EVALUATION REPORT DEVELOPED BY

**URC** University Research Co., LLC

**Evaluation Team**
Dr Frantz SIMEON, Team Leader  
Dr Gildas AGODOKPESSI, Tuberculosis Specialist  
Dr Amidou DIARRA, Bacteriologist  
Mr Cesaire AHANHANZO, Statistician  
Mr Patrick MAKOUTODE, Health Economist

**URC-CHS Support Team**
Dr Jean Fortune DAGNON, Public Health Physician  
Dr Annick APOVO, Public Health Physician  
Dr Antoine AZON, Researcher and Physician  
Mr Richard DOSSOU-YOVO, Statistician  
Mr Yetondji HOUYEYETONGNON, M&E Specialist  
Mr Franck BADOU, Sociologist
# Table of Contents

LIST OF ABBREVIATIONS...................................................................................................................... iv

LIST OF TABLES..................................................................................................................................... vi

LIST OF FIGURES................................................................................................................................... vi

EXECUTIVE SUMMARY ..................................................................................................................... 1

1 INTRODUCTION.................................................................................................................................. 3

1.1 Overview of Benin.......................................................................................................................... 3

1.1.1 General information.................................................................................................................. 3

1.1.2 Health system .......................................................................................................................... 3

1.2 Context........................................................................................................................................ 3

1.2.1 Magnitude of the problem......................................................................................................... 3

1.2.2 Overview of the national context ............................................................................................ 4

1.2.3 History of tuberculosis control in Benin ................................................................................. 4

1.2.4 Global Fund’s entry on the scene ............................................................................................ 5

1.2.5 Context of this evaluation ....................................................................................................... 5

1.3 Conceptual framework of the evaluation..................................................................................... 6

1.4 Evaluation objective...................................................................................................................... 6

1.4.1 Specific objectives..................................................................................................................... 6

1.4.2 Other evaluation areas ............................................................................................................ 7

2 DESCRIPTION OF THE METHODOLOGICAL APPROACH .......................................................... 8

2.1 Methodological approach .......................................................................................................... 8

2.2 Sampling.................................................................................................................................... 8

2.2.1 Description of study targets..................................................................................................... 8

2.2.2 Identification of the sampling framework .............................................................................. 8

2.3 Data collection ............................................................................................................................. 9

2.3.1 Data collection techniques ..................................................................................................... 9

2.3.2 Data collection tools and procedures .................................................................................. 10

2.4 Evaluation implementation ........................................................................................................ 10

2.4.1 Phase 1: Preparation and launch ......................................................................................... 10

2.4.2 Phase 2: Field work .............................................................................................................. 11

2.4.3 Phase 3: Data analysis and synthesis ................................................................................... 11

2.4.4 Phase 4: Producing the final report ..................................................................................... 11
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
<td>Data entry, quality assurance, and data analysis</td>
<td>11</td>
</tr>
<tr>
<td>2.6</td>
<td>Limitations and difficulties</td>
<td>12</td>
</tr>
<tr>
<td>2.7</td>
<td>Ethical considerations</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>RESULTS</td>
<td>13</td>
</tr>
<tr>
<td>3.1</td>
<td>Program inputs</td>
<td>13</td>
</tr>
<tr>
<td>3.1.1</td>
<td>Financial resources received by the program</td>
<td>13</td>
</tr>
<tr>
<td>3.1.2</td>
<td>Analysis of program costs</td>
<td>16</td>
</tr>
<tr>
<td>3.2</td>
<td>Activities (Process)</td>
<td>21</td>
</tr>
<tr>
<td>3.2.1</td>
<td>Training</td>
<td>22</td>
</tr>
<tr>
<td>3.2.2</td>
<td>Raising awareness about the disease in communities</td>
<td>22</td>
</tr>
<tr>
<td>3.2.3</td>
<td>Supervision</td>
<td>24</td>
</tr>
<tr>
<td>3.2.4</td>
<td>Support for TB screening and diagnostics</td>
<td>25</td>
</tr>
<tr>
<td>3.2.5</td>
<td>Monitoring and evaluation</td>
<td>27</td>
</tr>
<tr>
<td>3.2.6</td>
<td>Level of achievement for planned activities</td>
<td>27</td>
</tr>
<tr>
<td>3.3</td>
<td>Outputs</td>
<td>28</td>
</tr>
<tr>
<td>3.3.1</td>
<td>Staff recruitment</td>
<td>28</td>
</tr>
<tr>
<td>3.3.2</td>
<td>Training</td>
<td>28</td>
</tr>
<tr>
<td>3.3.3</td>
<td>Raising community awareness about the disease</td>
<td>29</td>
</tr>
<tr>
<td>3.3.4</td>
<td>Medical equipment</td>
<td>29</td>
</tr>
<tr>
<td>3.3.5</td>
<td>Office equipment</td>
<td>29</td>
</tr>
<tr>
<td>3.3.6</td>
<td>Civil-engineering work</td>
<td>30</td>
</tr>
<tr>
<td>3.3.7</td>
<td>Transportation equipment</td>
<td>30</td>
</tr>
<tr>
<td>3.4</td>
<td>Epidemiological results for the disease (outcomes)</td>
<td>30</td>
</tr>
<tr>
<td>3.4.1</td>
<td>National coverage of DOTS treatment centers</td>
<td>30</td>
</tr>
<tr>
<td>3.4.2</td>
<td>Case reporting</td>
<td>32</td>
</tr>
<tr>
<td>3.4.3</td>
<td>Treatment results</td>
<td>39</td>
</tr>
<tr>
<td>3.4.4</td>
<td>TB-HIV co-infection</td>
<td>42</td>
</tr>
<tr>
<td>3.4.5</td>
<td>Multi-drug resistant tuberculosis</td>
<td>45</td>
</tr>
<tr>
<td>3.5</td>
<td>Impact on the program and achieving the MDGs</td>
<td>46</td>
</tr>
<tr>
<td>3.5.1</td>
<td>Tuberculosis incidence and case detection</td>
<td>46</td>
</tr>
<tr>
<td>3.5.2</td>
<td>Tuberculosis prevalence</td>
<td>47</td>
</tr>
<tr>
<td>3.5.3</td>
<td>Treatment success rate</td>
<td>47</td>
</tr>
<tr>
<td>3.5.4</td>
<td>Tuberculosis-related mortality</td>
<td>48</td>
</tr>
</tbody>
</table>
LIST OF ABBREVIATIONS

ARV Antiretroviral Therapy
BCG Bacille Calmette Guérin vaccination
CAME Centrale d’Achat des Médicaments Essentiels (Central Medical Store)
CBO Community-Based Organization
CDM Centre de Diagnostic Microscopique (Microscopy Screening Center)
CDT Centre de Dépistage de la Tuberculose (Tuberculosis Screening Center)/Centre de Diagnostic et de Traitement (Screening and Treatment Center)
CHD Centre Hospitalier Départemental (Departmental Hospital)
CHMP Centrale Humanitaire Médico-Pharmaceutique
CHNPP Centre Hospitalier National de Pneumo-Phtisiologie (National Pneumophthisiology Center)
CHPP Centre Hospitalier de Pneumo-phtisiologie (Pneumophthisiology Center)
CSC Centre de Sante Communal (Commune level Health Center)
CTDO Centre de Traitement Directement Observé (Directly Observed Treatment Center)
CTM Cotrimoxazole
CVA Chauffeur de Véhicule Administratif (Administrative Vehicle Driver)
DDS Direction Départemental de la Santé (Departmental Health Directorate)
DNSP Direction Nationale de la Santé Publique (National Directorate of Public Health)
DOTS Directly Observed Treatment Short Course
DPP Direction de la Programmation et de la Prospective (Directorate of Programming and Forecasting)
DPS Domaine de Prestation de Service (Service Provision Area)
EPTB Extrapulmonary Tuberculosis
GF Global Fund
GFATM Global Fund to Fight AIDS, Tuberculosis and Malaria
GFATM-MU Global Fund to Fight AIDS, Tuberculosis and Malaria Management Unit
HC Health Center (first-line health facilities)
HZ Health Zone
IUATLD International Union Against Tuberculosis and Lung Disease
LFA Local Fund Agent
LRM Laboratoire de Référence des Mycobactéries (National Reference Laboratory for Mycobacteria)
MDG Millennium Development Goal
MDR-TB Multi-Drug Resistant Tuberculosis
MS Ministry of Health
NGO Non-Governmental Organization
NTP National Tuberculosis Program
PIB Public Investment Budget
PIP Public Investment Program
PLWH People Living with HIV
PNLS Programme National de Lutte contre le Sida (National AIDS Control Program)
PSM Procurement and Supply Management
ROBS Réseau des ONG du Bénin en Santé (Network of Health NGOs in Benin)
SEIB Société d’Electricité Industrielle et de Bâtiment (Society for Industrial Electricity and Building)
SOP Standard Operating Procedures
SPPS Service de Protection et de Promotion Sanitaires (Health Protection and Promotion Services)
SS-  Sputum Smear Negative
SS+  Sputum Smear Positive
TB   Tuberculosis
UNDP United Nations Development Programme
WHO  World Health Organization
ZH   Zonal Hospital
LIST OF TABLES
Table 2: Summary of activities financed by Round 6 of the Global Fund ...................................................... 27
Table 3: Categories of personnel recruited through GFATM financing .............................................................. 28
Table 4: Office equipment obtained through GFATM financing ........................................................................ 29
Table 5: Case management of multidrug-resistant tuberculosis ....................................................................... 45
Table 6: Summary of prospects for achieving Goal 6 of the MDGs .................................................................. 49
Table 7: Availability of information related to case management in audited patient records ......................... 57
Table 8: List of selected CDTs and patient sample size by CDT ...................................................................... 64
Table 9: Results of the NTP-data-quality investigation .................................................................................. 65
Table 10: Medical equipment obtained through Global Fund financing ......................................................... 66
Table 11: Data collection tools ......................................................................................................................... 67
Table 12: Overview of laboratory staff for 12 evaluated CDTs ........................................................................ 68

LIST OF FIGURES
Figure 1: Partner contributions to the NTP budget......................................................................................... 13
Figure 2: Expenses from 2003 to 2011 by the main funding sources of the NTP ........................................... 14
Figure 3: Portion of the NTP budget in the Ministry of Health General Budget ............................................. 15
Figure 4: Categories of spending funded by GFATM from year 1 to year 5 for Rounds 6 and 9 ................... 16
Figure 5: Cumulative spending per cost category from year 1 to year 5 for Rounds 6 and 9 ....................... 17
Figure 6: GFATM funding expenditures by category over the 5-year period of Rounds 6 and 9 .................... 17
Figure 7: Number of CDTs and TB Testing Centers ...................................................................................... 31
Figure 8: CDT contribution to case reporting ................................................................................................. 31
Figure 9: Ratio of examined suspected cases of TB to detected TB cases ....................................................... 32
Figure 10: Reporting rate for new TB cases (all forms combined) ................................................................. 33
Figure 11: Reporting rate for new SS+ cases .................................................................................................. 33
Figure 12: Reporting rate for SS- cases .......................................................................................................... 34
Figure 13: Reporting rate for extrapulmonary tuberculosis ........................................................................... 35
Figure 14: Reporting rate for retreatment cases ............................................................................................. 35
Figure 15: Reporting rate for relapse cases .................................................................................................... 36
Figure 16: Reported rate of primary treatment failure .................................................................................. 36
Figure 17: Rate of retreatment cases ............................................................................................................ 37
Figure 18: All new cases reported by department .......................................................................................... 38
Figure 19: Benin and bordering countries ...................................................................................................... 38
Figure 20: Reported rates of TB in Benin and neighboring countries .............................................................. 39
Figure 21: Treatment outcomes of new SS+ cases in Benin ....................................................................... 40
Figure 22: Treatment success rates of SS+ cases in Benin and neighboring countries ............................... 40
Figure 23: Mortality rate for SS+ cases in Benin and neighboring countries .................................................. 41
Figure 24: Treatment outcomes of new smear-negative/extrapulmonary cases ........................................... 41
Figure 25: Treatment outcomes of retreatment cases in Benin ................................................................... 42
Figure 26: TB/HIV co-infection and ARV and cotrimoxazole initiation ......................................................... 43
Figure 27: Rates of HIV testing for tuberculosis patients in Benin and neighboring countries between 2005 and 2010 .............................................................................................................. 44
Figure 28: Rate of TB/HIV co-infected patients on Cotrimoxazole ............................................................... 44
Figure 29: Estimated TB incidence in Benin ................................................................................................... 46
Figure 30: Estimated TB case detection rate in Benin .................................................................................... 47
Figure 31: Estimated TB case prevalence rate in Benin ................................................................................ 47
Figure 32: Treatment success rate for SS+ patients in Benin ....................................................................... 48
Figure 34: GFATM financing and selected performance results .......................................................... 53
Figure 35: Treatment results for SS+ cases by department ............................................................ 56
EXECUTIVE SUMMARY

Tuberculosis continues to be a serious public health problem in Sub-Saharan Africa and Benin. According to 2010 WHO data, Benin represents 1.05% of the total population of the Africa Region, with 8.8 million out of a total 837 million people. In the Africa Region, Benin accounts for 0.4% of the tuberculosis incidence (8,300 out of 2.3 million new cases), 0.5% of the estimated tuberculosis prevalence (13,000 out of 2.8 million cases), and 0.6% of tuberculosis related mortality (1,400 out of 247,000 tuberculosis related deaths). In response to this, the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) has funded Benin’s efforts to control endemic tuberculosis since 2003. These contributions have significantly increased the financial resources available for the National Tuberculosis Program (NTP) in Benin; from 3,104,181 Euros in 2003 to 6,175,350 Euros in 2010. This evaluation aims to determine the extent to which this GFATM support has had an impact on key tuberculosis indicators in Benin.

Since its founding, the NTP has been supported primarily by the government of Benin but has also received support from other technical and financial partners, such as the World Health Organization (WHO) and the International Union Against Tuberculosis and Lung Disease (IUATLD). Since 2003, the GFATM has supported NTP activities through grants awarded in Rounds 2, 6, and 9, which have totaled approximately 60% of the NTP’s operating budget (10,957,529 Euros out of a total 18,304,336 Euros budget between 2003 and 2010). Most of GFATM’s contribution from 2006 to 2011 was used for human resources development (1,226,821 Euros, or 24%), as well as training and retraining of staff at all levels of the program (808,308 Euros, or 16%). The remainder of the GFATM’s contributions went to purchasing of pharmaceutical products (605,070 Euro, 12%), nutritional support for TB patients (641,509 Euro, 12%), and supervision of program activities (381,784 Euros, 7%). GFATM support also allowed for the development of a standard operating procedure for NTP program management.

In addition, the GFATM funds made it possible to significantly increase the number of screening and treatment sites across the country, from 47 CDTs in 2003 to 57 in 2010. The funds increased hospitalization capacity and improved conditions for patients by ensuring virtually constant drug availability, providing funds for non-medical expenses (transportation equipment, infrastructure repairs, food purchases for patients), and for CDT renovations. Additionally, the funding has helped set up a monitoring and evaluation system, which has been a key tool in securing the program’s current results.

Through the GFATM, Benin has made significant progress in tuberculosis control. In Benin, the proportion of the total population covered by DOTS-implementing health centers has been improved with at least one CDT per health district. In 2005, the country achieved an 85% threshold for the treatment success rate for new SS+ cases. The death rate for newly reported cases of SS+ gradually decreased, going from 9% in 2004 to 5% in 2009. In addition the cure rate increased from 55% in 2003 to 80% in 2009 with the lost to follow-up rate during this period decreasing from 8.3% to 1.2%. From 2005 to 2009, 86,583 suspected cases were screened for TB. 20% of those screened were diagnosed with TB (90% of patients diagnosed with TB had pulmonary tuberculosis). Among pulmonary TB cases diagnosed, 92% were SS+ with 88% of these being successfully treated. During the same period 93% of TB patients were screened for HIV, of which 16% were found HIV-positive. 91% of TB/HIV co-infected patients started on CPT and 35% on ART.

With GFATM support, the execution of numerous activities has contributed to these results. Global Fund intervention has helped improve access to screening and treatment and has strengthened capacities in
all program components, placing Benin’s program in the forefront in terms of quality in tuberculosis control in the West African sub-region. For example, Benin has the best treatment outcomes of its neighboring countries. This contribution has had a significant impact on Benin’s effort to achieve Millennium Development Goal (MDG) 6 to combat HIV/AIDS and TB, though according to WHO estimates of tuberculosis incidence, prevalence and death, it is unlikely that Benin will achieve any of the goals except for the treatment success rate of 90%. The success on this goal is primarily a result of improved program performance in case management and data monitoring systems. The goals for SS+ case detection rate, TB related mortality and TB prevalence are not anticipated to be achieved. This assessment is limited, however, by the fact that NTP estimates are not in agreement with the WHO estimates, and need to be revisited.
1 INTRODUCTION

1.1 Overview of Benin

1.1.1 General information

Benin is a country in West Africa, located on the Gulf of Guinea and covering an area of 114,763 square kilometers.\(^1\) It is bordered by Niger in the north, Burkina Faso in the northwest, the Atlantic Ocean in the south, Nigeria in the east, and Togo in the west. Its climate is hot and humid. The country is divided into 12 departments that are subdivided into 77 communes. Each commune is subdivided into districts, which are divided into villages or urban neighborhoods. According to UN estimates\(^2\):

- Benin’s population was 8,850,000 inhabitants in 2010.
- Life expectancy at birth was 55 years for the period between 2005 and 2010; 53 years for men and 57 years for women.
- The mortality rate for children under five was 85.1 per 1000 live births for the period between 2005 and 2010.

1.1.2 Health system

The national health system is organized in a pyramidal structure modeled on the administrative divisions in the country. It has three levels; the central or national level, the intermediate or departmental level, and the peripheral or operational level. Benin has 5 national hospitals including 1 university hospital, 5 departmental hospitals, 27 zone hospitals operating in the country’s 34 health zones, and 608 health centers. Since 2009, 57 CDTs operate throughout the country offering tuberculosis screening and treatment. The five most common reasons for hospitalization are malaria, anemia, diarrhea, respiratory infections, and accidental injury.\(^1\)

1.2 Context

1.2.1 Magnitude of the problem

According to the WHO world report on tuberculosis issued in 2011, between 8.5 and 9.2 million new cases of tuberculosis were recorded in 2010, including 1.2 to 1.5 million deaths (including HIV-positive cases). With 12% of global population, the African region accounts for 24% of incidence of tuberculosis cases in the world.

The last WHO report shows a decrease in the number of new cases globally in 2010 compared to previous years, while the estimated number of cases in Africa remains stable at 2.3 million, and incidence decreased from 286 cases per 100,000 people in 2008 to 276 cases per 100,000 in 2010. The current relative stability of the number of tuberculosis cases in Africa can be attributed to poverty and the high prevalence of HIV among tuberculosis patients, particularly in Sub-Saharan Africa.

---

\(^1\) Benin National Health Statistics Yearbook, 2010
\(^2\) United Nations, Populations Division, Department of Economic and Social Affairs, 2011.
1.2.2 Overview of the national context

According to WHO estimates, in 2010, prevalence of TB disease in Benin was estimated at 149 cases per 100,000 people, while the incidence of cases was 94 cases per 100,000 people. The tuberculosis detection rate was 45%, while the international target is 70%. The actual magnitude of the epidemiological situation for tuberculosis in Benin is unknown. Recent WHO estimates of TB prevalence in Benin have not been accepted by NTP. According to the 2010 Benin NTP Activity Report, the reported incidence for all types of cases was 3756 (42.8 cases per 100,000 people), and for sputum smear positive TB (SS+), it was 2973 cases, or 34 per 100,000 people.

The male/female ratio in TB patients is 1.8. The most affected age group is 25–44 years. The prevalence of human immunodeficiency virus (HIV) is 14% for those with tuberculosis, and the HIV-testing rate of this population is 98%. There is a strong gradient of the disease from the north to the south that appears to be related to the country’s population density.

1.2.3 History of tuberculosis control in Benin

The history of tuberculosis control in Benin has occurred over three main periods:

1. Before 1966;
2. Between 1966 and 1980; and
3. From 1980 to the present.

Before 1966, tuberculosis control fell under the responsibility of the major endemic diseases service and mainly consisted of mass immunization activities using BCG.

In 1966, a tuberculosis section was created within the Ministry of Public Health whose mission was to create and develop specialized centers to control tuberculosis. Four centers were created: the Akron Pneumophthisiology Center (CPP) in Porto Novo, the Centre National Hospitalier National de Pneumophthisiologie (National Pneumophthisiology Center, CHNPP) in Cotonou, and the tuberculosis control centers (CDTs) of Abomey in Zou and of Parakou in Borgou.

The limitations of this specialized-centers based strategy were evident early on and in 1972 TB-control activities were integrated and decentralized into general healthcare structures. During this integration process, plans were made to create three to four Centres de Diagnostic et de Traitement (Screening and Treatment Centers; CDTs) per year within the District Health Centers (currently the Commune Health Centers) for patient case management.

However, without a national program providing clear programmatic and clinical guidance, screening and treatment methods were not standardized throughout the country.

Plans to develop a well-defined national program first emerged in the 1980s with the hiring of a national program coordinator. The International Union Against Tuberculosis and Lung Disease (IUATLD) and the French Cooperation supported this new direction.

The year 1983 marked a major turn in the fight against tuberculosis in Benin with the introduction of eight-month short-course regimens containing Rifampicin (a major antituberculosis drug), administered to patients under direct observation by healthcare staff. Plans were made for accompanying measures to support implementation of short-course chemotherapy, namely: strengthening the national coordination team; TB screening tests and control tests for disease evolution, creation of the National

---

3 Global Tuberculosis Control 2011, WHO report
Reference Laboratory for Mycobacteria (LRM) to control quality in the laboratory network, regular supply of antituberculosis drugs to CDTs in order to avoid stockouts, and implementation of tools for data collection on screening and treatment.

These activities prefigured the development of the DOTS strategy, recommended by WHO in 1993. The results that followed were dramatic with increased rates of cured cases and a drastic reduction in the rate of patients lost to follow-up.

In 1986, through technical and financial support from the IUATLD, the NTP’s first guideline document was produced and validated. This guide underwent two revisions in 1996 and 2006, respectively, and is now in its third edition.

In 1998, the government demonstrated its dedication to the program when the NTP budget was integrated in the public investment budget (PIB).

1.2.4 Global Fund’s entry on the scene

Since 2003, following approval of the Benin application, the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) has contributed substantial support to the National TB Control Program (NTP). This GFATM support made it possible to build on the previously mentioned achievements and develop new initiatives such as community involvement in tuberculosis case management.

The main goal of activities subsidized by the GFATM is to reduce morbidity and mortality due to tuberculosis among the people of Benin. Specifically, this includes:

1. Improving access to testing and treatment of all forms of tuberculosis cases while maintaining a high detection rate of smear-positive cases.
2. Building the capacity of the National Reference Laboratory for Mycobacteria.

1.2.5 Context of this evaluation

Since 2003, the involvement of GFATM has substantially increased the financial resources available to control tuberculosis in Benin, from 3,104,181 Euros in 2003 to 6,175,350 Euros in 2010. This financial support is aimed at producing a significant impact on the availability, quality, and coverage of services, as well as on treatment outcomes for the disease and therefore the disease burden.
1.3. Conceptual framework of the evaluation

The conceptual framework of this evaluation is shown in the diagram below:

**Expected Flow of Global Fund Financing**
- Global Fund
  - National TB Control Program
    - Input
    - Process
    - Output
    - Outcome

**Evaluation Areas**
- Epidemiologic Laboratory
- Financial

Impact = 50% reduction in disease burden (in 2015) $\rightarrow$ MDG 6 achieved
2006 - 2011

1.4 Evaluation objective

This evaluation was designed to determine the impact of the financial resources provided by the GFATM on tuberculosis services and disease burden in Benin.

1.4.1 Specific objectives

More specifically, this evaluation will:
- Explain to what extent Global Fund investments contribute to the decrease in tuberculosis related morbidity and mortality;
• Assess the performance of the NTP in tuberculosis case management;
• Assess Benin’s progress to date towards the achievement of MDG 6;
• Make specific recommendations for improvement.

1.4.2 Other evaluation areas

1. DOTS Expansion Model:

• Has the model been implemented countrywide as intended?
• What has been its effect on access to quality diagnosis and treatment?
• Does the model take into account all target groups for tuberculosis treatment by incorporating TB/HIV co-infection and multi-drug resistant cases?
• Does it allow for compliance to standards and to national policy?

2. What are facilitating and inhibiting factors to achieving results?

3. Has gender and equity been considered in the provision of TB services?
2 DESCRIPTION OF THE METHODOLOGICAL APPROACH

2.1 Methodological approach

The evaluation team conducted a cross-cutting descriptive study with mixed methods: qualitative and quantitative.

Three main components of the study were:

- The “epidemiological and field survey”
- The “laboratory survey”
- The “economic survey”

2.2 Sampling

2.2.1 Description of study targets

This evaluation covers six of the country’s departments, based on the former administrative divisions and includes:

- Health structures, namely the Screening and Treatment Centers (CDTs) as well as hospitals that provide treatment for tuberculosis patients. NTP coordinating body.
- Partners from various levels of the NTP (technical and financial partners, Global Fund principal and sub-recipients, the Ministry of Health, and the LFA).
- Surveyed target groups included the various program stakeholders from the national to the peripheral level, key informants from partnering agencies, patients on treatment, and cured patients.

2.2.2 Identification of the sampling framework

The different sampling methods used were based on the targets for each investigation. A random sampling method was used to select the CDTs, patients, and patient records and a purposive non-randomized sampling method was used for interviews with managers (of the program, Global Fund, and WHO) and social partners (NGO directors, local radio stations).

The following sampling framework was used:

- Selection of CDTs using data on the number of tuberculosis cases (new and old) tested in 2010;
- “Systematic” selection of patients using lists of patients collected in the CDTs;
- Selection of key informants from the program and partners using the “purposive” non-randomized sampling method; those selected being those to answer questions about themselves.

For health structures:

- First, the CDTs were stratified by level (Central/Intermediate/Peripheral);
- Next, lots were drawn based on scientific criteria and available resources: two CDTs per department were selected through a “simple random” drawing and the number of patients per CDT was allocated proportionally. The sampling frame was the list of patients screened.
The number of patients to interview per CDT was estimated based on data from 2010, multiplied by a sampling rate (3%) and a multiplying factor (1/12) representing the fraction of the monthly average for the actual number of patients in 2010. (Names of the CDTs that were drawn and sample sizes for each CDT are presented in Annexes.)

In each selected CDT, patient selection was conducted based on the “S” sampling interval, equal to the total number of registered patients from January 1–November 30, 2011 reported for the sample size. The first patient was chosen randomly; his or her rank \( R_0 \) will be between 1 and the calculated sampling interval \( S \). The other patients are those whose ranks are:

\[
R_0 + S, R_0 + 2S, R_0 + 3S, \ldots, R_0 + (n - 1)2S
\]

**Patient records were selected** with the same procedure used for selecting patients.

Therefore:

- 12 CDTs were selected: 1 from the central level (CHNPP), 1 from the intermediate level (Akron), and 10 from the peripheral level;
- 120 patients were to be targeted for the investigation;
- 100 patient records were audited.

**Selection of key informants:**

- The Program Coordinator and his deputy were selected to be interviewed regarding governance and compliance with policies and strategies related to tuberculosis control;
- The financial manager and the LFA were selected to be interviewed regarding financial and budget issues;
- Head doctors/heads nurses of CDTs were selected to be interviewed regarding screening and case management of tuberculosis patients;
- Directors from partner NGOs and radio stations were selected to be interviewed to assess coverage and content of awareness-raising messages.
- WHO and SEIB were selected to be interviewed in order to clarify their role in the program.

### 2.3 Data collection

#### 2.3.1 Data collection techniques

Data were collected using a number of techniques, including:

- Document review;
- Analysis of existing documents;
- Semi-structured interviews with key informants; and
- Direct observation.
2.3.2 Data collection tools and procedures

The evaluation team designed and pre-tested interview guides which were adapted from the World Health Organization (WHO’s) Monitoring and Evaluation Tool-Kit - HIV, Tuberculosis and Malaria and Health System Strengthening.

WHO disease burden estimates and routine data from the NTP were analyzed by the evaluation team and are the basis for many of the graphs included in this report.

On-site interviews with NTP technical partners and healthcare providers were conducted by public health doctors while on-site interviews with patients were conducted by experienced sociologists.

In order to assess the quality of program data, the team used the program’s data flow diagram to target three levels of data quality control:

- **1st level of control (CDT)**
  The study team verified the agreement between and accuracy of information in patient records and the tuberculosis register.

- **2nd level of control (CDT)**
  The study team verified agreement between the tuberculosis register and the quarterly report.

- **3rd level of control (PNT)**
  The study team verified agreement between information in the quarterly report and that taken from the NTP database.

An error rate was calculated for each level of control; program data quality was judged to be “good” if it fell below 5%. The following data were verified:

**4th quarter screening report of 2010**

1. number of reported new SS+ cases (new sputum smear positive)
2. number of reported SS- cases
3. number of reported EPTB cases
4. number of relapses
5. number of cases of treatment failure
6. number of SS+ cases tested for HIV

**4th quarter treatment report of 2009**

7. number of new cases of SS+ lost to follow-up
8. number of new cases of SS+ cured
9. number of new cases of SS+ who completed treatment
10. number of new cases of SS+ who died during treatment

2.4 Evaluation implementation

The evaluation was conducted in four phases.

2.4.1 Phase 1: Preparation and launch

The evaluation team held meetings with stakeholders in order to clarify their expectations and to review:
• the organizational chart and program organization
• programming data (beneficiaries reached, services offered and used)
• financial data
• available literature
• identification of reference documents to better assess impact

Using results from the review, a data collection plan was established.

2.4.2 Phase 2: Field work

The evaluation team first met with the NTP coordination unit, the Ministry of Health, regional managers for tuberculosis coordination, and the local control structure for managing GFATM funds (LFA) and then visited health structures and met with healthcare providers as well as patients under treatment and cured patients.

Semi-structured interviews with key informants were conducted. Administrative services and health structures were randomly selected for the quantitative data collection.

In addition, the evaluation team conducted:

• Audits of patient records. Quality in filling out patient records was evaluated through verification of documentation of key case management information.
• Lab assessments (to find out if they have the necessary equipment, sufficient staff, and the required tests and if they use a quality-assurance system); recording of results in the laboratory registers was also verified.
• Financial assessments (to identify various funding, how it is used, and the flow of allocated funds).

2.4.3 Phase 3: Data analysis and synthesis

Data analysis was conducted in compliance with the previously adopted analysis plan. The team also evaluated other results such as adherence to workplan and guidelines, human resource management, innovative solutions to overcoming challenges and additional indicators related to laboratories, drug supply system. At each level of the program, the team tried to make the connection between GFATM financing and the results achieved by the program.

2.4.4 Phase 4: Producing the final report

This final report includes recommendations whose rationale and conclusions are based on the findings noted during the investigation, the various analyses, and results from the interviews with the key informants.

2.5 Data entry, quality assurance, and data analysis

Data processing operations were conducted using CsPRO® software. In order to limit data-entry errors and inconsistencies in information, processing was done in three phases:

• Data entry by two data-entry staff;
• Identification and correction of data entry errors; and
• Data cleaning through control procedures.
Qualitative data were organized by main topics and analyzed to respond to specific study objectives using the Atlas.ti.6.2 tool®.

2.6 Limitations and difficulties

Delays in providing some data, particularly financial data, hampered the data-collection process. Moreover, the various GFATM recipients did not all follow the same format to present their financial reports. This caused difficulties when compiling and cross-checking financial data. Consequently, the disaggregation of GFATM resources by service provision area (DPS) could not be done.

2.7 Ethical considerations

All necessary ethical considerations were complied with during this study and informed consent was obtained from the various people who were surveyed.
3 RESULTS

Results will be presented following the conceptual framework for this evaluation (page 5) in the following order: inputs, processes, outputs, outcomes, and impact.

3.1 Program inputs

The inputs provided to the NTP by GFATM can be divided into the following categories:

- financial resources
- human resources
- medical products
- other non-medical expenses

3.1.1 Financial resources received by the program

A database of the National Tuberculosis program’s overall financing was created using the data collected from the surveyed health structures and the Directorate of Programming and Forecasting of the Ministry of Health (DPP/MS). Figure 1 shows the evolution of NTP funding by funding source between 2003 and 2011, and Figure 2 shows the expenses incurred by funding source for this same time period.

Figure 1: Partner contributions to the NTP budget

![Figure 1: Partner contributions to the NTP budget](source: NTP)
These graphs show that apart from 2003 and 2006 when the government’s contribution was higher (due to transition into Rounds 3 and 6); nearly 60% of Benin’s TB program funding is primarily dependent on the Global Fund. This situation poses a problem in terms of ownership, funding sustainability, and maintenance of program performance improvements after GFATM withdrawal. In order to address these concerns, it is recommended that the program consider viable alternative funding mechanisms.

It was noted that the funds allocated by the GFATM were centralized. All of the key interventions, namely obtaining food supplies, monitoring and evaluation, recruitment of human resources, and training are planned and managed by the program at the central level. Financial flows are not transferred from the GFATM to the intermediate and peripheral levels.

Global Fund share

The GFATM contributes an estimated 60% to NTP operations. These funds have been disbursed across three rounds and are summarized in Table 1. Key informants in program management noted that Global Fund disbursement procedures have at times created delays in availability of funds.

Table 1: GFATM funding distribution for tuberculosis in Benin

<table>
<thead>
<tr>
<th>ROUNDS</th>
<th>PRINCIPAL RECIPIENT</th>
<th>SUB RECIPIENT</th>
<th>START &amp; END</th>
<th>PROJECTED AMOUNT OF GRANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROUND 2</td>
<td>UNDP</td>
<td>NTP</td>
<td>Nov. 1, 2003 – Oct. 31, 2006 (Completed)</td>
<td>$ 3,095,158</td>
</tr>
<tr>
<td>ROUND 6</td>
<td>GFATM-MU (Ministry of Health)</td>
<td>NTP</td>
<td>June 1, 2007 - Sept. 30, 2009 (Phase 1 completed) May 31, 2012 (end of Round 6, Phase 2)</td>
<td>€ 4,345,003</td>
</tr>
</tbody>
</table>
ROUND 9 + ROUND 6 consolidated funds

<table>
<thead>
<tr>
<th>NTP</th>
<th>SEIB (non-medical equipment) CAME (medical products)</th>
<th>July 1, 2010 - Dec 31, 2012</th>
<th>€ 3,246.896</th>
</tr>
</thead>
</table>

Source: NTP

- National budget share

Estimates of the government’s share of program funding consisted of four categories:
  - obligated by the Public Investment Program (PIP),
  - government allocated funds to health centers
  - salaries, and
  - electricity and water costs.

**Figure 3: Portion of the NTP budget in the Ministry of Health General Budget**

Source: MS/DPP

The share of the national budget allocated to the Ministry of Health remains quite low, below 10%. The NTP’s share of the Ministry of Health’s general budget is very low, ranging from 2% to 5% of the total. This may reflect limited interest in funding tuberculosis control activities, even though it is a high-priority disease in Benin.

Data from the Directorate of Programming and Forecast (DPP) provided information on commitments to the Public Investment Program (PIP) as well as those for assigned funds for each of the 55 CDTs and the 2 CHPPs. Discussions during the interviews with some of the program’s resource persons made it possible to estimate the program’s overall salary amount. Lastly, electricity and water costs for the entire Ministry were estimated. This evaluation did not allow for developing an allocation formula to extract the program’s share. Consequently, the government’s share suggested here is underestimated because it does not take into account electricity and water costs.

- Share of other program donors

Included among other donors who contribute to the program are the International Union Against Tuberculosis and Lung Disease (IUATLD) and WHO. The IUATLD provides technical support to the program by funding training for some staff through the Inter-University Diploma and MDR case management.
WHO supports the program through technical training for workers, help in establishing new protocols and guidelines, provision of management software, pre-qualification for drugs, and support in writing bids for GFATM rounds.

3.1.2 Analysis of program costs

GFATM resources were managed by the United Nations Development Programme (UNDP) from 2003 to 2006 and are currently managed by the Global Fund Management Unit of the Ministry of Health (GFATM-MU) and the NTP. Despite a lack of complete detailed information on GFATM expenditures for these three rounds, the evaluation team tried to analyze the management of funds from Rounds 6 and 9 of the Global Fund over the last five years by examining its spending commitments. Figure 4 shows the trends of the types of costs funded by GFATM from year 1 to year 5. The Global Fund resources mentioned here refer to those managed by the Global Fund Management Unit of the Ministry of Health and the NTP as the principal recipient. Year 5 covers the period from July 1 to December 31, 2011.

Figure 4: Categories of spending funded by GFATM from year 1 to year 5 for Rounds 6 and 9

This graph shows that, during the period from year 1 to year 5, the Global Fund primarily invested in the program’s human resources through as-needed recruitment, training and supervision of health workers, provision of equipment and infrastructure, monitoring and evaluation, provision of communication materials, social mobilization, and patient support. It should be noted that the GFATM is the sole partner that is involved in every strategic level of the program. It is hypothesized, then, that any improvement across all levels of the program as well as in TB epidemiological indicators or increase in technical support was contributed to by GFATM.
Figure 5: Cumulative spending per cost category from year 1 to year 5 for Rounds 6 and 9

Cumulative spending per cost category (%)

- Human Resources
- Training
- Pharmaceutical Products and Medical Equipment
- Stock Management Costs
- Infrastructure and Equipment
- Communication and Social Mobilization
- Monitoring and Evaluation
- Nutritional and Social Support to patients/target populations
- Planning and Administration

Source: NTP

Figure 6: GFATM funding expenditures by category over the 5-year period of Rounds 6 and 9

GFATM funding expenditures by category over the 5-year period of Rounds 6 and 9

Source: NTP
The preceding graphs show that the GFATM has provided most of the program funding (approximately 60% of the NTP’s total expenditures) since 2003 and is involved in all aspects of NTP services. This means that in the event of withdrawal or a significant decrease in Global Fund support, the program’s gains which have been achieved through high human, financial, or material investment are at risk. In order to counter this, the program should diversify its sources of funding for NTP activities. The program would also benefit from greater decentralization in its management to ensure that achievements are sustained at the peripheral level.

Two primary barriers prevented a formal cost-effectiveness analysis:

- The various management units for GF funding do not routinely structure expenditures by service provision area (DPS). So detailed expenditures by DPS were not available.
- Cost classification structures provided by the management unit gave only expenditure categories and did not allow for analysis by DPS. This structuring system will only allow for comparing the program’s performance factors to expenditure categories.

The remainder of this document will attempt to show the link between program inputs resulting from GFATM resources and the various program results.

3.1.3 Human resources

Financing from the Global Fund has mainly covered recruitment and payroll for a variety of program staff. The various targeted cadres of staff were:

- doctors
- laboratory technicians
- imaging engineers
- financial statisticians
- administrative assistants
- accountants
- administrative vehicle chauffeurs
- telephone operator
- social workers
- patient follow-up staff
- maintenance workers
- health aids
- data entry personnel

Additional staff at both the central and decentralized levels has allowed the Ministry of Health to extend tuberculosis control activities throughout the country. Justification for this large investment in human resources is:

- shortage of qualified health workers in the country’s health structures in general and of those working specifically in tuberculosis case management. This is related to a recruitment freeze in civil services since 1996. In addition, health care staff are often hesitant to work in tuberculosis due to stigma related to the disease.
- need to build management capacity in the various levels of case management.
• High turnover in the CDTs (due to departures for more lucrative contracts from NGOs and the for-profit private sector, and changes in healthcare staffing).

There is a plan for ongoing training which will be validated by the Global Fund and which will be updated every six months by the program. This will mitigate the unstable staffing challenge noted above. Training will be centered on gaps noted during supervision visits, and recruitments are based on needs expressed by the program. Management capacity is being built, with human resources management forms being updated frequently and development and maintenance of employee job descriptions. There is a risk that these skilled staff, developed at a high cost, will be lost as soon as GFATM grants cease.

In terms of human resources management, it was noted that the NTP has well-structured program with an organizational chart which clearly defines hierarchical levels, operational relationships between the various structures, and procedures for delegating tasks. There is a feedback mechanism coupled with a referral and counter-referral system for patients, in addition to a communications framework with all other program partners.

3.1.4 Medical products

GFATM grants have also contributed to purchasing medical products. Drug purchases are a major component in program implementation, since pharmaceutical products and medical equipment purchased through GFATM funding contribute to improved diagnosis and treatment. In particular, the GFATM supports the purchase of first-line antituberculosis drugs for the NTP.

Within the NTP, there is a team responsible for supply chain management of antituberculosis drugs and antiretrovirals. This team has been trained on supply chain procedures and is regularly monitored. The drug supply chain follows these steps:

• Specification of drugs to purchase
• Quantification of needs for each drug using site-based needs
• Selection of suppliers
• Purchase of products
• Product quality assurance
• Product inventory
• Product storage
• Distribution
• Ensuring rational use of products
• Information-system maintenance
• Budget preparation

There is a procurement plan for drugs that describes the supply modes, potential suppliers, budget corresponding to the purchasing plan, delivery timeframes, and product selection. Antituberculosis drugs are ordered directly by the NTP through the Centrale d'Achat des Médicaments (Central Medical Store, CAME).

Quality control will be launched in 2012 through Global Fund support; a laboratory has already been selected for this purpose.
In the area of stock management, processes are adhered to and the stockout rate is low, or even zero. Buffer stocks are maintained, and antituberculosis drugs are regularly ordered every six months. There is also a very well structured stock distribution policy; transportation occurs under proper conditions, and the distribution network is well established.

At the departmental level, stock management of antituberculosis drugs is done through the establishment of distribution warehouses, and the drugs are delivered quarterly during supervisions. For TB/HIV patients, antiretrovirals are delivered each month by the CAME.

The NTP is able to manage this system using equipment obtained through Global Fund financing (calculators, fax machine, photocopier, computers, and vehicles).

The following strengths of the drug management system were identified through this evaluation:

- Staff training on a supply procedure manual
- Use of a supply procedure manual
- Establishment of a supply team in charge of the various supply steps using a plan for management and purchasing stock
- Transparency of invitations to tender by the CAME
- Regular annual inventory
- Quarterly control of rational use of products
- Existence of procurement plans developed by the CAME
- Existence of the drug list established by the Directorate of Pharmacies
- Product quality control ensured by the CHMP (Centrale Humanitaire Médico-Pharmaceutique under contract with the NTP)
- A contract signed with the NISA/Benin Insurance Company for product safety. Products close to their expiration date are used first
- The expiration rate is almost zero

3.1.5 Other non-medical investments

✓ Purchase of food

Foodstuffs are purchased by the program and periodically distributed to patients, providing them with nutritional support. These include: rice, corn, millet, pasta shells, sardines, evaporated milk, vegetable oil, fish, meat, beans, and gari. These allocations allow patients to meet their food needs during their treatment. 100% of the patients interviewed during this study claimed to have received food support during their treatment. Funding granted by the GFATM has made it possible to buy and give patients food on a periodic basis with no stockouts unlike the subsidized food purchased through government assigned funds, which often reports delays.

✓ Purchase of transportation equipment

With GFATM grants, the NTP has acquired transportation equipment, specifically, cars and motorbikes. The purchase of cars has allowed for improvements in the program’s monitoring and evaluation and supervision systems by enabling greater interaction between managers at the central, intermediate, and peripheral levels. The purchase and delivery of motorbikes for CDT managers has mainly supported tracing of lost to follow-up patients in the community and allowed for supervision of CTDO staff.

✓ Office equipment and civil-engineering work
GFATM grants have also contributed to purchasing office equipment and civil-engineering construction. CDT renovations give healthcare providers a proper work environment and provide tuberculosis patients with a more pleasant environment during hospitalization. Laboratory renovation will ensure greater reliability for screening and facilities that comply with existing norms and standards. In addition, acquisition of office equipment will help strengthen the monitoring and evaluation system. The SEIB is the current GFATM sub-recipient responsible for non-medical product supply for the consolidated Rounds 9 and 6. Together, the SEIB and NTP carried out:

- renovation of 4 CDTs (Abomey-Calavi, Dogbo, Papané and Ouidah)
- renovation of the National Reference Laboratory for Mycobacteria
- construction of the Parakou LMC
- acquisition of office equipment
- purchase of transportation equipment

This collaboration has not been successful since less than 10% of the activities stipulated in the contract have been carried out by the end of the contractual period. This has been attributed to lengthy public procurement procedures in the Republic of Benin which cost valuable time. The lack of communication between the NTP and SEIB and differing views on the justification of administrative management costs should also be noted.

Guidelines provided to program actors

With GFATM support, the following policy documents were developed, printed, and disseminated:


3.2 Activities (Process)

Activities implemented through the GFATM grant included:

- Training of the various program actors
• Community awareness raising about the disease
• Supervision
• Support for case screening cases
• Monitoring and evaluation

3.2.1 Training
With GFATM support, the NTP was able to organize training sessions for the different TB program personnel. This work involved the identification of training needs, recruitment of trainers, organization of training sessions, and provision of adequate logistics. Trainings included:

• Training and retraining of CDT doctors, health zone coordinators, nurses and laboratory technicians on tuberculosis screening and case management.
• Training of doctors and nurses who provide outpatient consultations in the various non-CDT health structures on TB diagnostic algorithms.
• Organization of meetings for sharing and raising awareness among doctors and nurses who conduct outpatient consultations in departmental hospitals and similar facilities.
• Organization of post-graduate courses for doctors and nurses working in the for-profit private sector in two large cities (Cotonou and Porto Novo).
• Organization of training sessions on NTP national guidelines for students in their 7th year of medical school before defending their doctoral dissertations and for nursing students at the end of their training.
• Training of 145 health workers from PNLS treatment centers for PLWH (30 doctors, 40 nurses, 40 laboratory technicians, 35 psycho-social workers, and mediators) on tuberculosis.

The goals of the training were:

• Increased awareness for non-CDT healthcare personnel on referral of suspected cases of TB to CDTs and Microscopy Screening Centers (CDMs).
• Improved uptake of standards for case management and treatment.
• Improved screening and treatment.

3.2.2 Raising awareness about the disease in communities
Through GFATM grants, the program also oversaw:

• organization of monitoring and evaluation seminars for trained NGOs/CBOs to map out M&E plans for communication and social mobilization activities related to tuberculosis control.
• allocation of financial support to the Réseau des ONG Béninoises de Santé (Network of Health NGOs in Benin, ROBS) for coordination and supervision of NGO/CBO activities.
• organization of awareness-raising sessions for communities on TB and TB/HIV co-infection by NGOs/CBOs.
• training of community health workers in identifying and treating tuberculosis and about TB/HIV co-infection and financial motivation for those CHWs.
• training of members of religious communities, NGO members (4 NGOs per department) and traditional healers on TB identification and treatment and TB/HIV co-infection within communities.
- financial and technical support to community radio stations to broadcast shows (radio contests and discussions) in French and national languages and to the national television station and other radio stations with national coverage.
- training of journalists (radio, print media, and TV) on TB and TB/HIV co-infection.
- publication of newspaper articles on TB and TB/HIV co-infection.
- awarding of an annual prize for each of the three media categories (radio, TV, and print media) for the best production on TB in Benin.

All resources were administered with the goal of achieving the following objectives:

- ensuring a better understanding of the disease through mass media and community awareness raising by NGOs.
- enabling community case management with community health workers.
- enhancing community mobilization and involving community leaders in the disease.
- removing social barriers and reducing, even eliminating, stigma.

Concerning NTP collaboration with NGOs and radio stations, 100% of the NGOs and radio stations surveyed claimed to have been selected following an invitation to tender a proposal, and were given a contract that complied with existing standards. They all produced activity reports for the NTP. Staff who carry out contracts related to raising awareness were trained in the following topics on awareness-raising:

- History of tuberculosis in Benin, Africa and the world
- Using an image box for discussions
- Modes of TB transmission
- Clinical signs of TB
- Identification of persons with TB
- Tracing patients lost to follow-up
- TB prevention
- TB/HIV/AIDS co-infection
- Diagnosis/testing of TB/HIV
- Treatment/case management of TB

Interviews with the NGOs and radio stations involved in raising awareness about TB revealed that they encountered the following difficulties for this activity:

- Weak mobilization of the population
- Difficult geographic access to some locations during the rainy season
- Difficulties collaborating with the health center
- Lack of counter referral system (to follow-up on community members who were identified and referred to CDTs)
- Lack of synergistic action between the NGOs, CDTs, and community health workers in their efforts to raise awareness

Causes mentioned for these difficulties are:

- Concurrence of activities with election periods
- Intensive work in rural areas during the intervention period
• Various scheduling interferences (Ex. period of the annual Oro fetish ceremonies)
• Poor condition of access routes to virtually remote locations

Strengths of collaboration with the NTP were:

• Strict compliance with contractual commitments
• Strengthened local capacities
• Respect for autonomy of contracting parties
• New awareness among people about TB treatment in health centers
• Improved NGO visibility
• Good discipline within the NTP/GFATM in managing the partnership
• Contribution to professionalization of NGOs
• Continued collaboration with the NTP despite the end of the contract
• Creation of a productive partnership between the contracting NGOs and NTP
• Contribution to improving people’s understanding of TB

Key points to improve are:

• Partnership was too short and minor to sustain of activities
• Lack of a sustainability strategy
• Inadequate number of sessions to instill comprehensive awareness
• Unavailability of a copy of the signed contract for the NGO Jeunesse Ambition

The recommendations made by NGOs and radio stations were to:

• Promote a stronger partnership based on previous experiences
• Increase the number of awareness-raising sessions and length of contract
• Increase the level of financial support in order to improve the quality and quantity of work
• Involve and motivate the community health workers in executing activities in order to guarantee multiplier effects

3.2.3 Supervision

A regular supervision system for CDTs has been in place since the early 1980s and works quite effectively for continued professional development and training of workers in the field. This supervision occurs quarterly at the peripheral level in conjunction with staff from the central and intermediate levels. The supervision teams visit the CDTs periodically. Supervision visits focus on three main areas:

• clinical case management
• laboratory quality control
• food supply management

During these visits, supervisors verify key indicators, and monitor information system and quality assurance processes. 100% of surveyed providers noted the highly beneficial impact of these supervisions in achieving program results concerning quality of collected data and treatment results.

Each year all actors working in tuberculosis control meet for a departmental synthesis meeting to analyze indicators, discuss problems, especially those observed during supervision visits, and suggest corrective measures. The GFATM has strengthened the supervisory system by purchasing transportation equipment for all levels of the program, in addition to covering all supervision costs.
3.2.4 Support for TB screening and diagnostics

✓ Diagnostic techniques

The microscopic screening method is used by all CDTs to screen for tuberculosis. A national guide developed with GFATM support that serves as the Standard Operating Procedure was produced by the NTP and provided to each CDT. According to this guide, two approaches are used:

- Until 2010, in order to diagnose new cases, three sputum slides were sampled and read according to the guide. Since 2011, only two sputum samples are used. The first sample is taken during initial contact and the second is taken the next day after waking up. The results are available the next day.
- For TB patient follow-up, a single slide is prepared and read with results available the same day.

All patients who test positive for TB are routinely tested for HIV. However, there are independent HIV/AIDS voluntary counseling and testing centers where the majority of HIV/AIDS testing in Benin occurs. Usually a rapid test is done, followed by a confirmation test if the rapid test is positive. Sensitivity tests and screening for MDR-TB are exclusively conducted by the national laboratory located at the CHNPP in Cotonou. The other (peripheral and intermediate) centers take samples and send them to the CHNPP laboratory.

✓ Organization

The tuberculosis case management is primarily done at Tuberculosis Diagnostic and Treatment Centers (CDTs). CDTs are located in the ZHs, HCs, and some faith-based health facilities. The CDT team is made up of doctors, nurses, and biotechnologists. There are two specialized centers: the Akron CHPP in Porto Novo and CHNPP in Cotonou. The laboratory network is made up of:

- the National Reference Laboratory for Mycobacteria located in the CHNPP;
- intermediate laboratories located in the administrative centers of the former departments; and
- peripheral laboratories.

Each laboratory in the 12 tuberculosis diagnostic and treatment centers (CDTs) that were studied in this evaluation has the minimum number of laboratory technicians who are able to properly conduct screening of TB with microscopy, although some of these laboratories urgently need more staff. In terms of seniority and experience in TB diagnosis by microscopy, staff with the least experience averaged two years of service. The labs demonstrated weak internal organization, with no staff organization or training plan. Division of labor in the laboratory is organized through a bench rotation plan for technicians, although this has not been formalized in writing. With GFATM support in 2006, all laboratory technicians received routine training from the NTP. Since then, all new staff or those newly assigned to a CDT center are routinely trained by the NTP before conducting diagnosis of TB by microscopy. Performance records are archived in the NTP by CDT and by the technician.

With the exception of two CDTs (Parakou CDT and Perere CDT), there is sufficient workspace in the CDT laboratories. Benches are sufficiently spaced apart, and the type of biological material handled and specific procedures performed at each bench are taken into account. Not only does this minimize the
risk of cross contamination, it also reduces the collateral effects of equipment interactions (vibrations, jolts, wobbling, etc.) that can negatively affect the quality of results.

✓ Equipment and reagents

Through Global Fund support, each CDT has a high-performance microscope. At least one spare microscope is available in case of breakdown, with the exception of the Perere CDT, which, in addition to its obsolete laboratory with a cracked and untiled floor, has no spare microscope, much less continuous electricity. The technician must read the slides during the day with the help of sunlight and a handmade device adapted to the microscope.

The NTP uses two types of reagents, depending on the level of the CDT laboratory. All peripheral CDT laboratories use Ziehl-Nielsen reagents, while the CDTs in the intermediate health centers and the CHNPP lab use Auramine. The NTP has set up a centralized system to manage reagents. The intermediate zone CDTs regularly equip peripheral CDTs that report to them, while CDTs from the intermediate centers are supplied quarterly by the CHNPP. Unlike the peripheral zone CDTs that receive pre-prepared and tested reagents that are ready to use, the intermediate zone CDTs prepare their reagents themselves. Reagent quality control is conducted each month by each CDT in compliance with NTP standards.

Equipment maintenance, particularly for microscopes, is regularly provided by the NTP during supervisions and when a CDT requests it. However, this process needs to be formalized and documented in all the CDTs.

✓ Quality assurance: internal quality control

None of the CDT laboratories that were evaluated perform internal quality control of results, nor of staff tuberculosis screening methods. This situation is partially explained by a general lack of understanding of the importance of quality control, and partially by the low number of staff in some CDTs. Although quality control is performed for reagents, refrigerators where these reagents are supposed to be stored do not have quality control processes. In fact, none of the laboratories that were evaluated had a temperature-monitoring system for their refrigerators.

✓ Quality assurance: external quality control

External quality control for all CDTs of microscopy screening of tuberculosis is performed by the NTP on a quarterly basis. This quality control consists of:

- Selection of a random sample of slides that have already been read from each CDT.
- Selected slides from the peripheral centers are reread by technicians from the intermediate centers, while slides from the intermediate centers are read by the CHNPP technicians.
- Results are analyzed by the NTP, and conclusions from this analysis are sent to each CDT.
- In the event of a discrepancy, a staff retraining/training session is organized immediately at the relevant CDTs.

External quality control for MDR and sensitivity tests is conducted by the Anvers laboratory in Belgium.

✓ Biosecurity in the laboratory

The issue of biosecurity in the laboratory is a serious problem in all the CDTs surveyed in this evaluation. Nearly all staff claimed to have never been trained; this was evident in some of their actions,
particularly an absence of protective measures such as wearing gloves, not separating biological waste, and not decontaminating benches. Additionally, the lack of fire extinguishers, emergency exits, limited access to the lab, an emergency kit in case of accidents, and a procedure for managing incidents are some of the basic elements that health staff in the CDT laboratories disregard. It should be noted that the CDT laboratories are multi-use, and bacilloscopy is not the only test that the NTP conducts. However, not all of the noted deficiencies could be attributed to the NTP since the program actively contributes to strengthening performance in its CDT laboratories. The government of Benin must take responsibility to better equip and reform laboratories in the public sector.

3.2.5 Monitoring and evaluation

The Global Fund has helped the NTP to establish a Technical Committee for Coordination and Planning. This committee includes the coordinator and his deputy, members of the NTP monitoring and evaluation team, and directors of other departments and program units.

The GFATM supported the establishment of a Monitoring and Evaluation Unit within the program to monitor performance. The objective is to have the NTP develop a monitoring and evaluation plan to assess its own performance. This plan integrates well-defined indicators for process, results, and impact using precise calculation methods. The unit was set up and provided with staff (statistician, planner, data-entry operator) and equipment (desktop and laptop computers with accessories, supervision vehicles) so that it could function properly. At the end of each quarter, members of the program’s monitoring and evaluation unit collect data from activities in the field. Next, they validate these data with the program’s monitoring and evaluation manager; calculate indicators; monitor the progress made, performance, and sub-performance; identify bottlenecks, and implement corrective measures.

3.2.6 Level of achievement for planned activities

In terms of implementation of planned activities, the NTP has achieved positive results in carrying out planned activities.

Table 1: Summary of activities financed by Round 6 of the Global Fund

<table>
<thead>
<tr>
<th>Year</th>
<th>Activities planned (number)</th>
<th>Activities completed (number)</th>
<th>Level of execution for activities</th>
<th>Reason for activities not carried out (if applicable)</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>35</td>
<td>33</td>
<td>94% of initiated activities were carried out until the end of their terms.</td>
<td>Inventory of assets acquired from GFATM and final evaluation of support was not completed this year</td>
<td>This refers to activities in Round 2 for which the NTP was the sub-recipient. Only data from the second quarter 2006 are available.</td>
</tr>
<tr>
<td>2007</td>
<td>46</td>
<td>46</td>
<td>100% of initiated activities were carried out until the end of their terms.</td>
<td>NA</td>
<td>In 2007, the NTP only received the grant for Round 6 of the GF in June; Round 2 had terminated since December 2006.</td>
</tr>
<tr>
<td>2008</td>
<td>40</td>
<td>40</td>
<td>100% of initiated activities were carried out until the end of their terms.</td>
<td>NA</td>
<td>Continuation of Round 6 activities.</td>
</tr>
</tbody>
</table>
3.3 Outputs

The various outputs from the different program activities are as follows for the three rounds:

### 3.3.1 Staff recruitment

Table 2: Categories of personnel recruited through GFATM financing

<table>
<thead>
<tr>
<th>No.</th>
<th>SOCIO-PROFESSIONAL CATEGORY</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Doctor</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>Laboratory technician</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>Imaging engineer</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Financial statistician</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Administrative assistant</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Accountant</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>CVA</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Receptionist</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Social worker</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>Patient follow-up staff</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>Maintenance worker</td>
<td>3</td>
</tr>
<tr>
<td>12</td>
<td>Health aid</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Data-entry operator</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: NTP

### 3.3.2 Training

GFATM funding allowed for:

- Training and retraining of 280 nurses and laboratory technicians on tuberculosis screening and case management.
- Training and retraining of 100 doctors from CDTs and health zone coordinators on tuberculosis screening and case management.
• Organization of postgraduate courses for doctors and nurses working in the private for-profit sector in two large cities (Cotonou and Porto Novo).
• Training of 145 health workers from PNLS treatment centers for PLWH (30 doctors, 40 nurses, 40 laboratory technicians, 35 psycho-social workers, and mediators) on tuberculosis.

3.3.3 Raising community awareness about the disease
Through GFATM grants, the program also:
• Organized two seminars on monitoring and evaluation of activities carried out by trained NGOs/CBOs (a bi-annual meeting) to map out activities related to communication and social mobilization against tuberculosis.
• Organized 400 awareness-raising sessions for communities on TB and TB/HIV co-infection.
• Trained 880 community health workers in identifying and treating tuberculosis and about TB/HIV co-infection and provided financial support (twice annually) to perform their jobs.
• Trained 40 members from 5 religious communities, 80 members from 24 NGOs (4 NGOs per department), and 120 traditional healers in identifying and treating tuberculosis and about TB/HIV co-infection within communities.
• Provided financial and technical support to community radio stations to broadcast 10,560 shows (radio contests and discussions) in French and national languages and to the national television station and other radio stations with national coverage.
• Trained 100 journalists (radio, print media, and TV) on TB and TB/HIV co-infection.
• Published 20 newspaper articles on tuberculosis and TB/HIV co-infection.

3.3.4 Medical equipment
The complete listing of medical equipment obtained with GFATM funding is included as Table 10 in Annexes of this report.

3.3.5 Office equipment
Table 3: Office equipment obtained through GFATM financing

<table>
<thead>
<tr>
<th>No.</th>
<th>TYPE OF EQUIPMENT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Desktop computers</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>Laptop computers</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Printers</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>Uninterruptible power supply units</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Carpets</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Photocopiers</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Camcorder</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>TV screen</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Flip chart</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Projection screen</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Digital Camera</td>
<td>1</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Quantity</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>----------</td>
</tr>
<tr>
<td>12</td>
<td>Hospital beds and PEB mattresses</td>
<td>600</td>
</tr>
<tr>
<td>13</td>
<td>Video projector</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>Drill</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Filing cabinet</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Executive desk</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: NTP

3.3.6 Civil-engineering work
- Renovation of three tuberculosis CDT microscopy laboratories
- Renovation of one building for co-infection case management at the Cotonou CHNPP
- Renovation of rooms for staff housing in five CDTs
- Construction of one building for MDR patients at the Cotonou CHNPP

3.3.7 Transportation equipment
The NTP fleet has 23 4X4 vehicles of which 17 were purchased through GFATM financing on December 31, 2011. This financing was also used to purchase:
- 70 Yamaha motorbikes (Round 2)
- 50 Yamaha motorbikes (Rounds 6 and 9)

3.4 Epidemiological results for the disease (outcomes)
3.4.1 National coverage of DOTS treatment centers
The CDT is the primary location of NTP operations. Each CDT has clinical services and a laboratory. Patients suspected to have TB are referred from clinical services to the laboratory for screening and then if diagnosed as having TB, receive clinical follow-up within the clinical services. Since 2003, 11 new CDTs have been established. The NTP conducted staff training within already existing health structures and then equipped the laboratory and clinical services so they could provide TB screening and treatment. This increase in the number of CDTS, from 46 to 57, was realized through financial support from GFATM.
Extension of treatment structures has continued: district health centers have been converted into CTDOs (Directly Observed Treatment Centers) attached to the CDT; and structures that do not meet the definition of CTDOs (with at least 10 cases treated annually) are established as centers that collaborate with NTP. Through this system, all of Benin’s health structures are involved in TB screening and treatment. Treatment structure extension activities were executed through GFATM financial support, which also supported training for community health workers who work in the field to refer people with chronic coughs to the CDTs and the Microscopy Screening Centers (CDMs).

All of these efforts to extend the DOTS strategy have improved case reporting rates in Benin.

Figure 8: CDT contribution to case reporting

Source: NTP
3.4.2 Case reporting

The national strategy to control the tuberculosis epidemic, based on the strategy recommended by the World Health Assembly, aims to achieve a detection rate of at least 70% of new cases of pulmonary tuberculosis with positive sputum smear bacilloscopy (SS+).

Data on the number of examined suspected cases per detected TB cases was not documented before 2005. The participation of GFATM has strengthened the NTP’s monitoring and evaluation system, which provides information on the number of people with suspected cases of TB who have been screened. Ongoing efforts in screening TB cases have resulted in a continuous increase in the number of patients with suspected cases sent to laboratories.

**Figure 9: Ratio of examined suspected cases of TB to detected TB cases**

![Graph showing the ratio of examined suspected cases of TB to detected TB cases from 2005 to 2010.](image)

*Source: NTP*

**All reported new cases**

The new case reporting rate rose continuously in Benin, going from 39 to 45 per 100,000 people between 2003 and 2006. Since 2009, however, the reporting rate has decreased.
EVALUATION OF THE IMPACT OF THE GLOBAL FUND CONTRIBUTION ON BENIN’S NATIONAL TUBERCULOSIS PROGRAM

Figure 10: Reporting rate for new TB cases (all forms combined)

![Graph showing reporting rate for new TB cases](Image)

Source: NTP

**Reporting of new SS+ cases**

The reporting rate for new SS+ cases has increased over time and peaked in 2006 (37/100,000 people) before starting a downward trend in 2007, reaching a rate of 34/100,000 people in 2010. GFATM involvement since 2003 has resulted in improvements in screening performance through increased population coverage of screening and treatment centers and improved reporting.

Figure 11: Reporting rate for new SS+ cases

![Graph showing reporting rate for new SS+ cases](Image)

Source: NTP

**Reporting of SS-**

The reporting rate for sputum smear negative (SS-) cases gradually decreased from 1995 to 2003, but rebounded from 2004 to 2008 with a mean annual growth of 18%

Diagnosis of SS- is difficult and, in addition to microscopy, requires chest X-rays and medical expertise. The increased capacity to perform these screening techniques, particularly the purchase of X-ray machines, availability of X-ray films in zone hospitals, and recruitment and training of doctors (who had begun to lose interest in this difficult diagnosis) appear to be the main reasons for this improvement.
Figure 12: Reporting rate for SS- cases

The simultaneous decrease in the reporting rates for SS+ and SS- observed since 2008 suggest that the diagnostic methods used since 2003 have been effective, resulting in relatively high case detection in the population. Continuation of this trend in the coming years could be seen as reversing the epidemiological trend for TB in the country.

**Reporting EPTB**

Before 2003, the reporting rate for cases of extrapulmonary tuberculosis (EPTB) experienced a downward trend. Since 2003, EPTB reporting has rebounded, peaking in 2008. This increase is related to the efforts mentioned above for SS-, which—similar to EPTB—is difficult to diagnose and requires providers to have prior training. This reporting rate can be explained by the mass training of doctors on screening for SS- and EPTB. This training, provided through GFATM financial support, included doctors from health zones and faith-based hospitals, as well as those in the for-profit sector.
Reporting rate for extrapulmonary tuberculosis

Figure 13: Reporting rate for extrapulmonary tuberculosis

Source: NTP

Reporting rate for retreatment cases

The reporting rate for retreatment cases, which was on the rise until 2003 (mean annual growth of 10%), has decreased substantially and steadily since 2004 (11%) to a never-before-reached value of 2 per 100,000 people. This decrease involves all retreatment cases, namely, those who relapsed, restarted treatment, and who had treatment failure. This is mainly attributed to improvements in the quality of treatment for new cases.

Figure 14: Reporting rate for retreatment cases

Source: NTP
Reporting of relapses
The reporting rate for relapsed cases rose between 1995 and 2004, with 4% mean annual growth. Since 2005, this rate has undergone a gradual and continuous decrease (6%). Since reinfection is the most common situation for cases of relapses, it is very likely that the substantial resources invested in tuberculosis control since 2003, with the highest percentage coming from GFATM, has certainly had a major impact on the prevalence of the disease at the community level, thus reducing the risk of infection, particularly among vulnerable groups.

Figure 15: Reporting rate for relapse cases

![Reporting rate for relapse cases](image)

Source: NTP

Reporting of cases of failure of primary treatment
The reporting rate of failure of primary treatment increased between 2001 and 2004, with a 10% mean annual growth, and exceeded 1 per 100,000 people in 2004. Since 2005, this rate has seen a gradual decrease, with -8% mean annual growth. In 2010, this rate was 0.65 per 100,000 people.

Figure 16: Reported rate of primary treatment failure

![Reported rate of primary treatment failure](image)

Source: NTP
Reporting of retreatment cases

Between 2000 and 2003, the reporting rate of retreatment cases was nearly constant, with a mean annual growth of 1%. Since 2004, this trend has reversed, with an annual growth rate of -23%, and reached a value of 0.5 per 100,000 people in 2009.

**Figure 17: Rate of retreatment cases**

![Graph showing rate of retreatment cases from 1996 to 2009](image)

In sum, the drop in the reporting rate for retreatment cases observed since 2004, one year following GFATM’s arrival on the scene in Benin, involves all categories of retreatment patients, including relapsed cases, treatment failures, and those restarting treatment. This decrease in retreatment patients reflects the improved quality of patients care.

Reporting of cases by department

All of the country’s departments showed a nearly continuous increase in the number of TB cases, with the exception of Borgou-Alibori department where the number of cases has decreased since 2007. The Atlantique-Littoral department had the highest number of cases, given that the country’s largest CDT, which is also the referral center, is located there. Moreover, this department has the highest percentage of country’s population.
Also, it should be noted that the team had no data on reporting for risk groups because risk groups could not be separated out using the NTP data format.

**Reporting of cases in countries of the sub-region**

**Figure 19: Benin and bordering countries**

Although rising, the trend for TB case detection rates in Benin is less marked than in other countries in the sub-region. Despite Benin’s significant progress in tuberculosis control with the arrival of GFATM, this trend suggests that the problem of tuberculosis is probably less serious in Benin than in neighboring countries. Benin also has better indicators on the main risk factors for the disease, notably poverty and HIV. Implementation of the DOTS strategy in 1983, ahead of most of Benin’s neighboring countries, most likely also had a positive impact on the epidemiology of tuberculosis in Benin.
3.4.3 Treatment results

Results of SS+ cases

Results of treatment for SS+ patients are summarized as follows:

- The cure rate increased steadily, from 55% in 2003 to 80% in 2009 with an upward trend following GFATM involvement (1% versus 5% of mean annual growth for the periods before and after GFATM intervention).
- The treatment completed rate has experienced a sharp decline since 2003, going from 20% to 8% in 2009. Despite this, the treatment success rate (cured + treatment completed) increased substantially from 80% to 90% in 2009.
- The rate for patients lost to follow-up continued the downward trend that began before 2003, reaching 1.2% in 2009 from 8.3% in 2003.
- The TB related mortality rate also decreased, going from 7% in 2003 to 5% in 2009.
- The treatment failure rate remains low and stable at 3%.
Figure 21: Treatment outcomes of new SS+ cases in Benin

Since 2005, Benin has had the best therapeutic success rates for the sub-region.

Source: NTP

Figure 22: Treatment success rates of SS+ cases in Benin and neighboring countries

The annual mortality rate for SS+ cases decreased, placing Benin in second place, after Nigeria, in 2009.

Source: WHO
Figure 23: Mortality rate for SS+ cases in Benin and neighboring countries

Mortality rate for SS+ TB cases in Benin and neighboring countries

Source: WHO

Treatment results for SS- and extrapulmonary tuberculosis cases
The team was unable to conduct a comparable evaluation for these forms of TB with the available data because they were only available from 2007–2010.

Figure 24: Treatment outcomes of new smear-negative/extrapulmonary cases

Treatment outcomes of new smear-negative/extrapulmonary cases

Source: NTP
Results of retreatment

The cure rate for patients in retreatment increased gradually, going from 52% in 2003 to 70% in 2009. This trend is in opposition to treatment completed and lost to follow-up rates that, respectively, went from 25% to 10% and from 12% to 1% between 2003 and 2009. The mortality rate and treatment failure rate have not changed significantly over time.

Figure 25: Treatment outcomes of retreatment cases in Benin

These findings indicate that there have been continuous efforts made by the program at various levels. With GFATM financial support, numerous implemented activities have contributed to these results:

- periodic staff training and retraining resulted in improved quality of case management (in fact, all of the surveyed providers received training on treatment at least once).
- provision of a standard treatment guide and healthcare staff compliance to these guidelines (it was noted that 100% of the surveyed records met the agreed-upon standards for care; this attests to the staff's full compliance to guidelines).
- a rigorous monitoring and evaluation system for all the program's key indicators.
- nearly constant availability of drugs (i.e., no stockouts in the CDTs).
- regular quarterly supervision that enable validation of operations reports, ensure ongoing training for actors in the field, and address weaknesses if and when they arise.
- improving tracing patients lost to follow-up in communities (this was conducted routinely, and motorbikes were allocated to CDT managers to improve the search process).
- nutritional support given to patients. In addition to addressing nutritional problems often present in patients with TB, provision of nutritional support throughout TB treatment may be an incentive to attend appointments, leading to improved TB case management.

3.4.4 TB-HIV co-infection

The management strategy for co-infection is well codified and based on a guide developed and validated in 2008, entitled: Guide de Surveillance Epidémiologique et de Prise en Charge de la Coïnfection Tuberculose/VIH au Bénin (Guide for Epidemiological Surveillance and Case Management of Tuberculosis/HIV Co-Infection in Benin), 1st edition, 2008. Clinical guidelines which have been
modified since 2008, in particular delaying the introduction of ARVs after starting tuberculosis treatment, were supplemented by a memo. Since 2005, there has been outstanding progress in activities to manage co-infection.

Figure 26: TB/HIV co-infection and ARV and cotrimoxazole initiation

Before 2004, HIV testing for TB patients was done in the context of serosurveillance and only occurred at the CDTs of Cotonou and Porto Novo. The number of co-infected patients has increased since 2005. The rate of TB patients who have had an HIV test has increased substantially since 2005, going from 15% up to 96% in 2008, then 98% in 2010.

GFATM support has made it possible to develop and disseminate the national management strategy for co-infection, train providers, and provide screening and treatment supplies. Extension of systematic HIV testing for TB patients in all the CDTs in the country was launched in 2005. Since 2006, rates of co-infected patients who initiate cotrimoxazole (CTM) are routinely collected. The rate of co-infected patients who initiated CTM reached 98% in 2008. The rate for patients on ARVs went from 40% in 2008 to 44% in 2009.

Until 2011, only patients with CD4 counts <350 were put on ARVs before the end of their TB treatment. In 2011, the NTP and PNLS (National AIDS Control Program) adopted a new joint directive, which systematically places all co-infected patients on ARVs. This new directive was launched in 2011, and results from this measure can be assessed in the coming years.

A comparison of HIV testing rates in Benin to those of its neighboring countries shows that Benin has had the best HIV testing rate for tuberculosis patients from 2005 to 2010.
Similarly, from 2007 to 2010 Benin has had the best rate for placing HIV/TB co-infected patients on CTM.

Lastly, within the framework of public/private partnership, a national survey was conducted in 2010 that enabled identifying all health facilities throughout the entire country and analyzing the possibility of their involvement in controlling tuberculosis.

Results from this study can be used to collect data on providers who might participate in the public/private partnership. Future evaluations can be used to assess this activity’s impact.
3.4.5 Multi-drug resistant tuberculosis

The strategy to manage multi-drug resistant TB (MDR TB) is based on national guidelines contained in the MDR management guide that was developed and validated in 2009. The first national study on multi-drug resistance was conducted in 1994 and published in 1997. A previous study conducted in Cotonou in 2007 noted prevalence rates similar to those of 1994. The rate of multi-drug resistance for new cases varies depending on the location of patients: it is relatively high (1.6%) when taking into account all patients in the study, but low (0.5%) and comparable to rates from the 1994 national survey when only considering patients residing in Benin. The MDR rate (11.1%) is comparable to that of the 1994 survey for patients admitted to retreatment.

No cases of extensively drug-resistant tuberculosis were reported among all the reported cases of multi-drug resistant tuberculosis. Since 2003, with GFATM support, the NTP has set up a routine surveillance system for TB drug resistance among patients admitted for treatment failure in all CDTs and those admitted for retreatment in Benin’s two largest CDTs (CHNPP in Cotonou and Akron CPP in Porto Novo).

Since 2010, with strengthened capacities in the LRM, the routine surveillance system was extended to all patients in retreatment in the country, though this surveillance does not deal with new SS+ cases, so it is not possible to give the percentage of MDR patients for new SS+ cases.

The regimen used in Benin differs from the WHO recommended treatment regimen. Benin’s regimen is: 4 KGfxPzECfzHZ/8 GfxPzECfzZ Kanamycin (K), Gatifloxacin (Gfx), Prothionamide (Pt), Ethambutol (E), Clofazimine (Cfz), Isoniazid (H), Pyrazinamide (Z) for four months and Gatifloxacin, Prothionamide, Ethambutol, Pyrazinamide, and Clofazimine for the following eight months.

The following table provides information on the number of confirmed patients, those on treatment as well as treatment outcomes.

Table 4: Case management of multidrug-resistant tuberculosis

<table>
<thead>
<tr>
<th>Number of Cases</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Confirmed Cases of MDR</td>
<td>15</td>
<td>8</td>
<td>21</td>
<td>10</td>
<td>11</td>
<td>16</td>
<td>21</td>
<td>18</td>
<td>Available as of 2003</td>
</tr>
<tr>
<td>Treated Cases (%)</td>
<td>6 (54%)</td>
<td>1 (6%)</td>
<td>7 (33%)</td>
<td>9 (0.5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Only residents were put on treatment; treatment launched in 2007</td>
</tr>
<tr>
<td>Cured Cases (%)</td>
<td>6 (100%)</td>
<td>1 (100%)</td>
<td>6 (86%)</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deaths (%)</td>
<td>1 (14%)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Source: NTP

---


5 Multidrug and extensively drug-resistant TB (MXDR-TB) 2010 GLOBAL REPORT ON SURVEILLANCE AND RESPONSE.


7 For all confirmed cases of MDR-TB, only patients living in Benin received treatment. Most of them were from Nigeria and returned there for their treatment.
3.5 Impact on the program and achieving the MDGs

The tuberculosis burden is assessed through morbidity and mortality indicators: disease incidence, prevalence, and mortality. The indicators for the disease burden that were used in this evaluation are estimations from the WHO database of the global tuberculosis burden.

3.5.1 Tuberculosis incidence and case detection

According to WHO, the incidence of tuberculosis has had an annual mean growth of 1% for 1995–2010. This upward trend undermines the country’s odds in achieving the goal to reduce this incidence by half. Following this trend, the level of incidence will be approximately 99 per 100,000 people in 2015.

![Figure 29: Estimated TB incidence in Benin](image)

This increase in incidence may result from the low TB case detection rate. Therefore, it appears that the positive results observed by the Benin NTP for treatment success rates have not yet had a significant impact on the case detection rate and, in turn, on incidence.

Moreover, according to the NTP, the WHO data for number of expected cases may be overestimated. According to these same NTP estimates, the goal of a 70% detection rate for SS+ planned for 2014 was already reached in 2008.
Figure 30: Estimated TB case detection rate in Benin

![Benin TB Case Detection Rates (WHO and NTP Estimates)](image)

Source: WHO/NTCP

3.5.2 Tuberculosis prevalence

The goal to reduce the number of TB cases by half (64 cases per 100,000 people in absolute terms in Benin) in 2015 does not appear achievable. This is due to the fact that tuberculosis prevalence in Benin has continued to increase over time. This is difficult to predict, however, since there is no tuberculosis prevalence study on Benin and that the data reported here are only WHO estimates. There is a need to revisit the estimate of TB burden in Benin in collaboration with WHO using the latest data, including TB notification from routine surveillance systems.

Figure 31: Estimated TB case prevalence rate in Benin

![Estimated TB prevalence](image)

Source: WHO

3.5.3 Treatment success rate

The treatment success rate for new cases of SS+ TB has steadily increased over time, reaching a threshold of 85% in 2006, then 90% in 2010; this achieved the target set by WHO and the MDGs.
3.5.4 Tuberculosis-related mortality

Current data are unable to provide a TB mortality rate in the general population. There is a need to improve the vital registration system in order to have a direct measure of TB deaths.

![Figure 32: Treatment success rate for SS+ patients in Benin](source: WHO)

![Figure 33: Tuberculosis related mortality (excluding HIV+ cases)](source: WHO)
The table below presents prospects for achieving the MDGs. It summarizes the results presented above.

### Table 5: Summary of prospects for achieving Goal 6 of the MDGs

<table>
<thead>
<tr>
<th>Indicator</th>
<th>MDG objective</th>
<th>Year</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection rate of SS+ cases</td>
<td>A goal of 70%</td>
<td>2015</td>
<td>Unachievable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Achievable</td>
</tr>
<tr>
<td>Treatment success rate for SS+</td>
<td>A goal of 90%</td>
<td>2015</td>
<td>Achievable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Achievable</td>
</tr>
<tr>
<td>TB related mortality rate</td>
<td>A goal of 6.5%</td>
<td>2015</td>
<td>Unachievable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Data unavailable</td>
</tr>
<tr>
<td>TB prevalence</td>
<td>50% reduction</td>
<td>2015</td>
<td>Unachievable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Indeterminable;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Requires a prevalence survey</td>
</tr>
</tbody>
</table>

Notwithstanding the results reported here, the study team emphasizes that a fundamental question remains about the various estimations reported on trends for the disease’s impact and achieving the MDGs. According to WHO estimates, the detection rate of new smear-positive cases was 45% in 2010 while the NTP in Benin, reported a rate of 70%. This discrepancy raises a problem in estimating the number of expected cases in the population that only a prevalence study will help clarify. In the absence of such a study to provide comprehensive data, it is difficult to estimate the actual impact of NTP activities on the burden of disease without risk of error.

### 3.6 Quality of program data

The study team assessed the quality of data collected by the program by following the routine data flow from the peripheral level to the central level.

#### 3.6.1 Information flow at the NTP level

The flow for data collection at the NTP level is simple and includes three levels:

- The operations level: represented by the CDT, responsible for recording cases and producing reports.
- The intermediate level: from the Health Protection and Promotion Services, responsible for validating and compiling data at the departmental level, then sending it to the central level.
- The central level: from the Monitoring and Evaluation Services, responsible for validating, compiling, and analyzing data.

**a) Registration process for identifying and reporting cases**

Clinical diagnoses of those with suspected cases of TB are recorded in the laboratory register each day by lab technicians. Diagnosed cases are recorded in the tuberculosis register which is kept by the CDT nurse. Information for each patient is also recorded in the patient’s records. The nurse in charge of the TB register is responsible for producing a quarterly report on tuberculosis screening and treatment (using standardized reporting forms).
In addition, this nurse also produces drug inventory reports. Food updates are prepared by the center’s manager. Quarterly supervision is conducted by a joint team from the central and intermediate levels to ensure the correct flow of data.

b) **Data management at the intermediate and central level**

The intermediate level is responsible for archiving, centralizing of data at the department level, and transmitting data to the central level.

c) **Data management at the central level**

Data collection is conducted on a quarterly basis by the central level during the joint supervision visits. The validated data are entered in an EXCEL application and EPIDATA for analysis.

### 3.6.2 Results of the evaluation of program-data quality

In terms of analysis of NTP data quality, this study is the second of its kind. Specifically, an article published by the International Union Against Tuberculosis and Lung Disease published in the International Journal of Tuberculosis and Lung Disease presents the results of a similar study.8 Conducted in 2006, their study investigated 9 CDTs selected through a purposive sampling from the country’s 50 CDTs. The selected CDTs recorded zero patients lost to follow-up over the course of the three first quarters of 2006.

This was a retrospective survey conducted on site by independent teams investigating the treatment cards, TB register, quarterly reports, and home interviews of patients who reported having been successfully treated.

Following this study, the evaluation team concluded that agreement was excellent for information between the TB register and the treatment card, between the TB register and the quarterly reports, and between the TB register and the laboratory.

#### Results from this study

The survey included 3 of the main CDTs out of the country’s 57 CDTs, accounting for approximately 40% (1127/2973) of new SS+ cases reported in 2010.

a) **Agreement between treatment cards and the TB register**

Agreement between the treatment cards and the registers only was verified in the Akron center and the Abomey-Calavi CDT due to the unavailability of some treatment cards at the CHNPP level.

In this section, 11 errors were detected. Six cases of extrapulmonary TB were recorded in the registers, for which only three records could be analyzed. 104 new cases of SS+ tested for HIV were recorded in the TB registers; however, for three treatment cards, the box indicating the effectiveness of the test was not filled in, and on five cards, the treatment results were not marked. Thus, an error rate of 3% (11/318) occurred.

---

b) Agreement between data from the quarterly report and the NTP database

In the fourth quarter of 2010, the registers recorded 262 cases of sputum smear positive TB compared to 261 cases reported in the database; 11 relapse cases versus 12; 260 SS+ cases tested for HIV versus 261; and 219 new SS+ cured cases compared to 223 recorded in the database.

A total of 7 errors were recorded for a total of 884 analyzed pieces of information. A 1% error rate was found in data reporting from the quarterly report to the database.

(c) Agreement between the TB register and the quarterly report

28 cases of tuberculosis with negative sputum bacilloscopy were recorded in the TB register compared to 29 cases in the quarterly report; 47 cases of extrapulmonary tuberculosis compared to 46; and 261 cases of new SS+ cases tested for HIV compared to 260 reported in the quarterly reports. A total of 3 errors were detected in 884 analyzed data and an error rate approaching zero.

These results show that agreement of data between the treatment cards and the TB register, between the TB register and the quarterly report, and between the quarterly report and the database is excellent, and corroborates the research findings from the International Union Against Tuberculosis and Lung Disease study mentioned above.

(See the detailed results in Table 9 of the Annexes.)
4 DISCUSSION

4.1 Global Fund financing and program results

Global Fund intervention has led to a substantial increase in funding to control tuberculosis in Benin. This financial support accounts for approximately 60% of NTP expenses in the period 2003–2011. This funding covered all levels of the NTP strategic intervention through:

- development of human resources, including recruitment (62 workers from all categories) and training and retraining of staff (over 525 workers from all categories).
- provision of the main guides for standards and norms for efficient programmatic management.
- capacity building for the LRM through resource development, a significant increase in the number of screening and treatment sites by establishing CDTs (11 new CDTs established in the period 2003–2010), and the establishment of CTDOs, CDMs, and centers that collaborate with NTP.
- regular supply of drugs (i.e., no stockouts reported in the CDTs).
- construction and renovation of hospitalization rooms for tuberculosis patients and purchasing food for them.
- routine joint supervision visits to conduct monitoring and evaluation of all the program’s key indicators.

On the whole, since 2003 these investments have led to broader coverage and strengthening of the DOTS strategy. However, the main goal of the GFATM contribution is to reduce the disease burden and unfortunately this link cannot be made since the estimate of TB burden in Benin is weak and need to be improved.
4.2 Model used to extend DOTS services

The key questions regarding the DOTS extension model to which this evaluation report aims to respond are:

- Can it provide nationwide quality services in terms of coverage?
- Can it screen and treat all TB cases?
- Does it take into account target groups for tuberculosis by incorporating TB/HIV co-infection, and multi-drug resistant cases?
- Does it allow for compliance to standards?

The DOTS (Directly Observed Treatment Short Course) strategy involves five key points:

- Sustained political commitment;
- Access to quality-assured TB sputum microscopy;
- Standardized short-course chemotherapy under direct supervision;
• Uninterrupted supply of quality-assured drugs; and
• Reliable recording and reporting system.

In addition to these key points, case management for TB/HIV co-infection and multi-drug resistant TB has been integrated into the DOTS strategy.

The establishment of CDTs (for which there is at least one per health zone) and the attached CTDOs, CDMs, and collaboration centers that all provide DOTS—demonstrate good coverage for DOTS throughout the country. Therefore, with GFATM intervention since 2003, improving the DOTS strategy has led to increased case reporting, which peaked in 2008 (see Figure 7).

However, the NTP has evolved in a health system whose main challenge, after weak infrastructure, is health center attendance, particularly for public health centers. The attendance rate for health centers is low in Benin. It could be surmised that due to their low attendance levels, some public facilities responsible for applying DOTS are missing opportunities to detect potential cases, despite actions by community members (community health workers, traditional healers, former tuberculosis patients) who have been trained to direct those with chronic coughs to CDTs. From this perspective, setting up active screening of cases by the CDTs could help to detect these rare cases that may constitute disease reservoirs within communities. Specifically, according to the NTP, the case detection rate in 2010 was 70% compared to 45% according to WHO.

Regarding treatment, all patients who were diagnosed receive free treatment. This treatment package includes access to screening, drugs, and food.

Moreover, treatment results by department for SS+ patients show nearly identical trends following GFATM intervention in the program. Therefore, it could be claimed that this GFATM financing has contributed to reducing regional disparities in case management, thus promoting sound decentralization in standardizing the DOTS strategy throughout the country (Figure 33). This evaluation responded to the following specific questions regarding the DOTS strategy in Benin.

4.2.1 Can it provide nationwide quality services in terms of coverage?

Yes. All health zones (the decentralized case management units of the Ministry of Health) have at least one CDT where tuberculosis treatment is available. All other health centers in the country collaborate with these CDTs, referring TB patients to these CDTs. Programmatic management is well coordinated at all levels (CDT, health zone, and central levels) with a well functioning monitoring and evaluation system.

4.2.2 Can it screen and treat all TB cases?

Taking all of the previously identified challenges into account, particularly the issue of low attendance at the very health centers which are the center of the DOTS program, the DOTS system in Benin cannot screen all TB cases. Better integration of active case finding activities may improve this. However, in terms of treatment, the DOTS system achieved strong results, including improved reporting rates for both SS+ and SS- TB cases, and improved treatment outcomes for SS+ cases, so the answer to this part of the question is yes.

---

9An attendance rate of 46.8% according to the 2010 Health Statistics Yearbook.
4.2.3 Does it take into account target groups for tuberculosis by incorporating TB/HIV co-infection, and multi-drug resistant cases?

The current DOTS system does not cover all target groups. The NTP in Benin has not adopted the implementation of isoniazid preventive therapy for HIV+ patients as recommended by WHO. In addition, outside of prison settings, the program does not have specific interventions for other risk groups such as patients on hemodialysis, refugees, and patients with chronic immunosuppressive diseases such as diabetes.

4.2.4 Does it allow for compliance to standards?

Yes. The standardized procedure guides for efficient program management are available and regular supervision of the CDT activities and staff occurs on a regular basis and at health facilities throughout the country. These activities support the consistent implementation of diagnosis and treatment activities according to the NTP standards.
The assessment of providers’ compliance with norms and guides showed a good level of compliance to the various guides and norms for screening and treatment that were developed with GFATM support. One of the NTP’s strengths is the standardized guides for all aspects of case management, from diagnostic screening to treating various forms of the disease. Added to this is the existence of a rigorous monitoring system that promotes compliance to the various standards. The regular quarterly supervisions, periodic review of records for patients under treatment, and coaching of providers are among many factors that explain compliance to norms and standards at the peripheral and intermediate levels today.
Table 6: Availability of information related to case management in audited patient records

<table>
<thead>
<tr>
<th>Verified information</th>
<th>Percentage of documentation</th>
<th>Verified information</th>
<th>Percentage of documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client name</td>
<td>100%</td>
<td>Availability: Form of disease</td>
<td>100%</td>
</tr>
<tr>
<td>Client address</td>
<td>100%</td>
<td>Availability: HIV-serology result</td>
<td>99%</td>
</tr>
<tr>
<td>Client guarantor address</td>
<td>100%</td>
<td>Weight</td>
<td>100%</td>
</tr>
<tr>
<td>Client’s age</td>
<td>100%</td>
<td>Documentation: Type of patient</td>
<td>100%</td>
</tr>
<tr>
<td>Sex</td>
<td>100%</td>
<td>Use of the program’s therapeutic protocol</td>
<td>100%</td>
</tr>
</tbody>
</table>

4.3 Factors promoting and limiting achievement of program results

4.3.1 Factors that promote executing activities and producing results

a) central level

At this level, the contribution of the program director’s dynamism and expertise must be highlighted; he has demonstrated virtually flawless leadership. He knows how to instill a spirit of teamwork among his staff, ensure compliance to standards, respond to the needs of various partners, and provide rigorous management at various levels. Interviews with technical and financial partners indicated that his upcoming retirement could pose a risk to the program’s operations if he is not replaced by someone equally effective in program management.

b) operations level

At this level, there are multiple factors which promoted achievement of results:

- quarterly supervisions that lead to improved monitoring of developed activities; high-quality data collected by the program; and CDT management in areas related to laboratories and food management.
- directly observed treatment regimen by qualified healthcare staff improving treatment adherence, especially during the intensive phase.
- nutritional support for patients on treatment so they can meet their nutritional requirements.
- involvement and motivation of community health workers who play a significant role in community mobilization, detection of chronic cough, actively tracing cases lost to follow-up, and awareness raising about the disease.
- transportation equipment and fuel allocated to CDTs for outreach services in screening and follow-up for patients with irregular treatment.
- regular drug supply, allowing for uninterrupted flow in inventory management, thus avoiding stockouts.
- training and retraining of workers in the field to build their capacities to implement program activities.
- creating a CDT network through a free telephone system, enabling good communication among the program’s various actors.
• good collaboration between CDT clinical services and laboratories, enabling improved follow-up for diagnosed patients.

4.3.2 Factors limiting activity implementation and obtaining results

a) central level

These are:

• the low level of subsidies provided by the government of Benin, making the program dependent on GFATM grants.
• extended clarifications of the budget review that hampered the proper execution of activities supported by consolidated TB Rounds 6 and 9 in progress.
• rigid and slow national administrative procedures for supply and lengthy negotiations for supply management costs with the supply agencies (CAME and SEIB). This also explains the long delay in validating the purchasing plan during supply activities.

b) operations level

• food shortages due to delays in funds awarded by the Benin government.
• the impact of social pressures that force patients to wait before consulting a health facility or to consult a traditional healer as a first resort.

4.4 Gender and equity aspects in program implementation

Strategies for raising awareness and screening, diagnosis, and treatment of the disease were the same for Beninese men and women. There were no distinctions in terms of ethnicity or socio-economic classes for services offered to patients. All age groups requiring program services have access to services. The national epidemiologic profile of tuberculosis shows that the average age of a TB patient is higher in men than in women, 47 years as compared to 40. The male to female ratio within the TB patient population is 2, and has remained relatively constant from 1995 to 2010. For both men and women, people between the ages of 25 and 44 are most affected. In addition there is a higher notification rate among people older than 45 years of age, and particularly for older men (93/100,000) as compared to older women (21/100,000) in 2010. Case management provision is uniform and standardized, though it was not possible to disaggregate treatment outcomes by gender. Drugs and nutritional support are provided for free to everyone.

It can be stated that service provision is not the same in all structures. When comparing the CDTs to each other, it is easy to see differences in CDT equipment (for example, the Parakou CDT has no examining table) and conditions for patient hospitalization. For example, the Djougou CDT patients are hospitalized in a dark, dilapidated and poorly ventilated room. Meanwhile, at the Parakou CSC, patients are not entitled to hospitalization during the intensive phase (since the CDT has no hospital rooms) and end up at home during the entire treatment period. The quantity, quality, and type of food is not the same for all patients. In some CDTs, patients receive meals, while in others they receive food supplies (that they are supposed to cook themselves). Moreover, the natural distribution of the CDTs means that some patients are geographically closer than others to treatment structures. This distribution seems to be linked to the disease epidemic and population density, which is more concentrated in the southern part of the country than in the north. The two referral centers are in an urban setting (Akron in Porto
Novo and the CHNPP in Cotonou), however it should be specified that rural populations also receive program services. There are under-equipped CDTs (for example, in Abomey-Calavi, the CDT manager’s office is inside the multi-use laboratory where patient-provider confidentiality is not always guaranteed and a sterile environment is not ensured). All of these findings are closely related to weaknesses in the health system, within which the NTP must operate. Weak infrastructure quality can be noted as a contributor to this lack of equity in the tuberculosis service provision.

4.4.1 Tuberculosis Risk Factors

Benin is one of the world’s least developed countries and ranks near the bottom of the human development index. National poverty rates rose from 33.26% in 2007 to 35.2% in 2009\(^{10}\). The relationship between poverty and TB has been well documented.

Benin’s HIV prevalence has remained stable, with a rate of 1.9% in 2002, 2.0% in 2003, 2.0% in 2004, 2.1% in 2005 and 2.0% in 2006, 1.8% in 2007, 1.7% in 2008 and 2.0% in 2009\(^{11}\). Similarly, the rate of HIV seroprevalence among SS+ TB patients also has remained relatively stable at around 14% between 2006 and 2010. The share of new TB cases attributable to HIV also varies little. Smoking prevalence in the general population is unknown, but data from certain small targeted studies on the subject suggest that smoking is less common in Benin than it is in other countries of the subregion\(^{12}\).

Currently, the contribution of air pollution, whether urban (motorized) or rural (biomass burning), on tuberculosis across Benin does not seem significant and remains to be proven. A previous study on the subject noted a weak association (not statistically significant) between exposure to combustion of solid fuels and tuberculosis in Cotonou\(^{13}\).

4.4.2 Actions targeting high-risk groups

For high risk groups, the reported incidence of all forms of tuberculosis was 807 cases per 100,000 inmates according to the *Manuel de prise en charge de la tuberculose en milieu carcéral* (*Guide for Tuberculosis Case Management in Prison Settings*), 1st edition, 2010. It was not until 2010 that specific measures with clear directives were set up to treat prisoners in Benin. Because this activity is recent, its impact can only be assessed in the coming years.

In addition, Benin did not comply with implementation of preventive treatment with Isoniazid, as recommended by the WHO.

Lastly, there is no mention of specific actions for other risk groups, including chronic hemodialysis patients, minors, refugees, and patients with chronic immunosuppressive diseases such as diabetes.

\(^{10}\) Integrated Modular Survey of Household Living Conditions (EMICOV), preliminary report, INSAE, 2010

\(^{11}\) NACP, National HIV Report for UNGASS, 2010, Cotonou, Benin.


5 CONCLUSION
Since 2003, the GFATM has contributed significantly to the execution of NTP activities in the amount of approximately 60% of program costs. Program activities funded by the GFATM are varied and cover all aspects of tuberculosis case management from the central to the peripheral level. These activities are consistent with both national and international objectives in the fight against tuberculosis in terms of quality of patient services and program management. In addition, services appear to be equitable and reach various target groups, though there is a need for data in this area. Implementation of the DOTS strategy has been standardized with good, nationwide coverage and widespread adherence to existing norms; program data display excellent quality.

All the results presented above indicate that the Benin National Tuberculosis Program is well managed. And although it is difficult to quantify the impact of the GFATM contributions on the burden of tuberculosis in Benin, the improvements during the time period of the GFATM contribution cannot be denied, especially in the area of tuberculosis treatment. In addition to executing program activities, the Global Fund has helped considerably to:

- maintain gains and positive dynamics existing before 2003
- provide the necessary resources for the extension of the DOTS program
- invest in all important areas having an impact on the program

Therefore, given the large share of Global Fund financing in the execution of NTP activities and the significant role this funding plays in achieving the program’s current results, it can be claimed that GFATM:

- is currently the most important partner for executing most of the program activities,
- has significantly supported Benin in its approach to achieving the MDGs.

The main challenges facing the NTP now not only involve sustaining achievements, but also continuing the flow of financial resources.
6 RECOMMENDATIONS

The DOTS strategy is well established as a model in tuberculosis control in Benin. This strategy, with GFATM support, has produced significant advances. Therefore, it appears that the gains made since 2003 should be maintained and strengthened in order to maintain the current trends in the evolution of performance indicators for case management.

Based on the results of this evaluation, the recommendations are:

6.1 For the Ministry of Health of Benin

- Increase its funding for program operations in order to decrease the program’s dependence on external funding.
- Make its public procurement procedures more operational to facilitate executing civil-engineering and non-medical product-supply activities within the program;
- Conduct a needs analysis for human resources by CDT and CHPP before conducting recruitments and redeployments;
- Strengthen an ongoing Training/Retraining system for laboratory staff in order to strengthen TB screening and biological monitoring, as well as other diseases;
- Improve infrastructure in some CDTS in terms of reception and hospitalization structures and renovate laboratories with considerations for the expectations and norms of a clinical-biology laboratory;
- Strengthen some CDTs with qualified technical staff to build the laboratory’s capacity to manage workload;
- Support the CDTs in setting up a Quality Assurance system to improve the quality of lab results;
- Support the CDT laboratories in implementing SOPs (Standard Operating Procedures) to guarantee the quality of biological results.

6.2 For the Global Fund

- Readjust its process for clarifying budget review allocation rounds by taking into account local specificities in order to reduce administrative red tape.
- Support the government of Benin, and the NTP in particular, to develop a plan to ensure sustainability of achievements and viability of program resources.
- Support the NTP to revisit the estimate of TB burden in Benin in collaboration with WHO using the latest data, including TB notification from routine surveillance systems.

6.3 For the NTP

- Advocate that the government, in particular, and potential donors, in general, set up parallel mechanisms for the gradual substitution of GFATM financing in order to ensure the funding mechanism’s sustainability;
- Decentralize the program further, particularly in the area of financial management for greater involvement of the intermediate and peripheral levels; also document and share the amounts of food and drug provisions with the peripheral levels for greater transparency in the process. Then it will be easier to have disaggregated financial data for the peripheral level.
- Prioritize the active detection of TB cases and greater awareness in addition to the passive screening already in place. If it is assumed that the positive treatment results are related to a higher case detection rate, reducing the burden of the disease would happen faster.
- Maintain and improve the current supervision system in order to ensure better monitoring of the program's operationalization.
- Ensure supervisions are decentralized by placing greater emphasis on the departmental level;
- Review more flexible procedures with SEIB with a view to improve collaboration to meet contractual requirements regarding the acquisition of non-medical and civil-engineering materials;
- Suggest that GFATM recruit specialists in biomedical analysis and biology to reduce the wait time in responding to requests and facilitate the GAS plan flexibility;
- Ensure better case management for risk groups
REFERENCES

Table 7: List of selected CDTs and patient sample size by CDT

<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>CDT</th>
<th>NUMBER OF CLIENTS</th>
<th>NUMBER OF PATIENT RECORDS</th>
<th>HEAD DOCTOR/HEAD NURSE</th>
<th>LAB TECHNICIAN</th>
<th>NGO DIRECTOR</th>
<th>RADIO STATION MANAGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATACORA</td>
<td>Natitingou</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Djougou</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ATLANTIQUE</td>
<td>CHNPP</td>
<td>30</td>
<td>25</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Abomey-Calavi</td>
<td>16</td>
<td>14</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>BORGOU</td>
<td>Nikki CSC</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Parakou CSC</td>
<td>8</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>MONO</td>
<td>Lokossa</td>
<td>10</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Houeyogbe</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>OUEME</td>
<td>Akron</td>
<td>12</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Avrankou</td>
<td>13</td>
<td>11</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ZOU</td>
<td>Banté</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Zagnanado</td>
<td>12</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>120</td>
<td>100</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>
### Table 8: Results of the NTP-data-quality investigation

<table>
<thead>
<tr>
<th></th>
<th>SS+ New SS+ cases</th>
<th>Relapse</th>
<th>SS- Extrapulmonary</th>
<th>SS+ tested for HIV</th>
<th>New SS+ cases lost to follow-up</th>
<th>Cured SS+</th>
<th>SS+ treatment completed</th>
<th>SS+ deaths</th>
<th>Number of information categories to compile</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTP database</td>
<td>262</td>
<td>12</td>
<td>4</td>
<td>29</td>
<td>46</td>
<td>261</td>
<td>6</td>
<td>223</td>
<td>32</td>
</tr>
<tr>
<td>NTP register</td>
<td>261</td>
<td>11</td>
<td>4</td>
<td>28</td>
<td>47</td>
<td>261</td>
<td>6</td>
<td>219</td>
<td>32</td>
</tr>
<tr>
<td>NTP register (2 centers)</td>
<td>104</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>6</td>
<td>104</td>
<td>4</td>
<td>79</td>
<td>5</td>
</tr>
<tr>
<td>Quarterly report</td>
<td>261</td>
<td>11</td>
<td>4</td>
<td>29</td>
<td>46</td>
<td>260</td>
<td>6</td>
<td>219</td>
<td>32</td>
</tr>
<tr>
<td>Treatment card</td>
<td>104</td>
<td>2</td>
<td>1</td>
<td>8</td>
<td>3</td>
<td>101</td>
<td>4</td>
<td>77</td>
<td>4</td>
</tr>
</tbody>
</table>

**Number of discrepancies**

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarterly report&lt;&gt;NTP register</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Quarterly report&lt;&gt;Database</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Treatment card&lt;&gt;TB register</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>11</td>
</tr>
</tbody>
</table>
## Table 9: Medical equipment obtained through Global Fund financing

<table>
<thead>
<tr>
<th>No.</th>
<th>TYPE OF EQUIPMENT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hot plate stirrer MR3001</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Magnetic stirrer without heating</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Magnetic stirrer</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>VORTEX Mixer</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>Shaking machine, Kahn type</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Vertical autoclave 110lAstel</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Elma Transonic digital ultrasonic bath</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Grant SUB water bath</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>ADAM AAA 160L Analytic balance</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Bunsen burner</td>
<td>61</td>
</tr>
<tr>
<td>11</td>
<td>Eppendorf 5415D Centrifuge</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>ROTANTA 460 Refrigerated centrifuge</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>HETTICH Rotanta 460 RS Refrigerated benchtop centrifuge</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Multicapacity heating mantle</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>Gurney</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>Friocell coagulation analyzer (Fisher Bioblock)</td>
<td>2</td>
</tr>
<tr>
<td>17</td>
<td>Electrophoresis chamber</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>Aquatron water still</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Bi-distiller</td>
<td>2</td>
</tr>
<tr>
<td>20</td>
<td>Filamatic vending machine</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>Drying oven with mechanical control</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>Selecta bacteriological incubator</td>
<td>2</td>
</tr>
<tr>
<td>23</td>
<td>Sanyo –26°C Freezer</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>Power generator PS304</td>
<td>1</td>
</tr>
<tr>
<td>25</td>
<td>Laminar flow hood BK2000</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>TELSTAR Bio II A/P biosafety cabinet</td>
<td>3</td>
</tr>
<tr>
<td>27</td>
<td>Microcentrifuge 600pm</td>
<td>1</td>
</tr>
<tr>
<td>28</td>
<td>MOTIC Trinocular microscope + Camera</td>
<td>1</td>
</tr>
<tr>
<td>29</td>
<td>Olympus CX21 Microscope</td>
<td>20</td>
</tr>
<tr>
<td>30</td>
<td>Motic Microscope</td>
<td>35</td>
</tr>
<tr>
<td>31</td>
<td>Olympus CX41 Microscope</td>
<td>20</td>
</tr>
<tr>
<td>32</td>
<td>Fluorescence microscope with HBO</td>
<td>2</td>
</tr>
<tr>
<td>33</td>
<td>Olympus Microscope CX 21 LED</td>
<td>2</td>
</tr>
<tr>
<td>34</td>
<td>Moulinex Mixer</td>
<td>1</td>
</tr>
<tr>
<td>35</td>
<td>APC Smart-UPS 3000 (uninterruptable power supply)</td>
<td>1</td>
</tr>
<tr>
<td>36</td>
<td>Memmert Dry heat sterilizer</td>
<td>1</td>
</tr>
<tr>
<td>37</td>
<td>Concord Refrigerator</td>
<td>2</td>
</tr>
<tr>
<td>38</td>
<td>Selecta Refrigerator</td>
<td>2</td>
</tr>
<tr>
<td>39</td>
<td>Mastercycler Personal thermal cycler</td>
<td>1</td>
</tr>
<tr>
<td>40</td>
<td>Vilber Lourmat Transilluminator</td>
<td>1</td>
</tr>
<tr>
<td>41</td>
<td>Hospital bed and mattress</td>
<td>600</td>
</tr>
<tr>
<td>42</td>
<td>Ecograph</td>
<td>1</td>
</tr>
<tr>
<td>43</td>
<td>X-ray machine</td>
<td>1</td>
</tr>
<tr>
<td>44</td>
<td>Respiratory device</td>
<td>2</td>
</tr>
</tbody>
</table>
### Table 10: Data collection tools

<table>
<thead>
<tr>
<th>NAME OF TOOL</th>
<th>STUDY OBJECTIVES</th>
<th>METHODS</th>
<th>COMPONENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB data analysis tool (Developed by Merhan Hossein (GF), Angelo Makpenon (PNT) and Richard Dossou-Yovo (URC Benin))</td>
<td>Assess PNT program performance on TB case management</td>
<td>Quantitative</td>
<td>Compilation of routine PNT and WHO data</td>
</tr>
<tr>
<td></td>
<td>Assess national performance towards achieving of MDG 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview with NTP coordinator</td>
<td>Program Coordination Information</td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td>Interview with providers at the intermediate level</td>
<td>Program management and implementation, problems, and other</td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td>Interview with providers at the peripheral level</td>
<td>Operational implementation of the program, service provision, problems,</td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>challenges, motivation. Adherence to standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview with technical and financial partners</td>
<td>Forms of support and control, assessment of the program and its results,</td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>areas for collaboration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview with human resources manager</td>
<td>Aspects related to human resources management at the central level</td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td>Interview with food and consumables supply managers</td>
<td>Supply-chain management of drugs, consumables, and food</td>
<td>Qualitative</td>
<td>Epidemiological and field survey</td>
</tr>
<tr>
<td>Guide for discussions with cured patients</td>
<td>Satisfaction survey, knowledge and perceptions about the disease, lessons learned</td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td>Guide for interviews with patients on treatment</td>
<td>Experience of treatment in progress and knowledge about the disease</td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td>Interview with radio station staff</td>
<td>Technical and financial support, cooperation arrangements</td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td>Data-quality audit sheets</td>
<td>Quality of program data</td>
<td>Quantitative</td>
<td></td>
</tr>
<tr>
<td>Interview with NGOs</td>
<td>Technical and financial support, cooperation arrangements</td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td>Case-management observation</td>
<td>Case management procedures</td>
<td>Qualitative</td>
<td></td>
</tr>
<tr>
<td>Audit of patient-record quality</td>
<td>Quality in filling out patient records and following protocols, adherence to</td>
<td>Quantitative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory survey questionnaire</td>
<td>Organizational chart of laboratory staff and workspace, procedures for ordering</td>
<td>Quantitative</td>
<td>Laboratory survey</td>
</tr>
<tr>
<td></td>
<td>equipment and reagents, reagents and consumables management and equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>maintenance, existence and use of Standard Operating Procedures (SOP),</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>internal and external quality control, biosecurity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data collection form</td>
<td>Funding sources, Mechanism and Procedures for financial management</td>
<td>Quantitative</td>
<td>Economic survey</td>
</tr>
<tr>
<td>CDT Laboratory</td>
<td>Total number of workers</td>
<td>Number of biologists/pharmacists</td>
<td>Number of Technicians-Level A</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>-------------------------</td>
<td>---------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Centre Hospitalier National de Pneumo-Phtisologie (National Pneumonphthisiology Center)</td>
<td>17</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Abomey-Calavi</td>
<td>4</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Avrankou</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Akron</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Banté</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zagnado</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Houeyogbe</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Parakou</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nikki/Perere CTDO</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Djougou</td>
<td>3</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Natitingou</td>
<td>6</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Lokossa</td>
<td>9</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>
### Table 13: List of persons interviewed

<table>
<thead>
<tr>
<th>Structures</th>
<th>List of persons met</th>
<th>Job title</th>
<th>Email address</th>
<th>Phone number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Central level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTP</td>
<td>Pr Sévrin Anagonou</td>
<td>NTP Deputy Coordinator</td>
<td></td>
<td>95 05 03 25</td>
</tr>
<tr>
<td>NTP</td>
<td>Dr Dissou Afolabi</td>
<td>Reference Laboratory Director</td>
<td></td>
<td>66 61 48 82</td>
</tr>
<tr>
<td>NTP</td>
<td>Mr Traoré Tidjani</td>
<td>CSAE</td>
<td></td>
<td>97 39 85 15</td>
</tr>
<tr>
<td>NTP</td>
<td>Mr Adrien Otti</td>
<td>CSAF</td>
<td></td>
<td>97 57 80 83</td>
</tr>
<tr>
<td>NTP</td>
<td>Mr Bakary Sirageou</td>
<td>SAF Assistant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTP</td>
<td>Mr Angelo Makpenon</td>
<td>Head of Statistics Services and GFATM focal point</td>
<td></td>
<td>94 05 58 44</td>
</tr>
<tr>
<td><strong>At the CDT level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natitingou ZH</td>
<td>Ms Lidwine Mahada</td>
<td>Head of ZH Laboratory Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natitingou ZH</td>
<td>Mr Amede</td>
<td>Manager</td>
<td></td>
<td>97 11 30 05</td>
</tr>
<tr>
<td>Djougou HC</td>
<td>Ms Lucette Sagbo</td>
<td>CDT Manager</td>
<td></td>
<td>97 17 00 69</td>
</tr>
<tr>
<td>Djougou HC</td>
<td>Mr Martial Houdeve</td>
<td>Laboratory Manager</td>
<td></td>
<td>97 82 82 75</td>
</tr>
<tr>
<td>Djougou HC</td>
<td>Ms Mamatou Djeregou</td>
<td>Accountant</td>
<td></td>
<td>64 69 00 63</td>
</tr>
<tr>
<td>Akron CHPP</td>
<td>Mr Didier Sagbo</td>
<td>Reference Laboratory Director</td>
<td></td>
<td>97 11 28 64</td>
</tr>
<tr>
<td>Akron CHPP</td>
<td>Mr Laurent Ahouadi</td>
<td>CSAE</td>
<td></td>
<td>97 64 28 70</td>
</tr>
<tr>
<td>Akron CHPP</td>
<td>Mr Marius Toi</td>
<td>CSAF</td>
<td></td>
<td>97 60 06 37</td>
</tr>
<tr>
<td>Akron CHPP</td>
<td>Mr Grégoire Gbenagnon</td>
<td>Head nurse of center</td>
<td></td>
<td>96 44 62 65</td>
</tr>
<tr>
<td>Akron CHPP</td>
<td>Dr Irisse Houehounha</td>
<td>Head Doctor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Akron CHPP</td>
<td>Ms Linda Agbossou</td>
<td>Social worker</td>
<td></td>
<td>96 02 09 44</td>
</tr>
<tr>
<td>Djougou-Copargo-Oauké HZ</td>
<td>Dr Sourkatou</td>
<td>Coordinator</td>
<td></td>
<td>97 68 44 47</td>
</tr>
<tr>
<td>Natitingou health center</td>
<td>Dr Wenceslas Amale</td>
<td>Head Doctor</td>
<td></td>
<td>97 64 65 23</td>
</tr>
<tr>
<td>Natitingou health center</td>
<td>Ms Nathalie Gouissi</td>
<td>CDT Manager</td>
<td></td>
<td>97 13 23 55</td>
</tr>
</tbody>
</table>
### Departmental level

<table>
<thead>
<tr>
<th>Department</th>
<th>Doctor Name</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPPS/Atacora/Donga</td>
<td>Tatchienta M’po Nekoua</td>
<td>97 49 49 58</td>
</tr>
<tr>
<td>SPPS/Atlantique Littoral</td>
<td>Théotine Migan</td>
<td>97 52 59 47</td>
</tr>
<tr>
<td>SPPS/Borgou/Alibori</td>
<td>Gado Kora</td>
<td>97 68 54 94</td>
</tr>
<tr>
<td>SPPS/Mono/Couffo</td>
<td>Alfred Waounwa</td>
<td>97 11 16 00</td>
</tr>
<tr>
<td>SPPS/Ouémé/Plateau</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPPS/Zou/Colines</td>
<td>Thierry Tossou Boco</td>
<td>97 18 40 72</td>
</tr>
</tbody>
</table>

### Workers at the operations level

<table>
<thead>
<tr>
<th>CDT/Djougou</th>
<th>Lucette Sagbo</th>
<th>97 17 00 69</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDT/Natitingou</td>
<td>GOUISSI Nathalie Gouissi</td>
<td>97 13 23 55</td>
</tr>
<tr>
<td>CDT/Abomey-Calavi</td>
<td>Anita Lawson</td>
<td>97 69 69 64</td>
</tr>
<tr>
<td>Nikki HC</td>
<td>Yai Kassim</td>
<td>97 13 85 86</td>
</tr>
<tr>
<td>Parakou CDT</td>
<td>Séverin Worou</td>
<td>66 95 46 06</td>
</tr>
<tr>
<td>CDT/Houeyogbe</td>
<td>Chantale Ahouansou</td>
<td>96 72 46 56</td>
</tr>
<tr>
<td>CDT/Klouekanme</td>
<td>Joseph Monguede</td>
<td>97 92 25 90</td>
</tr>
<tr>
<td>CDT/Lokossa</td>
<td>André Aglokpo</td>
<td>97 46 80 24</td>
</tr>
<tr>
<td>Akron CHPP</td>
<td>Grégoire Gbenagnon</td>
<td>96 44 62 65</td>
</tr>
<tr>
<td>CDT/Avrankou</td>
<td>Rolande Tossou</td>
<td>66 48 68 88</td>
</tr>
<tr>
<td>CDT/Banté</td>
<td>Frise Vilon</td>
<td>97 85 38 62</td>
</tr>
<tr>
<td>Zagnanado</td>
<td>Kakpovi Anani</td>
<td>97 24 98 20</td>
</tr>
</tbody>
</table>

### Other partners

<table>
<thead>
<tr>
<th>Organization</th>
<th>Contact Person</th>
<th>Email Address</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global LFA (Swiss TPH)</td>
<td>Dr Mawo Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global LFA (Swiss TPH)</td>
<td>Ms Annie Maganga d’Almeida</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHO</td>
<td>Dr Houansou Télephore</td>
<td><a href="mailto:houansout@bj.afro.who.int">houansout@bj.afro.who.int</a></td>
<td>97 29 02 56</td>
</tr>
<tr>
<td>SEIB-GFATM-MU</td>
<td>Mr Araba Matthieu</td>
<td></td>
<td>95 96 39 79</td>
</tr>
</tbody>
</table>