablanca-Settat	98
Eddakhla-Oued Eddahab	86
Fès-Meknès	81
Guelmim-Oued Noun	80
Souss-Massa	58
Laayoune-Sakia El Hamra	57
Oriental	52
Béni Mellal-Khénifra	51
Marrakech-Safi	50
Drâa-Tafilalet	27

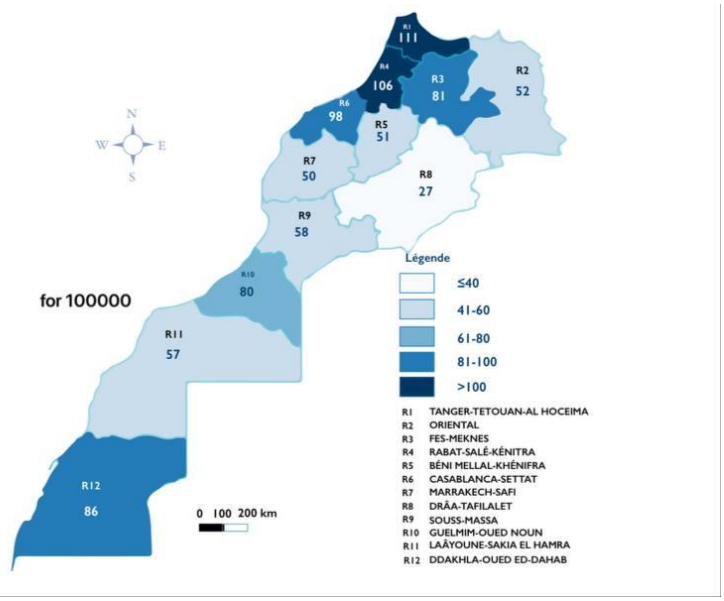


Fig. 3.8. Notification rate of TB cases by region, Morocco, 2021

3.2 Analysis of Morocco's National TB Control Strategy and its alignment with Global standards

The National Tuberculosis Control Program represents the institutional framework established by the Ministry of Health and Social Protection to lead the national TB response. It operates through a network of Centers for Diagnosis and Treatment of Respiratory Diseases (CDTMR), which are functionally integrated into Morocco's Primary Health Care Facilities. These centers coordinate technical and programmatic aspects of TB management across all levels of the health system.

Over the past two decades, Morocco's NCTP has evolved in parallel with global tuberculosis strategies, incorporating WHO recommendations and adapting to changing epidemiological realities. Current strategies are implemented using a participatory, patient-centered, and rights-based approach that emphasizes gender equity and social inclusion.

Institutional efforts, led by the Ministry and supported by partners and civil society, have expanded the program's scope to prioritize high-risk and vulnerable populations, preventive interventions, and the management of drug-resistant TB and TB/HIV co-infection. In parallel, technical capacities have improved through

sustained investments in laboratory infrastructure, digital systems, and innovative diagnostic and treatment tools, such as GeneXpert.

Recent epidemiological trends suggest a continuous decline in TB incidence, particularly among children and young adults. This reflects improved disease control and reduced transmission. National performance indicators also show consistent gains in treatment coverage and success rates, with overall success maintained at approximately 90%.

Nevertheless, important challenges persist. These include limited capacity for prevention, uneven treatment adherence, gaps in surveillance, human resource constraints, drug supply vulnerabilities, and insufficient community-level interventions. Addressing the social determinants of health and aligning programmatic governance with the broader context of health reforms – such as universal health coverage and system decentralization – remain strategic priorities.

The National Strategic Plan (NSP) for tuberculosis control, guided by program review outcomes and epidemiological data analysis, is built on a series of measures aimed primarily at:

- Strengthening TB detection systems;
- Improving treatment initiation and therapeutic care for patients with active TB and latent TB infection;
- Enhancing the program's management capacity at all levels of the health system;
- Reinforcing and organizing multisectoral action within a framework of accountability, where all sectors involved in TB control commit to fulfilling their roles in the national response and to reporting on the actions and outcomes they have pledged to achieve.

Despite these achievements, several operational challenges remain. Morocco continues to face constraints in ensuring universal access to services, preventing treatment interruption, and sustaining funding for critical components such as drug supply and human resources. Table 3.1 presents a structured comparison of Morocco's NCTP and NSP with internationally recognized components of effective TB programs (Table 2.2).

Table 3.1

Analyze of National Tuberculosis Control Program (Morocco) according to key components of effective program

Key Component	Subcomponent	Present in Morocco's NSP	Explanation / Current Status
1	2	3	4
1. Policy and Governance	Strategic planning and coordination	Yes	Morocco's TB program involves well-organized plans and collaboration between government, private sector, and NGOs. e.g: regular joint sessions and shared labs help improve diagnosis and treatment across regions.
	Health system restructuring	Yes	Seen as an opportunity to improve governance and service delivery.
	Integration with UHC policies	Partially	The integration with UHC policies is addressed partially, with ongoing efforts to enhance coverage and reduce costs, but full integration has not yet been fully realized,
2. Surveillance and Monitoring	Case notification systems	Yes	It is present but faces challenges. It relies on diagnosing and notifying cases, yet underreporting and data quality issues hinder its effectiveness
	Use of digital data tools	Yes	It is present, such as the creation of a smartphone application for digitalizing screening and diagnostic algorithms to facilitate case management
	Monitoring and evaluation indicators	Yes	Yes, monitoring and evaluation indicators are present, such as regular validation of data quality, updating reference manuals, and conducting assessments of the strategy implementation.

Continuation Table 3.1

1	2	3	4
3. Early Detection and Diagnosis	TB detection systems	Yes	Detection is a strategic focus; 81% case detection achieved.
	Active case finding	Yes	active case finding is present, with activities like systematic screening of contacts, reinforcement of contact investigations, and extended outreach efforts
	Contact tracing	Yes	Examples include identifying and inviting contacts to health centers for examination and establishing care pathways for contacts
	Use of GeneXpert/molecular diagnostics	Yes	It includes the deployment of 64 GeneXpert sites across regions and the planned acquisition of additional machines for rapid detection of drug resistance
4. Treatment and Patient Support	Treatment initiation and follow-up	Yes	>725,000 patients treated; success rate ~88–90%.
	Adherence monitoring	Yes	It is present. For example, treatment adherence is monitored through direct observation and support technologies like VOT, though challenges remain in ensuring consistent follow-up.
	LTBI management	Yes	LTBI covered as part of prevention.
	Psychosocial support	Yes	The strategic plan emphasizes providing psychosocial and financial support to patients, especially those with drug-resistant TB and TB/HIV co-infection

Continuation Table 3.1.

1	2	3	4
5. Infection Prevention and Control	IPC in healthcare facilities	NO	Absence of a comprehensive national IPC protocol.
	Protection of health workers	Yes	activities include ensuring the availability of PPE such as masks, gloves, and autoclaves for laboratory staff and healthcare workers
	Ventilation and isolation measures	Yes	Ensuring the availability of isolation rooms with appropriate ventilation in prisons, and acquiring air extractors and UV lamps for hospitals and regional services
6. Drug Supply and Management	Uninterrupted drug supply	No	Uninterrupted drug supply is not fully assured. The program mentions the lack of a specific budget line for antituberculous drugs and diagnostic supplies, and issues with storage conditions and stock management
	Forecasting systems	No	it highlights the need to improve data management and analysis, indicating that advanced forecast systems are not yet fully implemented
	Stock management tools	Partially	Stock management tools are present but have issues, such as inadequate storage conditions and unreliable stock tracking, indicating that their effectiveness is limited. For example, the conditions of storage facilities are unsatisfactory, and real-time stock tracking is lacking.

Continuation Table 3.1

1	2	3	4
7. Community Engagement and Partnerships	Community-based DOT	Partially	Community-based DOT is not fully implemented, with limited involvement of NGOs and inadequate support for community-level activities, such as contact tracing and patient follow-up.
	Role of NGOs	Yes	They contribute to community awareness, patient support, and case detection, such as organizing annual screening sessions for vulnerable populations
8. Research, Innovation, and Digital Tools	Digital data.	Yes	Digital data collection is present; an application on smartphones is being developed to digitize screening and diagnostic algorithms to facilitate referrals.
	Use of software systems	Yes	The use of software systems is present; examples include DHIS2 for data management and ISILAT-DHIS2 for epidemiological data analysis.
	Operational research agenda	Yes	The operational research agenda is present; for example, studies on tuberculosis incidence estimation, delays in diagnosis, and cost assessments are specified
9. Human Rights, Gender, and Equity	Patient-centered care	Yes	Patient-centered care is addressed; for example, attention to the needs of women, children, and adolescents in TB management is mentioned, along with efforts to improve support for patients, such as offering food aid and addressing social support needs
	Gender-sensitive services	Yes	Gender-sensitive services are present; the plan emphasizes exploring gender roles, ensuring gender equality in TB care, and collecting data disaggregated by gender to address inequalities
	Legal protection and stigma reduction	Yes	Legal protection and stigma reduction are present; activities include studies on stigma, rights-based messaging, sensitization, and legal support mechanisms to protect patients and reduce discrimination

The analysis presented in Table 3.1 indicates that Morocco has implemented most of the fundamental components of an effective TB control program, with particular strengths in diagnostics, digitalization, and patient-centered care. However, important gaps remain in areas such as IPC, drug forecasting systems, uninterrupted supply of TB medicines, and community-based interventions.

To further evaluate Morocco's alignment with global TB targets, Table 3.2 presents a comparative overview of national performance indicators alongside the WHO End TB Strategy benchmarks.

Table 3.2

Comparison of Morocco's National TB Targets with WHO End TB Strategy benchmarks

INDICATOR	GLOBAL TARGET	MOROCCO TARGET
TB treatment coverage	90% by 2027 (equivalent to up to 45 million people globally in the 5 years 2023–2027, including up to 4.5 million children and up to 1.5 million people with drug-resistant TB)	Increase the treatment coverage rate for drug-sensitive tuberculosis to at least 95%, and the detection rate of multidrug-resistant/ rifampicin-resistant TB (MDR/ RR-TB) to at least 75% by 2030.
Treatment success rate	Not specified in the global target	Increase the treatment success rate for drug-sensitive tuberculosis to 95%, and for multidrug-resistant/rifampicin-resistant TB (MDR/RR-TB) to 90% by 2030.
TB preventive treatment coverage	90% by 2027 (equivalent to up to 45 million people globally in the 5-year period 2023–2027, including 30 million household contacts of people with TB and 15 million people living with HIV)	Provide preventive treatment for tuberculosis to at least 90% of eligible people by 2030.
Multisectoral governance	Required under WHO End TB Pillar 2	Strengthen the governance of the NCTP and promote multisectoral action.
Financial protection	No household should face catastrophic TB costs	Addressed via social protection and universal access policies

Morocco's performance targets generally align with WHO global goals and, in some cases, exceed them. For example, the national plan sets higher coverage and success benchmarks for both drug-sensitive and drug-resistant TB. Furthermore, Morocco has committed to expanding preventive treatment, improving data systems, and strengthening multisectoral collaboration.

Strategic emphasis is also placed on integrating TB control into broader health sector reforms, mobilizing sustainable funding, and embedding equity and human rights considerations across all levels of program implementation.

In summary, Morocco's national TB control strategy demonstrates substantial alignment with international standards. The program reflects WHO's pillars of patient-centered care, robust governance, and innovation, and is backed by ambitious national targets. Continued progress will require sustained investment in IPC, uninterrupted drug supply chains, accurate forecasting systems, and community-level service delivery – particularly among marginalized populations.

3.3 Generalization of opportunities for expanding the role of pharmacists in TB control programs in Morocco

The evolving challenges of TB control in Morocco necessitate a broader engagement of healthcare professionals, including those traditionally underutilized within national TB strategies. Among these, pharmacists represent a uniquely accessible and technically skilled group whose potential in TB prevention, detection, and treatment support remains largely untapped.

Currently, the role of pharmacists in Morocco's TB control efforts is limited. Most pharmacists operate in community-based settings, outside formal TB care networks. They are rarely involved in systematic screening, contact tracing, treatment monitoring, or pharmacovigilance related to anti-TB therapy. Their interactions with TB patients are generally restricted to prescription filling, with limited opportunities for therapeutic counseling, adverse event monitoring, or referral to specialized services [14].

However, pharmacists are ideally positioned to support TB control in several ways:

- Early identification of presumptive TB cases through observation of chronic cough, frequent antitussive use, or repeated antibiotic requests;
- Referral of high-risk individuals (e.g., migrants, immunocompromised patients) to diagnostic centers;
- Patient counseling on treatment adherence, side effects, and infection prevention;
- Detection and reporting of adverse drug reactions, particularly in the context of multidrug-resistant TB;
- Distribution and follow-up for TB preventive treatment among household contacts;
- Participation in community awareness campaigns and anti-stigma education [13, 31].

Barriers to greater pharmacist involvement include the absence of official protocols for collaboration between pharmacists and TB programs, lack of training in TB-specific interventions, and limited incentives or recognition within the current health governance model. Moreover, the national legal framework does not currently assign pharmacists an active role in TB surveillance or community-level care [20].

International experience demonstrates that pharmacist integration into TB programs can significantly enhance access, adherence, and continuity of care – especially in decentralized health systems. For instance:

- In the Philippines, pharmacists are included in TB case-finding strategies and receive government training for symptom-based triage and referral [31];
- In India, the NIKSHAY system integrates private pharmacists into the national TB notification platform [31];
- In South Africa, community pharmacists participate in directly observed treatment and adverse event monitoring [31];
- In the United Kingdom, pharmacists provide patient education and support VOT adherence initiatives [31].

We explore opportunities for expanding the role of pharmacists in Morocco's TB control programs. A number of practical avenues exist for this expansion presents on fig. 3.9

Fig. 3.9. Summary of opportunities for expanding the role of pharmacists in Morocco's TB control programs

The WHO End TB Strategy emphasizes a “whole-of-society” approach that includes engaging non-traditional actors such as pharmacists and private providers [14]. Furthermore, WHO’s Multisectoral Accountability Framework to End TB encourages countries to mobilize all available resources – clinical, financial, and human – to achieve national TB goals [20].

In Morocco, expanding the role of pharmacists within the NCTP can support both decentralization and integration. Specific opportunities include:

- Training and certification programs on TB diagnosis, treatment protocols, and public health communication;
- Integration into the TB notification system through digital tools (e.g., DHIS2 modules adapted for pharmacies) [13];
- Inclusion in preventive treatment distribution chains, especially for isoniazid preventive therapy;
- Establishment of formal referral pathways between pharmacists and CDTMR centers;
- Support for contact tracing and adherence monitoring in collaboration with community health workers;

Implementing these initiatives would require updates to legal frameworks, the development of public–private partnership models, and pilot testing of pharmacist-led TB care models in urban and semi-urban areas.

The integration of pharmacists into Morocco’s TB control efforts offers a promising opportunity to strengthen early case detection, adherence, patient education, and drug safety. With appropriate training, institutional support, and digital linkage, pharmacists can play a critical role in decentralized and community-based TB control – aligning with global priorities and enhancing the country’s capacity to achieve End TB targets by 2030 [14, 20].

Conclusions to Chapter III

1. The analysis of epidemiological data confirmed that Morocco maintains a moderate but persistent TB burden, with a slow decline in incidence and regional disparities in case distribution. Vulnerable groups, including individuals living with HIV, people with diabetes, and residents of urban centers, remain disproportionately affected. Although the country has achieved notable progress in reducing childhood TB and enhancing treatment outcomes, challenges related to underreporting, extrapulmonary TB, and comorbidities persist.

2. The review of the National Tuberculosis Control Program and the Strategic Plan for 2024–2030 demonstrated that Morocco has successfully adopted most components of effective TB control as recommended by the WHO End TB Strategy. Strengths include political commitment, structured surveillance, case detection systems, and a treatment success rate near 90%. Moreover, the national strategy has set ambitious performance targets that, in some areas, exceed global benchmarks – particularly in treatment coverage and preventive therapy.

3. However, several implementation gaps remain, including inadequate IPC protocols, fragile drug supply systems, and insufficient community engagement. These areas require targeted investment and multisectoral coordination to sustain and scale progress.

4. Finally, ehe analysis highlighted the untapped potential of pharmacists in strengthening TB control. Despite limited formal integration to date, community pharmacists in Morocco could play a key role in early detection, adherence support, adverse drug reaction monitoring, and public education. International experiences and WHO policy frameworks offer relevant models that Morocco could adapt. Expanding pharmacists' involvement would reinforce decentralized, patient-centered care and contribute meaningfully to national End TB goals.

CONCLUSIONS

1. Tuberculosis remains one of the most significant global public health threats, particularly in low- and middle-income countries. Despite being preventable and curable, TB continues to impose a considerable burden on individuals, communities, and health systems – both in terms of morbidity and mortality, as well as in socioeconomic consequences.

2. This study explored the global and national dimensions of TB control, with a focus on Morocco. It began with a comprehensive review of international strategies and frameworks developed under the leadership of the World Health Organization. The WHO End TB Strategy, along with related instruments such as the Multisectoral Accountability Framework and Global Strategic Plans, provided a reference model for effective TB control, highlighting the importance of early diagnosis, integrated care, social protection, and multisectoral collaboration.

3. The analysis of Morocco's epidemiological situation revealed moderate but persistent TB incidence, with disparities across regions and risk groups. Although the country has made notable gains in reducing incidence among children and improving treatment success rates, the impact of social determinants, comorbidities (HIV, diabetes), and limited access to services continues to challenge elimination efforts.

4. Morocco's National Tuberculosis Control Program was assessed in terms of its strategic coherence with global standards. The results demonstrate that Morocco has adopted most of the core components of effective TB control, including surveillance systems, molecular diagnostics, digital tools, and treatment protocols. The 2024–2030 Strategic Plan sets ambitious national targets that in several areas exceed WHO benchmarks, particularly in treatment coverage and preventive therapy uptake.

5. Nonetheless, gaps remain in infection prevention and control, drug supply management, real-time data forecasting, and community-based service delivery. These must be addressed to ensure sustained progress toward the 2030

targets. Greater integration with universal health coverage, better intersectoral accountability, and more equitable resource allocation are also required.

6. Importantly, the study identified the underutilized potential of pharmacists as key contributors to TB control. Their integration into detection, counseling, pharmacovigilance, and adherence support could strengthen decentralized care models and improve treatment outcomes, especially in underserved populations.

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ANNEXES

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

АКТУАЛЬНІ ПИТАННЯ СТВОРЕННЯ НОВИХ ЛІКАРСЬКИХ ЗАСОБІВ

МАТЕРІАЛИ
XXXI МІЖНАРОДНОЇ НАУКОВО-ПРАКТИЧНОЇ
КОНФЕРЕНЦІЇ МОЛОДИХ ВЧЕНИХ ТА СТУДЕНТІВ

23–25 квітня 2025 року
м. Харків

Харків
НФаУ
2025

УДК 615.1

Редакційна колегія: проф. Котвіцька А. А., проф. Владимирова І. М.
Укладачі: Сурікова І. О., Боднар Л. А., Комісаренко М. А., Комісарова Є. Є.

Актуальні питання створення нових лікарських засобів: матеріали XXXI міжнародної науково-практичної конференції молодих вчених та студентів (23-25 квітня 2025 р., м. Харків). – Харків: НФаУ, 2024. – 515 с.

Збірка містить матеріали міжнародної науково-практичної конференції молодих вчених та студентів «Актуальні питання створення нових лікарських засобів, які представлені за пріоритетними напрямами науково-дослідної роботи Національного фармацевтичного університету. Розглянуто теоретичні та практичні аспекти синтезу біологічно активних сполук і створення на їх основі лікарських субстанцій; стандартизації ліків, фармацевтичного та хіміко-технологічного аналізу; вивчення рослинної сировини та створення фітопрепаратів; сучасної технології ліків та екстемпоральної рецептури; біотехнології у фармації; досягнень сучасної фармацевтичної мікробіології та імунології; доклінічних досліджень нових лікарських засобів; фармацевтичної опіки рецептурних та безрецептурних лікарських препаратів; доказової медицини; сучасної фармакотерапії, соціально-економічних досліджень у фармації, маркетингового менеджменту та фармакоекономіки на етапах створення, реалізації та використання лікарських засобів; управління якістю у галузі створення, виробництва й обігу лікарських засобів; суспільствознавства; фундаментальних та мовних наук.

УДК 615.1

UNICEF supports a "zero-dose" strategy, prioritizing identification and vaccination of children who have not received any vaccines, based on the Immunization Agenda 2030 framework.

Furthermore, recent WHO interim guidelines (2023) advocate for integrating measles vaccination campaigns with broader health service delivery, such as nutrition supplementation and routine check-ups, to maximize community outreach and resilience against future outbreaks.

Conclusions: Effective measles control requires a dual approach of maintaining high immunization coverage and providing standardized supportive care for infected individuals. Adherence to WHO and CDC guidelines on vaccination schedules and case management has proven successful in reducing measles-related morbidity and mortality. However, persistent challenges, such as vaccine hesitancy, logistical barriers in low-resource settings, and the impacts of global crises like the COVID-19 pandemic, continue to threaten progress. Strengthening healthcare systems, enhancing surveillance and outbreak response capacities, and investing in community-based health education are critical to sustaining measles elimination efforts worldwide.

ANALYSIS OF WHO STANDARDS AND INTERNATIONAL APPROACHES TO UNIVERSAL ACCESS TO RAPID TUBERCULOSIS DIAGNOSTICS

Zhad Nadia, Surikova I.O.
Scientific supervisor: Kotvitska A.A.
National University of Pharmacy, Kharkiv, Ukraine
socpharm@nuph.edu.ua

Introduction. Tuberculosis (TB) remains a major global public health concern, with 10.6 million people falling ill and 1.3 million dying from the disease in 2022. Early and accurate diagnosis is critical for TB control, yet access to rapid molecular testing remains insufficient in many countries. To address this, the World Health Organization (WHO) developed in 2023 the Standard for Universal Access to Rapid Tuberculosis Diagnostics, offering a structured framework to enhance access to WHO-recommended rapid diagnostics (WRDs) globally. Ensuring equitable, timely, and widespread access to these technologies is essential for reducing TB incidence, detecting drug resistance early, and achieving global End TB Strategy targets.

Aim. To analyze the WHO approach for universal access to rapid TB diagnostics, focusing on the structure of the WHO standard and its benchmarks, and to consider its application within the context of international TB control efforts, including Morocco.

Materials and Methods. The study involved a desk review of the WHO document "Benchmarks for Universal Access to Rapid Tuberculosis Diagnostics" (2023), the WHO Shiny benchmarking tool, and relevant national reports on TB diagnostics. The analysis focused on the conceptual framework of the diagnostic cascade, the structure of benchmarks, and practical recommendations for improving access to WRDs.

Results and discussion. The WHO standard structures the diagnostic process into four critical steps along the patient pathway, as summarized in Table 1.

These four steps are linked with 12 specific benchmarks designed to assess performance at each stage of the cascade. The WHO standard emphasizes facility surveys, diagnostic network mapping, and patient pathway analysis to accurately evaluate national progress. In addition, the standard provides a comprehensive mapping of enablers, approaches, and solutions to help countries

strengthen WRD deployment, including policy updates, workforce capacity building, service integration, and community engagement.

Table 1

Key Steps and Focus Areas in the WHO Standard for Universal Access to Rapid TB Diagnostics

Step	Description	Key Focus Areas
Step 1: Identifying presumptive TB	Active and passive case finding to recognize individuals with TB symptoms.	Symptom screening at health facilities; active case finding among high-risk groups.
Step 2: Accessing testing	Ensuring individuals can access WHO-recommended rapid diagnostics without delay.	Availability of WRDs at primary care and specialized services; reliable specimen referral systems.
Step 3: Being tested	Performing WRD testing promptly on identified presumptive TB cases.	High testing coverage; minimized time between presentation and sample collection.
Step 4: Receiving a diagnosis	Providing diagnostic results quickly and initiating linkage to care.	Fast turnaround of test results; prompt communication to patients.

Initial international assessments show that while many countries have expanded WRD availability at specialized TB services, achieving equitable and timely access at primary care and community levels remains challenging. In Morocco, despite notable progress in WRD implementation in urban diagnostic centers, further expansion and system-wide strengthening are needed to fully meet WHO's benchmarks for universal access.

Conclusions

The WHO Standard for Universal Access to Rapid TB Diagnostics offers a systematic and patient-centered approach for scaling up TB diagnostic services globally. By aligning national efforts with the WHO's structured diagnostic cascade and benchmarks, countries can accelerate early diagnosis, improve treatment outcomes, and advance toward the End TB Strategy targets. Strategic investments, continuous monitoring, and equity-focused interventions are essential to achieve true universal access, particularly in high-burden countries like Morocco.

СЕКЦІЯ 11. СОЦІАЛЬНО-ЕКОНОМІЧНІ, ОРГАНІЗАЦІЙНІ ТА ПРАВОВІ ДОСЛІДЖЕННЯ У ФАРМАЦІЇ
SOCIO-ECONOMIC, ORGANIZATIONAL AND LEGAL RESEARCH IN PHARMACY

МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
НАЦІОНАЛЬНИЙ ФАРМАЦЕВТИЧНИЙ УНІВЕРСИТЕТ

СЕРТИФІКАТ УЧАСНИКА

Цим засвідчується, що

Zhad Nadia, Surikova I.O.
Scientific supervisor: Kotvitska A.A.

брав(ла) участь у роботі
XXXI Міжнародної науково-практичної конференції молодих вчених та студентів
«АКТУАЛЬНІ ПИТАННЯ СТВОРЕННЯ НОВИХ ЛІКАРСЬКИХ ЗАСОБІВ»

В.о. ректора
Національного фармацевтичного
університету

Алла КОТВІЦЬКА

23-25 квітня 2025 р, м. Харків

Ф А 2.2.1–32-366

National University of Pharmacy

Faculty pharmaceutical
Department of social pharmacy

Level of higher education master

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

Nadia ZHAD

1. Topic of qualification work: «Research on approaches of implementing a Tuberculosis control program in Morocco»,
supervisor of qualification work: Alla KOTVITSKA, Doctor of Pharmacy, professor,
approved by order of NUPh from "27th" 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 and periodical literature in accordance with research objectives; reports of international organizations, statistical data.

4. Contents of the settlement and explanatory note (list of questions that need to be developed):
- to analyze the global public health burden of tuberculosis and the evolution of TB control strategies;
- to examine international experiences and WHO guidelines on the implementation of TB control programs;
- to generalize key components and stakeholders of effective TB control and elimination programs;
- to assess Morocco's current epidemiological situation regarding tuberculosis;
- to evaluate the structure and effectiveness of the National Tuberculosis Control Program in Morocco;
- to explore opportunities for strengthening the role of pharmacists in TB control efforts and develop recommendations.

5. List of graphic material (with exact indication of the required drawings):
tables – 5, figures – 9

6. Consultants of chapters of qualification work

Chapters	Name, SURNAME, position of consultant	Signature, date	
		assignment was issued	assignment was received
1	Alla KOTVITSKA, professor of higher education institution of department Social Pharmacy	11.09.2024	11.09.2024
2	Alla KOTVITSKA, professor of higher education institution of department Social Pharmacy	21.11.2024	21.11.2024
3	Alla KOTVITSKA, professor of higher education institution of department Social Pharmacy	24.12.2024	24.12.2024

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

CALENDAR PLAN

№	Name of stages of qualification work	Deadline for the stages of qualification work	Notes
1	Analysis of scientific, periodic literature on the topic of qualification work	September 2024	**done**
2	Study of international experiences and WHO guidelines	October-November 2024	**done**
3	Generalize key components and stakeholders of effective TB control and elimination programs	December-January 2024-2025	**done**
4	Evaluate the structure and effectiveness of the National Tuberculosis Control Program in Morocco	February-March 2025	**done**
5	Summary of the results of the study	April 2025	**done**
6	Finalizing the work, preparing the report	May 2025	**done**

An applicant of higher education Nadia ZHAD

Supervisor of qualification work Alla KOTVITSKA

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				
Зхад Надія	Дослідження підходів до впровадження програми боротьби з туберкульозом в Марокко	Research on approaches of implementing a tuberculosis control program in Morocco	Професор Котвіцька А.А.	Професор Малий В.В.

Ректор

Вірно. Секретар

ФА2.8-03-317

ВИСНОВОК

експертної комісії про проведену експертизу
щодо академічного плагіату у кваліфікаційній роботі

здобувача вищої освіти

«15» травня 2025 р. № 331220132

Проаналізувавши кваліфікаційну роботу здобувача вищої освіти Зхад Надія, групи Фм20 (4,10д) англ-02, спеціальності 226 Фармація, промислова фармація, освітньої програми «Фармація» навчання на тему: «Дослідження підходів до впровадження програми боротьби з туберкульозом в Марокко / Research on approaches of implementing a tuberculosis control program in Morocco», 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

Nadia ZHAD

on the topic: «Research on approaches of implementing a tuberculosis control program in Morocco»

Relevance of the topic. Tuberculosis (TB) remains one of the leading causes of morbidity and mortality worldwide, particularly in low- and middle-income countries. Morocco, while showing gradual improvements, continues to face challenges in controlling TB transmission and ensuring equitable access to care. The topic chosen by the student is highly relevant and socially significant, as it integrates the evaluation of Morocco's National Tuberculosis Control Program with global standards, emphasizing strategic alignment, system-level bottlenecks, and the underexplored potential of pharmacists in TB care.

Practical value of conclusions, recommendations and their validity. The practical value of the study lies in its comprehensive and evidence-based assessment of the TB control efforts in Morocco, offering realistic and policy-relevant recommendations. The work identifies both strengths and critical gaps in national implementation, particularly in infection prevention, drug supply forecasting, and community engagement. The suggested expansion of pharmacists' roles – in line with international WHO guidance – provides actionable insights that can contribute to the decentralization and improvement of TB services in Morocco. These conclusions are well-supported by qualitative and quantitative analysis, global best practices, and the WHO End TB Strategy framework.

Assessment of work. The student has shown high analytical capacity and academic maturity throughout the research process. The work is logically structured, methodologically sound, and thoroughly referenced. It combines statistical analysis, policy review, and strategic evaluation, while also offering innovative ideas for improving pharmaceutical care involvement in TB control. The author demonstrated

a clear understanding of the subject matter and provided a valuable contribution to the field of public health and pharmacy.

General conclusion and recommendations on admission to defend. In general, the qualification work of Nadia ZHAD on the topic: «Research on approaches of implementing a tuberculosis control program in Morocco» is performed at the proper level, meets the requirements of the "Regulations on the preparation and protection of qualification works at the National University of Pharmacy" and can be recommended for defense in the Examination commission.

Scientific supervisor Alla KOTVITSKA

«15th» of May 2025

Ф А 2.2.1-32-356

REVIEW

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

Nadia ZHAD

on the topic: «Research on approaches of implementing a tuberculosis control program in Morocco»

Relevance of the topic. The fight against tuberculosis continues to be a pressing issue on the agenda of global and national health systems, especially in countries with limited healthcare resources. The spread of multidrug-resistant forms of TB, difficulties in ensuring adherence to treatment, and insufficient integration of healthcare providers into control programs complicate the achievement of strategic goals set by WHO. The research draws attention to the implementation aspects of Morocco's tuberculosis control program and evaluates prospects for strengthening it through broader involvement of pharmaceutical professionals. Such a research focus reflects the need for evidence-based improvements in TB care and justifies the relevance of the chosen topic.

Theoretical level of work. The work demonstrates a strong theoretical foundation, with comprehensive coverage of TB epidemiology, history of control strategies, and modern approaches based on international best practices. The author skillfully integrates WHO documentation, national policy frameworks, and scientific literature, ensuring a well-grounded and logically structured narrative. The comparative component and critical evaluation of Morocco's strategy further reflect a high level of academic rigor.

Author's suggestions on the research topic. The author proposes several practical avenues to strengthen the TB control program in Morocco. Among the most notable are: scaling up infection prevention and control measures, securing uninterrupted drug supply chains, enhancing surveillance systems, and expanding the role of pharmacists in TB detection, patient counseling, and adherence monitoring. These

proposals are innovative, well-justified, and aligned with global standards, contributing to the development of patient-centered and decentralized TB care.

Practical value of conclusions, recommendations and their validity.

The conclusions and recommendations are well-supported by data, analytical tables, and strategic mapping. The proposed solutions can be applied in public health practice, particularly in improving multisectoral coordination, health worker engagement, and community outreach in Morocco.

Disadvantages of work. Some minor stylistic inconsistencies and occasional language issues are present, but they do not significantly affect the overall quality or comprehension of the research.

General conclusion and assessment of the work. According to the relevance and the results of the research qualification work of Nadia ZHAD on the topic: «Research on approaches of implementing a tuberculosis control program in Morocco» meets the requirements for master's works and can be recommended for official defense in the Examination commission.

Reviewer Professor Volodymyr MALYI

«17th» of May 2025

Ф А2.5-32-231

ВИТЯГ
з протоколу засідання кафедри соціальної фармації
№ 22 від «21» 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 здобувачки вищої освіти спеціальності 226 Фармація, промислова фармація Надії ЗХАД на тему: «Дослідження підходів до впровадження програми боротьби з туберкульозом в Марокко».
Науковий керівник: д. фарм. н., професор кафедри СФ Алла КОТВІЦЬКА.
Рецензент: д. фарм. н., завідувач кафедри ММЗЯФ, проф. Володимир МАЛИЙ.

УХВАЛИЛИ: Рекомендувати до захисту в Екзаменаційній комісії кваліфікаційну роботу здобувачки вищої освіти Надії ЗХАД на тему: «Дослідження підходів до впровадження програми боротьби з туберкульозом в Марокко».

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 здобувачка вищої освіти Надія ЗХАД до захисту кваліфікаційної роботи
за галуззю знань 22 Охорона здоров'я
спеціальністю 226 Фармація, промислова фармація
освітньою-професійною програмою Фармація
на тему: «Дослідження підходів до впровадження програми боротьби з туберкульозом в Марокко».

Кваліфікаційна робота і рецензія додаються.

Декан факультету _____ / Микола ГОЛІК/

Висновок керівника кваліфікаційної роботи

Здобувачка вищої освіти Надія ЗХАД під час виконання кваліфікаційної роботи продемонструвала уміння працювати з науковими даними, проводити їх узагальнення, аналізувати та узагальнювати результати дослідження. Усі поставлені завдання відповідно до мети роботи було виконано у повному обсязі. Результати дослідження належним чином оброблені і представлені.

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

Керівник кваліфікаційної роботи Алла КОТВІЦЬКА

«15» травня 2025 р.

Висновок кафедри про кваліфікаційну роботу

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

Завідувачка кафедри
соціальної фармації Аліна ВОЛКОВА

«22» 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/