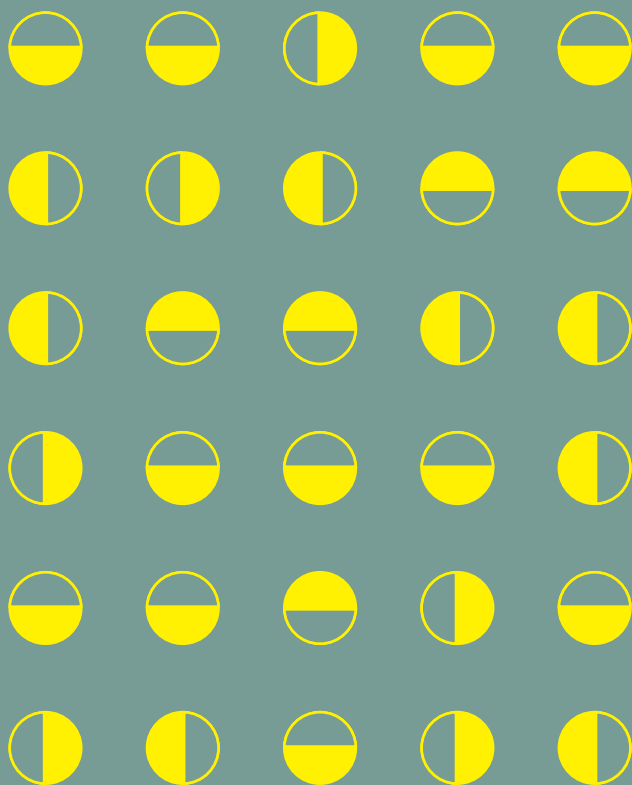


# TUBERCULOSIS AMONG PEOPLE WHO USE DRUGS IN ABIDJAN, CÔTE D'IVOIRE

PREVALENCE, MANAGEMENT  
AND COMMUNITY-BASED SUPPORT MODEL



SCIENTIFIC REPORT





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## ABBREVIATIONS AND ACRONYMS

ARV	Anti-retroviral
ASAPSU	Association de Soutien à l'Auto-Promotion Sanitaire et Urbaine (Urban Health Self-Help Support Organisation)
CDT	Centre de Diagnostic et de Traitement de la tuberculose (Tuberculosis Diagnosis and Treatment Centre)
CeDRoS	Centre de Diagnostic et de Recherche sur le Sida et les autres maladies infectieuses (Diagnosis and Research Centre on HIV and other Infectious Diseases)
CI	Confidence interval
CNACI	Comité National Anti-Tuberculeux de Côte d'Ivoire (Côte d'Ivoire National Tuberculosis Committee)
CT	Treatment centre
DOT	Directly observed treatment
ENSEA	Ecole Nationale Supérieure de Statistique et d'Economie Appliquée (National Higher School of Statistics and Applied Economics)
HIV	Human immunodeficiency virus
HR	Harm reduction
IPCI	Institut Pasteur de Côte d'Ivoire (Côte d'Ivoire Pasteur Institute)
LTBI	Latent tuberculosis infection
MdM	Médecins du Monde (Doctors of the World)
MDR-TB	Multi-drug-resistant tuberculosis
NEP	Needle exchange programme
NPV	Negative predictive value
NRL	National Reference Laboratory
NTP	National Tuberculosis Programme
OR	Odds ratio
PE	Peer educator
PLWHIV	Person living with HIV/AIDS
PPH	Service de Pneumologie Phtisiologie (Lung and Tuberculosis Service)
PPV	Positive predictive value
PWUD	People who use drugs
RDS	Respondent driven sampling
RDT	Rapid diagnostic test
RR-TB	Rifampicin-resistant tuberculosis
SD	Standard deviation
Se	Sensitivity
Sp	Specificity
TB	Tuberculosis
UNAIDS	Joint United Nations Programme on HIV and AIDS
UNODC	United Nations Office on Drugs and Crime
WHO	World Health Organization
XDR-TB	Extensively drug-resistant tuberculosis

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# EXECUTIVE SUMMARY



## INTRODUCTION

In the mid-2000s, West Africa became a major transit hub for heroin and cocaine trafficking, facilitating the emergence of local markets and resulting in an increase in people who use drugs (PWUD). Cannabis, heroin and cocaine, usually inhaled, are the most commonly used drugs in Côte d'Ivoire. Abidjan, the country's economic capital, has illegal drug consumption areas (known as 'smoking spots') in various locations, where drugs are purchased and used. Abidjan's estimated 6,000 PWUD are known to have specific health issues, particularly tuberculosis.

With 10.4 million new cases and 1.7 million deaths worldwide in 2016, tuberculosis (TB) is still a major public health challenge. It is the leading cause of death from a single infectious agent, ahead of HIV/AIDS. As the incidence of TB declines, the burden of the disease is increasingly borne by urban subpopulations living in harsh conditions, such as PWUD.

The World Health Organization estimated there were 36,000 new cases of tuberculosis in Côte d'Ivoire in 2016, i.e. a prevalence rate of 0.2% among the general population. In 2017, 21,307 cases that included all forms of tuberculosis were reported to the National Tuberculosis Control Programme, i.e. 59% of the total estimated number of cases. Although PWUD are a particularly at-risk group for TB and field experience suggests a high prevalence among this population, there is virtually no data on TB prevalence. The aim of the survey was thus to estimate the prevalence of pulmonary TB among PWUD in Abidjan and assess the cascade of care available to PWUD with confirmed pulmonary tuberculosis (TB+) participating in a community-based support programme.

## METHODS

The two-part survey targeted people over the age of 18 years who had used heroin and/or cocaine/crack in the previous six months, regardless of the method employed. The first part, which covered diagnosis, consisted in a cross-sectional prevalence estimation survey with systematic testing available in mobile units near the smoking spots. The survey was made available to all PWUD present in two smoking spots in Abidjan districts Yopougon and Treichville at the time of its implementation. The second part, which covered treatment, was a prospective survey. Thus, all people who tested positive for pulmonary TB and who agreed to start TB treatment were offered follow-up for the duration of their treatment. They were also invited to participate in a community-based support programme proposing various activities, e.g. family mediation visits, self-help groups, personalised follow-up interviews, nutritional and financial support.

On their inclusion in the survey, the following data was collected: a face-to-face socio-behavioural questionnaire, rapid diagnostic tests (RDTs) for HIV, a clinical examination, sputum collection and chest x-rays for pulmonary TB testing. Direct microscopic examination and Xpert MTB/RIF® analyses were performed on sputum. Those who tested positive for Xpert MTB/RIF® were considered to have confirmed pulmonary TB (TB+). If the rifampicin test was positive, individuals were considered to have rifampicin-resistant pulmonary TB (RIF-TB). The questionnaire collected data on: socio-demographic situation, drug use, imprisonment, sexual practices, knowledge of TB, access to TB and HIV testing and care, stigma and discrimination.

After a descriptive analysis, TB, RR-TB, TB/HIV co-infection and HIV prevalence were calculated on the basis of the total number of participants for whom test results were available. A multivariate logistic regression was performed to determine the factors associated with TB infection, with adjustments for smoking spots, gender and

age. A significance level of 5% was considered for the final multivariate model. In the case of testing algorithms, the algorithm used as reference was systematic testing with Xpert MTB/RIF<sup>®</sup>. Only participants with results from all the tests were taken into account in this algorithm analysis. To compare with the reference algorithm, the main indicator was the sensitivity of the algorithm (ability to detect TB+ cases among participants). To evaluate the effectiveness of the treatment, participants were considered at the end of their treatment as having been successfully treated if they were registered as “cured”, “treatment finished” or “treatment completed” in the follow-up booklets provided by the Anti-Tuberculosis Centre. R software (version 3.4.3) was used to perform the analyses.

The protocol was validated by Côte d'Ivoire's National Ethics and Research Committee. All participants took part voluntarily and signed informed consent forms prior to inclusion in the survey.

## RESULTS

Between October 2016 and May 2017, 545 PWUD were informed about the survey and 532 agreed to participate, i.e. a testing acceptability rate of 97.6%. The vast majority of the sample were male (n=484; 91.0%) single (n=434; 81.6%), with an average age of 34.9 years. Most lived with family or friends (n=331; 62.2%). Over half were in employment (n=315; 59.2%) and almost two-thirds had at least a secondary school education (n=346; 65.0%). The majority of drugs used were heroin and crack (n=530; 99.6% and n=353; 66.4%, respectively) and were inhaled (i.e. smoked). Injection was extremely uncommon (n=5; 0.9% had injected at least once). Almost half of the participants (n=260; 48.9%) had been incarcerated at least once.

Of the 531 participants with an Xpert MTB/RIF<sup>®</sup> test result, 52 were diagnosed with pulmonary TB, i.e. a prevalence of 9.8% 95% CI: 7.5% - 12.7%. 9 of the 52 (17.3%) had RIF-TB and 8 (15.4%) were co-infected with HIV. Of the 522 participants with a HIV test result, 29 tested positive for HIV, i.e. a prevalence of 5.6% 95% CI: 3.8% - 8.0%.

Factors significantly associated with TB infection in PWUD in multivariate analysis were: recruited for the survey in the Treichville smoking spot (OR: 2.0[1.1 - 3.7]; p= 0.03), unemployed (OR: 1.8[1.0 - 3.4]; p= 0.05), co-infected with HIV (OR: 3.3.3[1.2 - 8.1]; p= 0.01).

Regarding the testing algorithms, 485 participants were included in the analyses, with 46 positive Xpert MTB/RIF<sup>®</sup> cases (9.5%). The national testing algorithm (clinical signs + direct microscopic examination of sputum) detected 11 cases (23.9% sensitivity). Thus, the national algorithm would not have detected 76% of TB+ PWUD. Other algorithms including the different examinations had a sensitivity rate of between 13.0% (clinical signs + chest x-rays + direct microscopic examination of sputum) and 71.7% (clinical signs + Xpert MTB/RIF<sup>®</sup>).

Lastly, of the 52 participants identified as having confirmed pulmonary TB, 40 (76.9%) came back to get their results and agreed to be put on treatment and participate in the part of the survey on treatment. 24 out of 40 participants (60.0%) were successfully treated; 3 (7.5%) failed their treatment; 11 (27.5%) did not complete their treatment (4 died during the survey); and 2 had a not yet available definitive status (treatment ongoing or awaiting biological results). The outcome of the community-based support programme was as follows: 31 family mediation visits made with 21 participants, 11 self-help groups with 34 participants held in the two smoking spots and 151 follow-up interviews held with 34 participants.

## CONCLUSION AND RECOMMENDATIONS

First of all, the results of the survey suggest that, thanks to the community-based approach, it is quite feasible to roll out systematic tuberculosis-testing programmes in PWUD sites, with a high acceptability among PWUD (97.6%).

With a TB prevalence rate of 9.8%, the survey confirmed the hypothesis that there is a high prevalence of TB and RR-TB among this PWUD population in difficulty. 17.3% of the 9.8% were rifampicin-resistant. This TB prevalence is nearly 50 times that of the Ivorian population in general (i.e. 0.2%). Algorithm analyses show that, compared to systematic testing with Xpert MTB/RIF®, the other algorithms have unacceptable sensitivities for a population with such high prevalence.

The results of the part of the survey on treatment suggest that it is feasible, vital and pertinent to set up a community-based support programme to monitor treatment uptake among TB+ PWUD, who have a high level of adherence to activities made available to them. Thus, this community-based support model enables high treatment efficacy (i.e. 60%) among a population posing significant challenges in terms of both adherence and follow-up.

Based on these conclusions, there are several recommendations:

- **It is urgent to view PWUD as a key population in the fight against TB at national level, and more specifically in Abidjan.** Eradicating TB within the country can only be achieved if human and financial resources are specifically allocated and activities adapted to PWUD are rapidly set up.
- **The national algorithm must be reviewed to make Genexpert testing available to PWUD, as is the case of other key populations (e.g. PLWHIV).** Some sites, such as PWUD community care centres, seem particularly suited to offering Genexpert testing to PWUD and a budget should be allocated to this purpose.
- **When setting up activities adapted to PWUD, it is crucial to explore integrated action models, including harm reduction activities and access to a holistic approach to drug use (HIV, TB, hepatitis B, hepatitis C testing services, opiate substitution treatments and basic care) based on a robust community-based strategy.** These integrated models provide a comprehensive approach to health among PWUD and improve their access to health services and monitoring.
- **It is essential to support, formalise and sustain a community-based support model for PWUD** to connect with them in smoking spots, provide information, raise awareness and facilitate the implementation of local mobile actions, support with referrals and treatment for TB+ and/ or HIV+ PWUD.
- **To reduce stigma and discrimination among TB + PWUD, peers must be on hand to provide information and raise awareness to TB (symptoms, transmission, treatment) in places where drugs are used.**
- **It is important to include PWUD in TB research projects, as much in Côte d'Ivoire as internationally, such as clinical research into new treatments and operational research to enable access to more data on this group of people and guide public policy.** For example, very little data is available on female PWUD, despite their specific issues and need for ad hoc services.
- **Lastly, extensive reflection on decriminalising drug use is called for in Côte d'Ivoire and at the global level to reduce the vulnerability of PWUD,** prevent their marginalisation and lessen the number of incarcerations resulting from illicit drug use. This would ensure PWUD access to harm reduction, prevention and health services.

# INTRODUCTION

## DRUG USE IN SUB-SAHARAN AFRICA, WEST AFRICA AND CÔTE D'IVOIRE

For several years the use of injecting and non-injecting drugs has been reported in various countries in Eastern and Southern Africa, (e.g. Kenya, Tanzania, Zanzibar, Nigeria and South Africa).<sup>1</sup> However, this seems to be more recent and less well-documented in West Africa, where it is often concealed.<sup>2</sup> In the mid-2000s West Africa became a major transit hub for heroin and cocaine trafficking, and the increase in local and regional transport routes has encouraged the emergence of local markets.<sup>3</sup> Political, security, health and climate change crises, along with growing urbanisation and changes in lifestyle, have seen an associated rise in the number of people who use drugs (PWUD). In 2008, the number of PWUD was estimated at 1.78 million in Sub-Saharan Africa.<sup>4</sup> In 2012, the United Nations Office on Drugs and Crime (UNODC) warned of a worrying rise in cocaine use in West Africa, compared to the global average.<sup>1</sup>

Very few data are available on drug use in Côte d'Ivoire. Cannabis, heroin and cocaine, usually inhaled (smoked), are the most commonly used drugs.<sup>5</sup> Abidjan, the country's economic capital, has drug consumption areas (known as smoking spots) throughout the city. Drugs are sold and used in these rooms and some of the most vulnerable PWUD even live in them. A biobehavioural study conducted among PWUD in Abidjan in 2014 by Médecins du Monde (MdM), together with the Blue Cross, the CeDReS and Adjamé Tuberculosis Centre, estimated there were 100 smoking spots (smoking spots for cannabis alone were excluded),<sup>5</sup> and the total number of PWUD in Abidjan was 3,461. This study provided very important results as it was the first of its kind in this population. Unfortunately, the population size estimates were soon seen to be lower than the true numbers observed in the field. Current estimates are closer to 6,000 PWUD in Abidjan, although it is very difficult to give accurate estimates, given the illegal nature of drug consumption and the high geographical mobility of this

population (mostly related to the destruction of smoking spots by the law enforcement agencies). There may be between 100 and 200 people who inject drugs (see Annexe 1 for a discussion of the terms 'people who use drugs' and 'people who inject drugs' in Côte d'Ivoire).

## THE HARM REDUCTION APPROACH IN CÔTE D'IVOIRE BY MDM AND OTHER ACTORS

Médecins du Monde is an international NGO which has been running prevention and medical treatment programmes for the most vulnerable populations, and especially PWUD, for more than 30 years. MdM has extensive expertise in the harm reduction (HR) field, both in France and internationally. The organisation launched the first needle exchange programme (NEP) in France in 1989 and was very involved in gaining official recognition for HR by the French state. At the international level, MdM opened its first HR programme in Saint Petersburg in 1997 and was behind the first programme of this type in continental Sub-Saharan Africa (Tanzania). The central plank of MdM's strategy involves peers (the PWUD themselves participate in devising and implementing the programmes) and communities and rests on the introduction of innovative, high-quality HR programmes, adapted to the context of the intervention, and extending their reach by establishing resource and training centres. The important work of advocacy is run in parallel to promote the HR approach and advance the reform of repressive laws that block access to healthcare for at-risk groups.

Since January 2015, under the auspices of the Ministry of Health, MdM has been running an HR project for vulnerable PWUD in 20-30 smoking spots in Abidjan. This is a collaboration with several national partners and community organisations such as ASAPSU, the Blue Cross and Espace Confiance. Teams of partners and peer educators (PEs) offer awareness-raising sessions and

distribution of HR material, outreach care and screening strategies, as well as community-based support to healthcare facilities. A pilot community care and treatment centre for PWUD will open in 2018. This unique facility will offer its clients a warm welcome, activities and community support, in addition to providing screening and care appropriate to the needs of PWUD.

## OVERVIEW OF TUBERCULOSIS AND ITS LINKS TO DRUG USE: EPIDEMIOLOGY AND CARE AND TREATMENT FOR PWUD

Worldwide progress in combating tuberculosis (TB) has been significant since 2000. Between 2000 and 2016 there was an average reduction in the incidence of and mortality from TB of 1.4% and 3% per year respectively. Diagnosis and treatment of TB saved 53 million lives between 2000 and 2016<sup>6</sup>. However, tuberculosis remains a major public health issue, with 10.4 million new cases and 1.7 million deaths in 2016<sup>6</sup>. Worldwide, TB is the leading cause of death from a single infectious agent, ahead of HIV/AIDS. Drug-resistant tuberculosis has also become a major challenge; in 2016 there were 600,000 new cases of rifampicin resistance (RR-TB) and multidrug resistance (MDR-TB) (resistance to at least rifampicin and isoniazid, two antibiotics used as part of the most effective first-line treatments for TB). Only 22% of these 600,000 cases were diagnosed and treated.<sup>6</sup> In this context, in 2015 the World Health Organization (WHO) launched a global strategy for the elimination of TB by 2035 (End TB Strategy), with the objective of reducing the number of TB-related deaths by 95%, and achieving a 90% reduction in the incidence of TB between 2015 and 2035.<sup>7</sup>

With the decrease in the incidence of TB, the disease burden is increasingly borne by urban sub-populations living in precarious conditions,<sup>8-10</sup> including PWUD. Drug use is a significant factor in the epidemiology of TB<sup>11-17</sup> and is associated with a

higher prevalence of latent tuberculosis infection (LTBI) as well as higher levels of tuberculosis disease incidence and prevalence.<sup>13,18-26</sup> Furthermore, PWUD are at increased risk of developing antibiotic-resistant forms of TB owing to their precarious lifestyles, difficulty in accessing healthcare due to stigmatisation and discrimination, specific challenges with adherence to treatment, breaks in care related to incarceration and potential co-morbidities (e.g. HIV, hepatitis B and hepatitis C).<sup>13,27-33</sup>

It has been highlighted that this at-risk population requires the development of mobile provision with rapid test results for TB diagnosis, care and treatment.<sup>34</sup> Moreover, there are very few data on the use of molecular diagnostic testing, such as Genexpert (Xpert MTB/RIF®) in hard-to-reach populations, even though WHO has recommended since 2011 that the test should be used as the initial diagnostic test in individuals suspected of having drug-resistant TB or HIV-associated TB.<sup>35</sup> It was recommended to implement increased monitoring and supervision of patients (DOT strategy (=Directly Observed Treatment)), particularly for patients likely to have adherence issues.<sup>34</sup>

## TUBERCULOSIS AND HIV/TB CO-INFECTION IN CÔTE D'IVOIRE: OVERVIEW AND CARE AND TREATMENT

### Overview of tuberculosis and HIV/TB co-infection in Côte d'Ivoire

Despite the considerable improvements seen since the beginning of the century, tuberculosis remains a major public health problem in Côte d'Ivoire. In 2016, WHO estimated that there were 36,000 new tuberculosis episodes, an incidence of 153 per 100,000 people per year and a prevalence of 0.2%. Tuberculosis-related mortality is estimated at 35 deaths per 100,000.<sup>6</sup> WHO estimated there were 2,100 patients in Côte d'Ivoire with RR/MDR-TB.

The data reported to the National Tuberculosis Programme (NTP) indicate that men are more affected by TB than women (male/female ratio of 1:5 in 2016).<sup>36</sup> In 2017, a total of 21,307 cases of TB (all forms) were notified. In Côte d'Ivoire the Abidjan region is the most affected, accounting for 47% of the cases reported in 2017. Moreover, 368 cases of RR/MDR-TB were detected in 2017, as well as three cases of extensively drug-resistant TB (XDR-TB: MDR-TB with additional resistance to fluoroquinolones and at least one of the three second-line injectable tuberculosis treatments).

Furthermore, Côte d'Ivoire has a generalised HIV/AIDS epidemic; in 2016 there was an estimated prevalence of 2.7%, with 460,000 people living with HIV (PLWHIV)<sup>37</sup>. In 2016, 25,000 people died as a result of their HIV infection<sup>37</sup>. Women are more affected than men, with a prevalence of 3.5% (compared to 1.8% in men). The 2016 NTP data indicate that 22% of patients with tuberculosis who were offered an HIV test were seropositive.<sup>36</sup>

### Care and treatment of tuberculosis and HIV/TB co-infection in Côte d'Ivoire

Since 2001 the fight against tuberculosis has been coordinated by the NTP. The NTP has 25 regional coordination facilities, known as Tuberculosis Centres (centres anti-tuberculeux – CATs). Each CAT is the reference centre for its geographical region and has a specialist care and treatment centre for tuberculosis patients. The CATs work in close cooperation with the tuberculosis diagnosis and treatment centres (CDTs), the basic health units dedicated to diagnosis and treatment of TB. There are 244 CDTs located throughout the country. There are two central diagnostic laboratories (Côte d'Ivoire Pasteur Institute (IPCI), the national reference centre, and the CeDReS), as well as a laboratory in each CAT and 192 laboratories across the 244 CDTs.

The national care and treatment protocols for tuberculosis include screening based on clinical signs followed by direct microscopic examination

of sputum. If the result is positive, treatment based on the WHO's international recommendations is offered to the patient (see Annexe 2). Tuberculosis drug resistance is only assessed in cases of treatment failure or relapse and systematically for children and PLWHIV, using the Xpert MTB/RIF® test. Treatment is free for all patients residing in Côte d'Ivoire. Outpatient treatment is offered for standard cases of TB, with a relative responsible for checking the treatment is taken. No specific support is offered to improve treatment adherence in patients who may have problems in this respect, or to isolated patients. The International Union Against Tuberculosis and Lung Disease (IUATLD) short course treatment is offered to patients with RR/MDR-TB, with directly observed treatment at the health facility (DOT strategy) for the first four months of treatment. Detection of UR-TB is not yet integrated into the national care and treatment protocols. In 2016, there was an 83% treatment success rate for new and relapse cases.<sup>36</sup> In addition, 318 of the 368 RR/MDR-TB cases screened (86.4%) were treated with second-line drugs.

For HIV/TB co-infection the NTP has adopted the Stop TB strategy in 2006 to improve care and treatment of HIV/TB co-infections. Consequently, the national protocols include a systematic proposal to screen all TB+ patients for HIV. The patients are then offered a referral to HIV care and treatment centres, and immediate offered antiretroviral (ARV) treatment in accordance with international recommendations. In 2016, 99% of recorded tuberculosis cases were tested for HIV. In total, 4,274 TB+ patients tested seropositive and 93% of these were given ARV treatment.<sup>36</sup>

### JUSTIFICATION FOR THE STUDY

Even though people who use drugs are at high risk of contracting tuberculosis there are very few data that could be used to estimate the prevalence and number of PWUD with tuberculosis in Côte d'Ivoire, or to evaluate the cascade of care

for TB+ PWUD in the healthcare system, thus hindering the evaluation of TB care and treatment in this at-risk population.

As mentioned above, a respondent driven sampling (RDS) biobehavioural study was conducted in 2014 among PWUD<sup>5</sup>. This study involved adult heroin and/or cocaine users in Abidjan. 90% of the study sample (n=450) were men, and the mean age was 33.5 years. 34% of participants reported having their own accommodation, while 52% were living with family or friends and 14% were of no fixed abode. Almost half (48%) of the PWUD had already been in prison. In addition, smoking spots were shown to be isolated, unsanitary places. They are often found in areas close to rubbish dumps with no access to water or electricity and no provision for waste disposal or latrines. Makeshift shelters, if they exist at all, are made of wood, corrugated iron and plastic sheeting, and the PWUD gather under them to consume their drugs. There is a hierarchy in place in the smoking spots, with a chief (the 'babatché') and his team. Cocaine and heroin are sold on the premises and a 'zepier' rents handmade pipes to the consumers. The conditions in these smoking spots are extremely hazardous and overcrowded. So all the conditions are met to favour the transmission of infectious agents such as tuberculosis.

The study data on infection risk showed that PWUD are disproportionally affected by HIV and tuberculosis, with prevalence estimated at 9.5% for HIV and 1.8% for tuberculosis.

The prevalence of 1.8% active pulmonary tuberculosis appeared significant and mainly associated with precarious living conditions. 12% of PWUD had a history of TB. This prevalence is about 10 times the prevalence in the general population (i.e. 0.2%). However it may well be that this prevalence has been underestimated for several reasons:

- Not all the PWUD participating in the study had undergone active investigation for tuberculosis (only those with clinical signs of TB);

- The screening method was not ideal as it only included direct microscopic sputum examination; other methods with better sensitivity (Xpert MTB/RIF®, chest X-ray or culture) were not used;
- The high frequency of respiratory system problems found during routine field visits and the high number of referrals to the CATs suggest that the prevalence of TB is higher than 1.8%.

On the other hand, there are no data on the proportion of PWUD with RR/MDR-TB, a population which presents numerous risk factors for this.

Finally, there are very few data in Côte d'Ivoire on access and adherence to TB treatment for PWUD. Work on a 2017 doctoral thesis showed that of 29 PWUD monitored at four CATs, only six (20.7%) finished their treatment and were declared cured. Eighteen (62.1%) were lost to follow-up. Additionally, based on observations made in the field, MdM estimates that PWUD have very little access to tuberculosis treatment and very few of those who do have access actually finish the treatment. This implies a potential risk to the health of the person themselves, with disease progression and the appearance of antibiotic resistance, and also a significant risk of transmission of the TB. However, work carried out with PWUD in the smoking spots shows that they are willing to access healthcare if they receive support to do this.



# **HYPOTHESIS AND OBJECTIVES**

**The following research hypotheses were proposed for this study:**

- As PWUD are particularly at risk of pulmonary tuberculosis, including the resistant forms, they should be considered and treated accordingly.
- Using the community approach it is possible and acceptable to organise mass screenings in smoking spots.
- Diagnostic testing based on clinical screening is not sensitive enough to identify active pulmonary tuberculosis among PWUD.
- Using the community approach it is possible and acceptable to ensure that treatment for active pulmonary tuberculosis in PWUD is completed, to improve the chance of reaching the 80% rate found in the general population.

**The study objectives were as follows:**

#### **PRINCIPAL OBJECTIVE:**

- To estimate the prevalence of TB among PWUD in Abidjan and evaluate the cascade of care for TB+ PWUD receiving a community-based support programme

#### **SECONDARY OBJECTIVES:**

- To estimate the prevalence of RR-TB and HIV/TB co-infections among PWUD;
- To identify the factors associated with TB among PWUD;
- To evaluate the acceptability of each stage of the cascade of care for tuberculosis among PWUD who are participating in a community-based support programme (acceptability of screening, retrieval of results, referral to treatment centres, introduction of treatment, completion of treatment, efficacy of treatment);
- To estimate the performance of the different diagnostic methods used for diagnosis of TB among PWUD;
- To evaluate the knowledge, attitudes and practices, and also the stigma, relating to TB among PWUD.

# METHODS



Outreach unit close to a smoking spot where participants were recruited for the diagnosis component of the study, with the X-ray truck.



Community-based support at a CAT (PWUD, care provider)

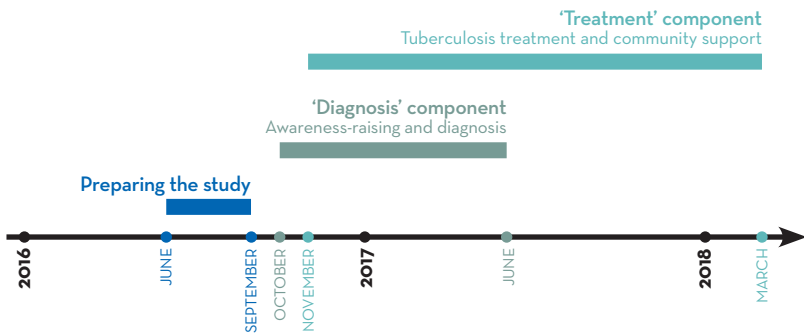


Figure 1 Study plan

## RESEARCH METHODOLOGY

The study has two partly associated components: a diagnosis component and a treatment component (Figure 1).

### DIAGNOSIS COMPONENT

This part of the study was a cross-sectional survey to assess prevalence. The study was proposed to all the PWUD present at the time of the survey in two Abidjan smoking spots, in the Yopougon and Treichville communes. These two smoking spots were chosen for pragmatic reasons, as they were the smoking spots with an ongoing harm reduction project for PWUD, run by MdM and partner organisations. In general, access to smoking spots is complex as they are illegal, however access to the smoking spots involved in the project was easier as they were 'regulated' These were 'typical' large smoking spots, where between 200 and 250 people gather. It also seemed more ethical to offer screening to everybody who frequented the same confined space, given the mode of transmission of tuberculosis, rather than using a sampling method.

### TREATMENT COMPONENT

To evaluate the cascade of care, the TB+ PWUD who were treated for tuberculosis and received community support were monitored throughout their TB treatment. This component was offered to all the people who screened positive for pulmonary tuberculosis during the study, came to retrieve their results and agreed to be referred and to start tuberculosis treatment.

### STUDY POPULATION AND SAMPLE SIZE

The study targeted heroin and cocaine/crack cocaine users from two smoking spots in the Yopougon and Treichville communes, in Abidjan, Côte d'Ivoire.

### Inclusion criteria:

- Having reported using heroin and/or cocaine/crack cocaine during the last six months (by any method of consumption);
- Meeting the criteria for belonging to the study population (verified during an inclusion interview);
- Being present in one of the smoking spots at the time of the survey;
- Having given informed consent to participate in the study.

### Exclusion criteria:

- Aged under 18 years;
- Found to be unable to give informed consent to their participation in the study;
- Having already participated in the survey.

### Sample size

Initially the sample size was calculated to obtain at least 50 TB+ people to be monitored in the treatment component. It was calculated by taking the following parameters into account:

1. expected TB prevalence of 7.6%;
2. required accuracy of the prevalence of 5%;
3. 10% lost to follow-up between diagnosis and start of treatment.

The number of participants to be recruited was therefore estimated at 750 PWUD.

## PATHWAY FOR THE PARTICIPANTS

### Recruitment procedure for the diagnosis component

The participant pathway is shown in Figure 2. At the end of the pathway the participants received a first payment of 2,000 CFA francs.

### Recruitment procedure for the treatment component

The participants were invited to come and receive their results seven days after testing,



Researcher completing the questionnaire with a participant

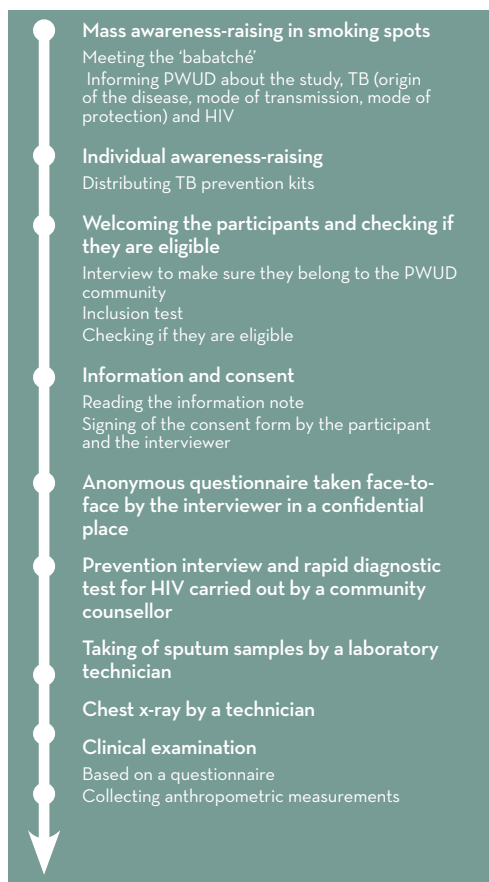


Figure 2 Pathway for the participants during the diagnosis component

bringing their coupon containing a unique code. The results were given together with information appropriate for the participant's TB status. Participants who screened positive for TB were given the opportunity to be entered in the second part of the study, the treatment component. People who tested positive for HIV but with an HIV/TB co-infection could also be included in the second component, with integrated care and treatment managed by the CAT. Participants who came for their results received a payment of 3,000 CFA francs.

## SPUTUM ANALYSIS

The analyses were performed at the laboratories of the partner CATs the CeDRoS and the IPCI.

## DATA COLLECTED

The questionnaire was developed using validated tools and questionnaires used in previous surveys conducted by MdM. The initial version was developed by MdM in collaboration with the



Sputum sampling area – sputum samples were taken by a laboratory technician

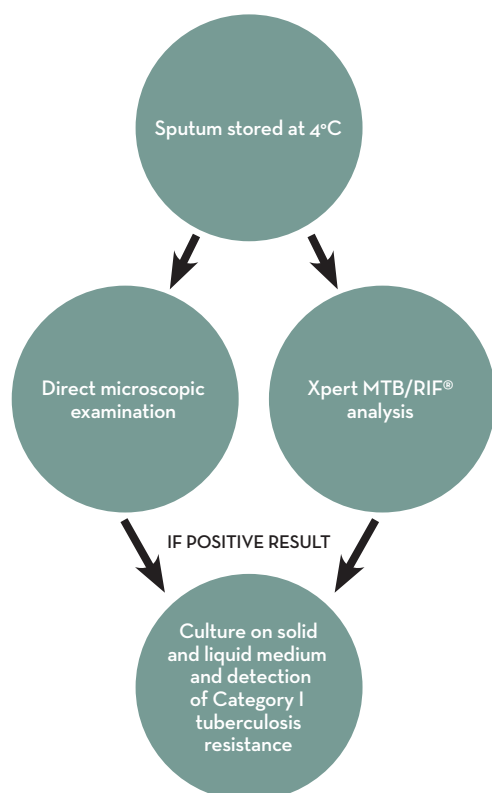


Figure 3 Flow chart of sputum samples analysis

partners. A preliminary version was then tested on 20 people, after which a final version was produced (see Annexe 3). The questionnaire was designed to take 30 to 40 minutes and contains the following sections: socio-demographic situation, drug use, imprisonment, sexual practices, knowledge about TB, access to TB and HIV screening and care, stigmatisation and discrimination.

### TREATMENT FOR THE PARTICIPANTS

The TB treatment was dispensed at the Treichville and Yopougon CATs, the two partner CATs for the project. The participants received the same treatment regime as the general population. To comply with national protocols the treatment regime was adapted according to the patient's circumstances: six months for new cases, eight months for retreatment and nine months for the RR-TB cases (see Annexe 2).

### COMMUNITY-BASED SUPPORT

For this study MdM suggested a global community approach, with different types of actors.

Moreover, each TB patient included in the treatment component was offered community support to help with taking the treatment. This support comprised a number of elements, as detailed pages 23-24.

## STATISTICAL ANALYSES

### Definitions

A person is considered as having active pulmonary tuberculosis if their result is positive for the presence of MTB in the Xpert MTB/RIF® test. If the result is also positive for the RIF component of the Xpert MTB/RIF® test they are considered as also having a rifampicin-resistant form of tuberculosis (RR-TB).

### Descriptive analyses

The analysis was conducted on all the participants and also by smoking spot (stratified analysis) to identify any possible 'smoking spot effect'. The categorical variables were expressed in numbers and as percentages. The continuous variables were expressed as the mean and standard deviation and/or the median and inter-quartile range. The intergroup comparisons were made using the Chi-squared test or Fisher's exact test based on the numbers for the categorical variables, and by the Student's t-test or the Kruskal Wallis test based on the numbers and distribution for the continuous variables.

### Acceptability of the screening

The acceptability of the screening was evaluated using the following indicators:

- screening acceptance rate: the proportion of people who received awareness-raising information and participated in the study;
- results retrieval rate: the proportion of people who had the screening test and who came to receive their results;

- results retrieval rate for TB+ participants: the proportion of participants diagnosed with pulmonary tuberculosis who came to retrieve their results.

### Estimation of TB, RR-TB and TB-HIV co-infection prevalence

The prevalences were calculated by dividing the number of participants whose test results were available by the total number of participants. A 95% confidence interval (CI 95%) was calculated using the standard formula for calculating a confidence interval for a proportion. The prevalences were estimated for all the participants, then per smoking spot.

### Study of the factors associated with TB infection

The factors associated with having a pulmonary TB infection were studied by stepwise descending logistic regression. The following risk factors were included in the analysis: socio-demographic characteristics, history of tuberculosis, sharing smoking materials, injecting, imprisonment and HIV infection. The analysis was adjusted for the smoking spot, to take into account any 'smoking spot effect', and was also adjusted for gender and age.

The variables where the p-value was less than 0.20 in the univariate analyses were included in the multivariate model. Under a bilateral hypothesis, a 5% significance level was considered for the final multivariate model. The analyses were performed with Version 3.4.3 of the R statistical software.

### Analysis of the screening algorithms

The sensitivity, specificity, positive predictive value and negative predictive value (see definitions in Annexe 4) of the different algorithms based on the clinical signs and/or direct microscopy and/or X-ray and/or the Xpert MTB/RIF® test were evaluated by using the algorithm used in the diagnostic component as the reference,



## MDM'S COMMUNITY-BASED APPROACH FOR THIS STUDY

This approach involves contributions from three types of contributors: community mediators (PWUD or former PWUD), peer educators (PEs) recruited in the smoking spots to provide services of direct benefit to their peer PWUD, and non-drug-user community agents who provide technical support to the PEs. Their specific tasks are described below.

### *Community mediators (PWUD or former PWUD)*

The mediators are part of the MdM team, they know how the smoking spots are organised and have many contacts in the community. They are on the frontline for:

- maintaining contact with the smoking spot chiefs ('babatchés');
- guaranteeing access to areas where drugs are consumed;
- monitoring safety and gathering information;
- preparing the intervention sites for the mobile team.

### *Peer educators (DU)*

The peer educators were involved throughout the study and particularly with the following tasks:

- informing the PWUD about the study and mobilising them to take part in the study;
- raising awareness among PWUD about harm reduction, TB and HIV;

- from the mobile unit, being involved in the study throughout the course of the research (reception, inclusion, guidance on the tests required, help retrieving the test results);
- accompanying the PWUD who tested positive for TB at the CAT and the PWUD who tested positive for HIV at a care and treatment centre;
- accompanying the sick PWUD with their care at the health centres and during hospital admissions;
- monitoring the treatment of TB+ PWUD at the CATs and helping them keep appointments for their daily or weekly receipt of medication, laboratory tests and other investigations (e.g. X-ray, microscopy) and medical consultations;
- looking for lost-to-follow up participants, given that PWUD move easily from one smoking spot to another;
- reporting back on the situation of the TB+ PWUD (e.g. problems with DOT, deterioration in general health, or imprisonment);



Peer educator team briefing in the field.

- contributing to the preparation of individual psychosocial interviews;
- contributing to family mediation visits to re-establish family relationships for sick PWUD;
- contributing to preparation for self-help group meetings (e.g. finding venues for the meetings and contact with group members) and participating in meetings as co-facilitator with a non-drug-user community agent, a health professional or another resource person.

#### ***Non-peer community agent (non-drug-user)***

Non-peer community agents are part of the operational teams and are involved in the following tasks:

- supervising support for the TB+ PWUD going to the CATs and HIV care and treatment centres;
- maintaining contact with the CAT staff for monitoring patients;
- ensuring patients' compliance with the tuberculosis treatment requirements;
- carrying out reimbursement of transport costs for the PWUD to receive their care and organising financial support for patient nutrition;
- with the PEs, contributing to family mediation visits to strengthen the family ties of the PWUD;

- organising and leading self-help groups for TB+ PWUD;
- conducting the individual psychosocial interview questionnaires.

#### **Community-based support for taking treatment**

During the treatment component of the study, community activities were run to facilitate the TB+ PWUD taking their treatment. These activities can be classified into five main types:

- family mediation visits to re-establish family relationships;
- self-help groups, to share experiences and life stories;
- personalised monitoring interviews;
- support with taking treatment (e.g. accompanying the PWUD to the CAT, reimbursement of transport costs for going to the CAT, reminding people of their medical appointments);
- Other activities (e.g. nutritional support, looking for people lost to follow-up).



Self-help group organised in Yopougon.

in other words a systematic analysis by Xpert MTB/RIF®.

### Treatment effectiveness

When participants included in the treatment component had completed their treatment, they were categorised as: (i) treatment success (ii) treatment failure (iii) died or (iv) lost to follow-up. The following definitions were used:

- Treatment success: patient whose follow-up record at the TB care and treatment centre shows 'cured', 'treatment finished' or 'treatment completed';
- Treatment failure: patient whose follow-up record shows 'failure' or who has had a positive direct microscopic examination at the end of treatment;
- Died: patient whose death was established during the study;
- Lost to follow-up: patient for whom information about the outcome of treatment cannot be obtained.

### ETHICAL CONSIDERATIONS

The protocol was authorised by the Côte d'Ivoire National Research Ethics Committee on 11 October 2016. The research was performed in accordance with the ethical principles of the Declaration of Helsinki. All the participants were informed about the study's objectives and how it would work, their participation was voluntary and they signed an informed consent form before they participated in the research. Specific measures were taken to ensure anonymity and confidentiality were respected. Particular attention was given to support for the people who use drugs who screened positive for TB, to avoid them experiencing discrimination and being excluded from the smoking spots. Measures were also taken to ensure that participation in the research did not lead to stigmatisation or increase the risk of being arrested by law enforcement agencies, given that the study population was involved in illegal, stigmatised practices. To avoid any problems relating to withdrawal, the study was designed so that the participants could attend for as short a time as possible, community agents were present to help manage any situations that might arise and the study staff were trained in management of withdrawal symptoms.

# RESULTS

## DIAGNOSTIC COMPONENT OF THE STUDY

### Diagram and acceptability of screening

The first component was conducted between October 2016 and May 2017. The diagram for this component can be found here, Figure 4.

A total of 545 PWUD received information about the study, the majority of whom (91.2%) were male. Of these, 532 agreed to participate, the **acceptability rate for TB screening was therefore 97.6%**. In terms of the results retrieval rate, 442 people came to collect their results, **the results retrieval rate was therefore 83.1%**.

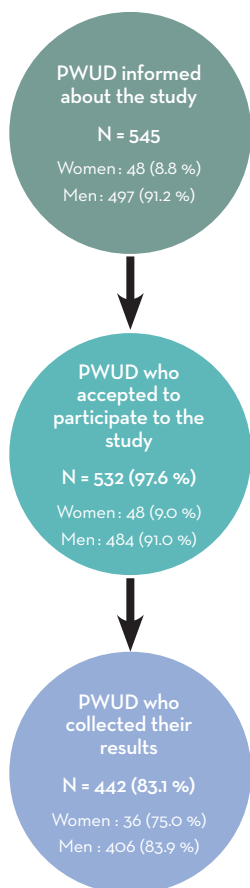


Figure 4 Diagram for the diagnosis component of the study

### Socio-demographic characteristics of the sample

The socio-demographic characteristics of the participants are shown in Table 1.

The great majority of the participants in the sample were men (91.0%). The proportion of women was higher in the Treichville sample (14.2% vs 5.0%;  $p < 0.001$ ). The average age was 34.9 years. The participants in Treichville were older than those in Yopougon (37.1 vs 33.2;  $p < 0.001$ ). Less than a quarter of the participants lived in their own accommodation and the majority (62.2%) lodged either with their family or with friends. It should be noted that the proportion of people living in precarious situations (institution, no fixed abode, in a smoking spot or on the streets) was higher for the Treichville smoking spot than for the Yopougon smoking spot (23.2% vs 5.3%;  $p < 0.001$ ). Almost 60% of participants had work (formal or informal). More than eight out of ten participants were single. The level of education of 65.0% of the participants was secondary level or higher. This proportion was lower among the Treichville participants than those from Yopougon (56.7% vs 71.6%;  $p < 0.001$ ).

→ The sample was thus composed mainly of single men, most of whom were living with their family / friends. More than half of them had a job and almost 2/3 had received education to secondary level or higher. More participants in Treichville were living in a precarious situation than those in Yopougon (more people with precarious living arrangements, lower level of education).

### Drug use profile

Information about the participants' drug-use practices is shown in Table 2.

Almost all participants (99.6%) reported having smoked heroin within the 30 days prior to the study. Two thirds of them (66.4%) had also smoked crack. More than 80% of crack smokers regularly shared their smoking equipment, which

	Treichville participants N=233	Yopougon participants N=299	Total N=532
<b>Sex</b>			
Male	200 (85.8 %)	284 (95.0 %)	<b>484 (91.0 %)</b>
Female	<b>33 (14.2 %)</b>	15 (5.0 %)	48 (9.0 %)
<b>Age (mean ± SD)*</b>			
	<b>371 ± 8.9</b>	<b>33.2 ± 7.3</b>	34.9 ± 8.3
<b>Residence</b>			
Own home	54 (23.2 %)	75 (25.1 %)	129 (24.2 %)
Living with family/ a friend	124 (53.2 %)	207 (69.2 %)	<b>331 (62.2 %)</b>
Precarious accommodation (institution/no fixed abode/in a smoking spot/on the street/other)	<b>55 (23.6 %)</b>	17 (5.6 %)	72 (13.6 %)
<b>Employment</b>			
Having a job (formal or informal)	132 (56.6 %)	183 (61.2 %)	<b>315 (59.2 %)</b>
Pupil/student/other	10 (4.3 %)	18 (6.0 %)	28 (5.3 %)
No work	91 (39.1 %)	98 (32.8 %)	189 (35.5 %)
<b>Situation familiale</b>			
Single/separated/divorced	188 (80.7 %)	246 (82.3 %)	<b>434 (81.6 %)</b>
In a relationship	43 (18.4 %)	52 (17.4 %)	95 (17.9 %)
No response given	2 (0.9 %)	1 (0.3 %)	3 (0.5 %)
<b>Educational level</b>			
No schooling	35 (15.0 %)	13 (4.3 %)	48 (9.0 %)
Primary school	52 (22.3 %)	63 (21.1 %)	115 (21.6 %)
Secondary or higher	132 (56.7 %)	214 (71.6 %)	<b>346 (65.0 %)</b>
Other	14 (6.0 %)	7 (2.3 %)	21 (4.0 %)
No response given	0 (0 %)	2 (0.7 %)	2 (0.4 %)

\*SD = Standard Deviation

**Table 1** Participants' sociodemographic characteristics (N=532)

	Treichville participants N=233	Yopougon participants N=299	Total N=532
<b>Heroin consumed within the past 30 days</b>			
No	1 (0.4 %)	1 (0.3 %)	2 (0.4 %)
Yes	232 (99.6 %)	298 (99.7 %)	<b>530 (99.6 %)</b>
<b>Crack consumed within the past 30 days</b>			
No	84 (36.1 %)	95 (31.8 %)	179 (33.6 %)
Yes	149 (63.9 %)	204 (68.2 %)	<b>353 (66.4 %)</b>
<b>Sharing equipment for smoking crack</b>			
	N=149	N=204	N=353
Sometimes/Never	26 (17.4 %)	34 (16.7 %)	60 (17.0 %)
Always	122 (81.9 %)	170 (83.3 %)	<b>292 (82.7 %)</b>
No response	1 (0.7 %)	0 (0 %)	1 (0.3 %)
<b>Alcohol consumed within the past 30 days</b>			
No	157 (67.4 %)	133 (44.5 %)	290 (54.5 %)
Yes	76 (32.6 %)	166 (55.5 %)	242 (45.5 %)
<b>Ever injected drugs</b>			
No	228 (97.8 %)	297 (99.3 %)	525 (98.7 %)
Yes	3 (1.3 %)	2 (0.7 %)	<b>5 (0.9 %)</b>
No response	2 (0.9 %)	0 (0 %)	2 (0.4 %)

**Table 2** Participants' drug-use practices (N=532)

is consistent with observations made in the field suggesting that most smokers rent crack pipes in the smoking spots and share them with other smokers. More than 40% of participants had consumed alcohol within the 30 days prior to the study. Less than 1% of participants reported having injected drugs at some time in their lives.

→ The PWUD recruited for this study are therefore active heroin smokers. Two thirds of the participants are multiple people who use drugs (i.e. they also smoke crack). Less than 1% inject drugs.

### History of TB and imprisonment

The data on history of TB and imprisonment are shown in Table 3.

The participants had a high level of previous TB, with more than 13% reporting having already had a positive direct microscopic sputum result. This suggests that some of the participants who screened positive for TB could, in fact, have a recurrence of TB or have experienced a treatment failure, or there may be participants who had not started treatment despite a positive screening test. There could also be TB re-infections despite successful treatment. A clear difference can be seen in the number of previous TB infections between the two smoking spots, with a much higher proportion of participants in Treichville reporting a previous TB infection than in Yopougon (20.2% vs 9.0% ;  $p < 0.001$ ).

Almost half the participants reported having been in prison (48.9%). There was a higher rate of imprisonment for the Treichville participants than for the Yopougon participants (53.7% vs 45.1%) but this difference was not significant ( $p = 0.06$ ).

→ The level of previous TB infections was very high for all these participants, for the Treichville ones in particular, suggesting that the sample had a high level of TB exposure. Almost half of all participants had previously been imprisoned, it is possible that these periods of imprisonment could have increased their level of exposure to TB and also led to breaks in treatment, reinforcing social and family isolation and having repercussions for these people's social and professional integration.

### Prevalence of TB, RR-TB, HIV and TB/HIV co-infection

531 of the 532 participants in the study had results from an Xpert MTB/RIF<sup>®</sup> assay and 522 had results from the rapid diagnostic test (RDT) for HIV. The prevalences were calculated using the numbers of participants having results for these tests. These prevalences are shown in Figure 5.

Of the 531 participants with results from the Xpert MTB/RIF<sup>®</sup> assay, 52 had tested positive, i.e. **a TB prevalence of 9.8%** [CI 95%: 7.5% - 12.7%], and nine of the participants (17.3%) had a rifampicin-resistant TB infection. Women appeared to be more affected than men (12.5% vs 9.5%)

	Treichville participants N=233	Yopougon participants N=299	Total N=532
<b>History of TB*</b>			
No	186 (79.8 %)	271 (90.7 %)	457 (85.9 %)
Yes	<b>47 (20.2 %)</b>	<b>27 (9.0 %)</b>	<b>74 (13.9 %)</b>
No response given	0 (0 %)	1 (0.3 %)	1 (0.2 %)
<b>History of imprisonment</b>			
No	108 (46.3 %)	164 (54.9 %)	272 (51.1 %)
Yes	<b>125 (53.7 %)</b>	<b>135 (45.1 %)</b>	<b>260 (48.9 %)</b>

\*Reported having already had a positive direct microscopic sputum result

**Table 3** Participants' history of TB and imprisonment (N=532)

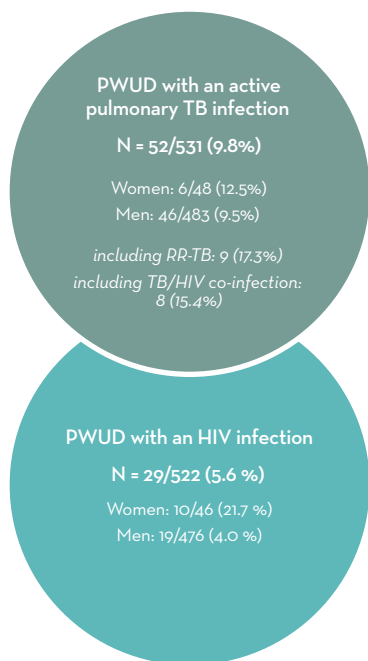


Figure 5 TB (N=531) and HIV (N=522) screening results

but this difference was not significant ( $p=0.45$ ). However, these results should be treated with caution as the numbers of women in the sample were low. Of the 52 TB+ participants, eight also had an HIV co-infection, giving an HIV co-infection prevalence of 15.4% for the TB+ participants. Of the 522 participants, 29 had a positive result from the RDT for HIV infection, giving an **HIV prevalence of 5.6%** [CI 95%: 3.8% - 8.0%]. This prevalence was significantly higher for the women (21.7% vs 4.0%;  $p<0.001$ ).

Table 4 shows the results for TB and HIV screening by smoking spot.

The prevalence of active pulmonary TB infection was significantly higher in Treichville than in Yopougon (13.4% vs 7.0%;  $p=0.022$ ). Similarly, despite the low number of subjects, it appeared that among the TB+ PWUD the percentages of RR-TB infections and TB-HIV co-infections were higher for the Treichville participants than for the Yopougon participants (19.4% vs 14.3% and 19.4% vs 9.5%, respectively), even though these differences were not significant ( $p=0.75$  and  $p=0.45$ ). Finally, the overall prevalence of HIV infection was also almost twice as high in Treichville (7.3%) as in Yopougon (4.0%), even though this

	Treichville participants			Yopougon participants		
	Men N=199	Women N=33	Total N=232	Men N=284	Women N=15	Total N=299
<b>Active pulmonary TB infection</b>						
No	170 (85.4 %)	31 (93.9 %)	201 (86.6 %)	267 (94.0 %)	11 (73.3 %)	278 (93.0 %)
Yes	29 (14.6 %)	2 (6.1 %)	<b>31 (13.4 %)</b>	17 (6.0 %)	4 (26.7 %)	<b>21 (7.0 %)</b>
<b>RR-TB infection</b>						
	N=29	N=2	N=31	N=17	N=4	N=21
No	23 (79.3 %)	2 (100 %)	25 (80.6 %)	15 (88.2 %)	3 (75.0 %)	18 (85.7 %)
Yes	6 (20.7 %)	0 (0 %)	<b>6 (19.4 %)</b>	2 (11.8 %)	1 (25.0 %)	<b>3 (14.3 %)</b>
<b>TB-VIH co-infection</b>						
	N=29	N=2	N=31	N=17	N=4	N=21
No	25 (86.2 %)	0 (0 %)	25 (80.6 %)	16 (94.1 %)	3 (75.0 %)	19 (90.5 %)
Yes	4 (13.8 %)	<b>2 (100 %)</b>	<b>6 (19.4 %)</b>	1 (5.9 %)	<b>1 (25.0 %)</b>	<b>2 (9.5 %)</b>
<b>HIV infection</b>						
No	182 (91.5 %)	24 (72.7 %)	206 (88.8 %)	274 (96.5 %)	12 (80.0 %)	286 (95.7 %)
Yes	10 (5.0 %)	<b>7 (21.2 %)</b>	<b>17 (7.3 %)</b>	9 (3.2 %)	<b>3 (20.0 %)</b>	<b>12 (4.0 %)</b>
No response	7 (3.5 %)	2 (6.1 %)	9 (3.9 %)	1 (0.3 %)	0 (0 %)	1 (0.3 %)

Table 4 TB and HIV screening results by smoking spot (N=531)



difference was not significant ( $p=0.11$ ). There were also very high prevalences of TB-HIV co-infection and HIV infection among the women in both smoking spots.

→ The prevalence of TB is very high in this population (9.8%), confirming that tuberculosis infection in the Abidjan DU population is a major public health challenge. Antibiotic resistance is also at very high levels (17.3% RR-TB infections). Some smoking spots are the focus for particularly vulnerable populations who are at risk of TB infection. This is the case for the Treichville smoking spot where the TB prevalence was 13.4%, with almost one TB infection in five resistant to rifampicin, and one TB sufferer in five also co-infected with HIV, greatly increasing the challenges for care and treatment. The HIV infection prevalence among men was slightly higher than in the general population (4.0% vs 1.8%) but it was much higher in the female PWUD (21.7%), suggesting a specific accumulation of HIV infection risk factors among women who use drugs and illustrating the need for global and integrated care and treatment in this population of female PWUD.

### Levels of results retrieval among the TB+ participants

Of the 52 TB+ participants screened, 40 returned to collect their results, a **rate of results retrieval for the TB+ participants of 76.9%**. This rate is slightly lower than the rate of results retrieval for the total population of participants (i.e. 83.1%) but the difference was not significant ( $p=0.35$ ). Thus 12 TB+ participants were lost to follow-up between screening and provision of the results. This could be for various reasons, including the fear of a positive diagnosis and the stigmatisation which would result.

→ Three-quarters of TB+ participants came to collect their results and were referred for care. This illustrates the problems with screening and referral to healthcare facilities for PWUD populations

and indicates the importance of setting up community monitoring from the time of screening.

### TB and antibiotic resistance: case narratives

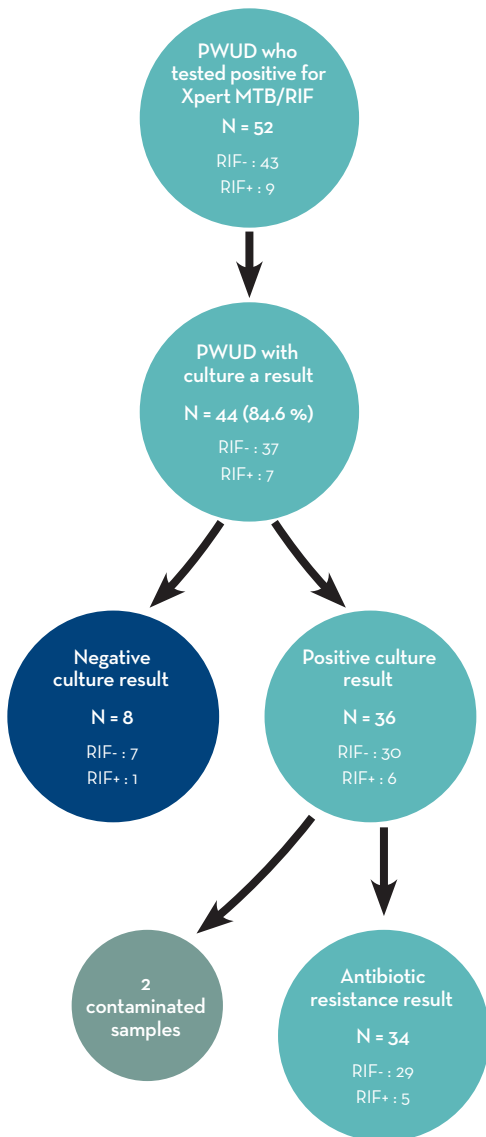
Of the participants, 52 screened positive using the Xpert MTB/RIF<sup>®</sup> assay, nine of whom were identified as rifampicin resistant. Cultures and antibiotic resistance profiles were performed on these 52 participants' specimens. Figure 6 shows a diagram for this part of the study.

Eight of the 44 culture results available were negative. However, there was no doubt that the 52 participants had active pulmonary tuberculosis. These negative results could possibly be explained by problems with the quality of the sputum specimens taken from the participants or problems with storing the specimens between sampling and analysis.

The antibiotic resistance profiles for the 34 participants whose results were available are detailed in Table 5. The definitions of the various terms used to characterise the resistance are given in Annexe 5.

These results show that the great majority of the RIF- participants (89.7%) were infected with a RIF sensitive strain. However, 3 people were infected with antibiotic resistant strains and could be defined as poly-resistant. All the RIF+ participants were infected with multi-resistant strains, emphasizing the strong correlation between resistance to rifampicin and multi-resistance. However, as the population sample was very low these results should be treated with caution.

→ These results highlight the value of the Xpert MTB/RIF<sup>®</sup> test which rapidly provides information on rifampicin resistance. The results were subsequently corroborated by the antibiotic resistance profiles for the great majority of the participants. Treatment could therefore swiftly be adjusted so that treatment failures and the development of new resistance could be avoided.



**Figure 6** Diagram of the results of the cultures and antibiotic resistance profiles for the TB+ participants (N=52)

	TB+ RIF- participants N=29	TB+ RIF+ participants N=5
<b>Sensitive</b>	26 (89.7 %)	0 (0 %)
<b>Mono-resistant</b>	2 (6.9 %)	0 (0 %)
<b>Poly-resistant</b>	1 (3.4 %)	0 (0 %)
<b>Multi-resistant</b>	0 (0 %)	5 (100 %)

**Table 5** Antibiotic resistance profile for the TB+ participants (N=34)

### Knowledge about tuberculosis

Knowledge about tuberculosis was influenced by community-based initiatives carried out prior to the study, including awareness-raising about TB and HIV delivered by PEs through community activities in the smoking spots. Thus the study population was not totally 'naive' in terms of information about tuberculosis.

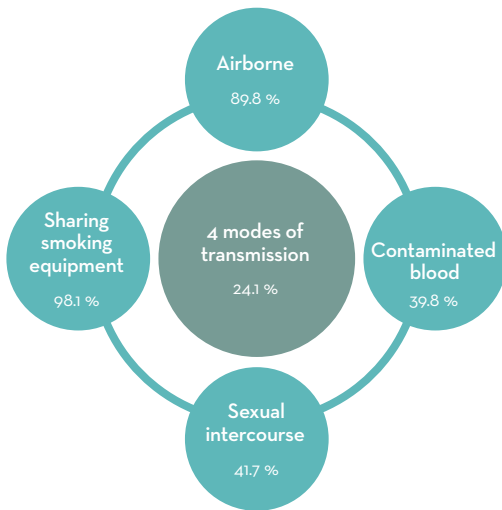
### Modes of transmission

Knowledge about modes of tuberculosis transmission was evaluated using two true statements ('airborne' and 'by sharing smoking equipment') and two false statements ('through contaminated blood' and 'through sexual intercourse'). The results are shown in Figure 7.

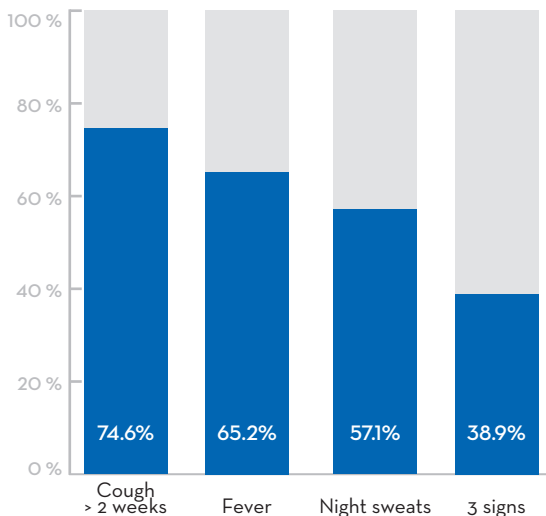
The percentages of participants who gave the correct answer for each statement are shown around the outside and the percentage of participants with four correct answers is given in the centre.

The majority of the participants knew TB is transmitted in airborne particles (89.8%) and by sharing smoking equipment (98.1%). However, the percentage of correct answers to the false statements on the mode of transmission was lower (39.8% for contaminated blood and 41.7% for sexual intercourse). Less than a quarter of the participants (24.1%) gave correct answers on all four possible modes of transmission, illustrating that there was only partial understanding of what tuberculosis is and how it is transmitted.

→ The participants' level of knowledge about some modes of TB transmission was very high, probably a reflection of the community awareness-raising work done before the study by the PEs. Nevertheless, the overall level of understanding about tuberculosis and the modes of transmission was lower, showing how important it is to continue providing information and raising awareness in this population.



**Figure 7** Participants' knowledge about the modes of TB transmission (N=532). The percentages of participants who gave the correct answer for each statement are shown around the outside and the percentage of participants with four correct answers is given in the centre.



**Figure 8** Participants' knowledge about the clinical signs of tuberculosis (N=532). The percentages show the participants who answered that the clinical signs were connected with tuberculosis, and also the percentage of participants who had the correct answer for all three clinical signs.

### Clinical signs

The participants were asked about the three principal clinical signs of tuberculosis (cough > 2 weeks, fever and night sweats). The results are shown in Figure 8.

The percentages show the participants who answered that the clinical signs were connected with tuberculosis, and also the percentage of participants who had the correct answer for all three clinical signs.

The persistent cough was the most commonly recognised sign, followed by fever and night sweats. Knowledge about the clinical signs seems fairly good, which could be a reflection of the previous awareness-raising work done in the smoking spots. However, only 38.9% of participants associated all these three clinical signs with tuberculosis.

→ The knowledge level about the clinical signs was fairly high, for the cough in particular. However, less than 40% of participants knew all three major clinical signs of TB, illustrating the need to continue providing information and raising awareness in this at-risk population.

### Stigmatisation and discrimination

#### Self-stigmatisation

The participants were asked to comment on different statements about screening positive for tuberculosis. For example: "Do you think you would feel ashamed if you had TB?". This focused on the participants' perception about what might happen to them if they screened positive for TB. The results are shown in Figure 9.

Almost 20% of the participants would feel ashamed of having tuberculosis and a substantial majority thought that they would be a danger to their friends and family (92.5%). The majority of the participants thought that the situation in the smoking spots would be very difficult and might even lead to them being excluded. These points

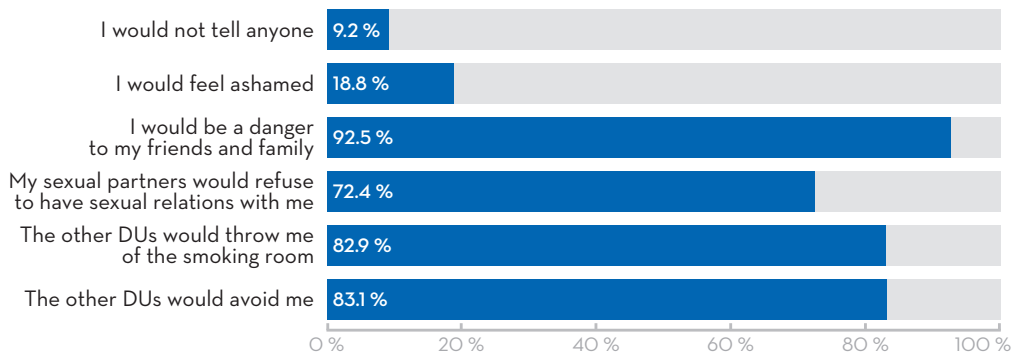


Figure 9 The participants' perception of potential stigmatisation (N=532)

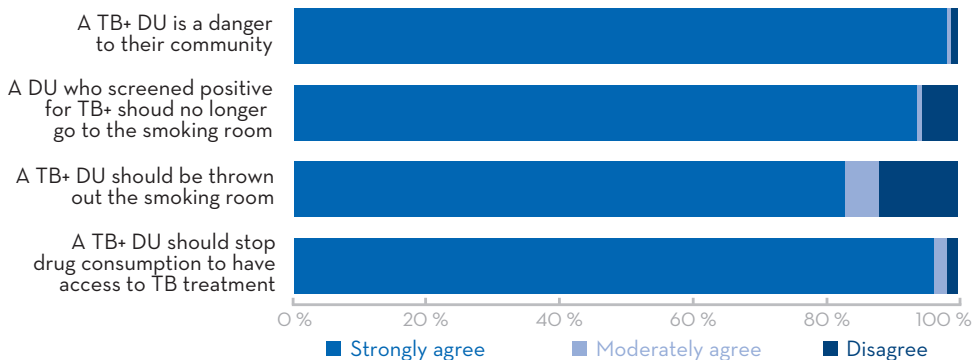


Figure 10 Perception of participants on the attitude to adopt towards a TB+ PWUD (N=532)

illustrate the potential problems (perceived or real) for PWUD if they screen positive for TB. It could deter people from accessing screening (fear of a positive result) and treatment (fear of the consequences of their TB status being disclosed to people in the smoking spot).

### Discrimination

The participants were asked for their opinion on certain statements. For example: "A PWUD who screens positive for TB should not go to the smoking spot any more." The intention was to assess the level of possible discrimination among participants against a person of their acquaintance screening positive for TB. The results are shown in Figure 10.

More than 90% of participants thought that a TB+ PWUD is a danger to their community and that they should not go to the smoking spot

any more, and more than 80% thought that TB+ PWUD should be driven out of the smoking spot.

→ The participants had very high expectations of negative consequences in the smoking spot if they screened positive for TB, which is a potential barrier to screening and to treatment if tuberculosis is present. In addition, the level of potential discrimination in the smoking spots against TB+ PWUD is very high. A significant effort must therefore be made to limit the stigmatisation of and discrimination against TB+ patients in the smoking spots, in order to facilitate access to screening and treatment.

### Factors associated with TB infection

Univariate and multivariate analyses were performed on several variables of interest, to identify the factors associated with TB infection among the study participants. This analysis was

	TB- participants N=479	TB+ participants N=52	Unadjusted OR [IC 95%] <sup>a</sup>	p-value	Adjusted OR [IC 95%] <sup>b</sup>	p-value
<b>Commune</b>						
Yopougon	278 (58.0 %)	21 (40.4 %)	Ref		Ref	
Treichville	201 (42.0 %)	31 (59.6 %)	2.0 [1.1 - 3.7]	0.02*	2.0 [1.1 - 3.7]	0.03*
<b>Sex</b>						
Male	437 (91.2 %)	46 (88.5 %)	Ref			
Female	42 (8.8 %)	6 (11.5 %)	1.4 [0.5 - 3.1]	0.51		
<b>Age</b>						
18-30 years	161 (33.6 %)	13 (25.0 %)	Ref			
31-40 years	218 (45.5 %)	26 (50.0 %)	1.5 [0.7 - 3.0]	0.27		
> 40 years	100 (20.9 %)	13 (25.0 %)	1.6 [0.7 - 3.6]	0.25		
<b>Living arrangements</b>						
Own home	122 (25.5 %)	7 (13.5 %)	Ref			
With family	248 (51.8 %)	31 (59.6 %)	2.2 [1.0 - 5.5]	0.07		
Precarious living arrangements	109 (22.7 %)	14 (26.9 %)	2.2 [0.9 - 6.1]	0.09		
<b>Employment activity</b>						
Has a job (formal or informal)	291 (60.8 %)	24 (46.2 %)	Ref		Ref	
Pupil/student/ other	26 (5.4 %)	2 (3.8 %)	0.9 [0.1 - 3.4]	0.93	1.1 [0.2 - 4.1]	0.91
No employment	162 (33.8 %)	26 (50.0 %)	1.9 [1.1 - 3.5]	0.03*	1.8 [1.0 - 3.4]	0.05*
<b>Situation familiale</b>						
Single/Separated/ Divorced	393 (82.0 %)	40 (76.9 %)	Ref			
In a partnership	84 (17.5 %)	11 (21.1 %)	1.3 [0.6 - 2.5]	0.5		
<b>Educational level</b>						
No schooling/ Primary school	147 (30.7 %)	16 (30.8 %)	Ref			
Secondary or higher	311 (64.9 %)	34 (65.4 %)	1.0 [0.5 - 1.9]	0.99		
Other	19 (4.0 %)	2 (3.8 %)	1.0 [0.1 - 3.8]	0.97		
<b>History of TB</b>						
No	416 (86.8 %)	40 (76.9 %)	Ref			
Yes	62 (12.9 %)	12 (23.1 %)	2.0 [1.0 - 3.9]	0.05*		
<b>Sharing crack smoking equipment</b>						
Always	261 (54.5 %)	30 (57.7 %)	Ref			
Sometimes/Never	57 (11.9 %)	3 (5.8 %)	0.5 [0.1 - 1.3]	0.21		
N/A	160 (33.4 %)	19 (36.5 %)	1.0 [0.6 - 1.9]	0.92		
<b>History of imprisonment</b>						
No	248 (51.8 %)	24 (46.1 %)	Ref			
Yes	231 (48.2 %)	28 (53.9 %)	1.2 [0.7 - 2.2]	0.44		
<b>HIV infection</b>						
No	448 (93.5 %)	44 (84.6 %)	Ref		Ref	
Yes	21 (4.4 %)	8 (15.4 %)	3.9 [1.5 - 9.0]	0.002*	3.3 [1.2 - 8.1]	0.01*

<sup>a</sup>Unadjusted odds ratio; CI 95% = 95% confidence interval.

<sup>b</sup>Adjusted OR = OR adjusted for sex and age, as well as for other variables in the final model.

\*p-value < 0.05

**Table 6** Factors associated with TB infection - results of univariate and multivariate analyses (N=531).

performed on the 531 participants whose Xpert MTB/RIF® results were available. The results are shown in Table 6. The injection variable could not be integrated into the analysis as the sample was too small. For the multivariate analysis, adjustments were made for smoking spot, sex and age, and only the variables with a p value below 0.20 in the univariate analysis were considered for the multivariate analysis. The adjusted ORs are only given for the variables in the final model.

Multivariate analysis of the factors associated with TB infection is as follows:

- The commune: having been recruited in Treichville was associated with a TB infection risk multiplied by two compared with Yopougon;
- Having a job: the fact of being unemployed is associated with a TB infection risk multiplied by almost two compared with the risk for people who are employed;
- HIV infection: co-infection with HIV is associated with a TB infection risk multiplied by almost four compared with the risk for people who are not HIV positive.

→ **The factors independently and significantly associated with an increased risk of TB infection for the participants are as follows: having been recruited in Treichville (OR=2.0), being unemployed (OR=1.8) and being HIV positive (OR=3.3).**

### Screening algorithms

Different screening algorithms were compared to the algorithm used for this study, namely a systematic offer of Xpert MTB/RIF® screening. Only the 485 participants who had results for all the tests (i.e. Xpert MTB/RIF®, direct sputum smear microscopy, chest X-ray and clinical signs screening) were included in this analysis. The results of the six algorithms are shown in Figure 11.

Table 7 shows the sensitivity (Se) and the negative predictive value (NPV) for the different algorithms. The algorithm used as the reference algorithm is the one based on the Xpert MTB/

RIF® offered to all the participants. Since there were no false positives, the specificity (Sp) and the positive predictive value (PPV) of all the algorithms were 100%. The definitions of these terms and the calculation methods are described in Annexe 4.

These results show the poor performance of the algorithms for the direct microscopy examination; these algorithms had a maximum sensitivity of 30.4% (systematic microscopy examination). This highlights the poor effectiveness of this examination which is known to have fairly low sensitivity, imposing strict requirements for the management and handling of samples that can be difficult to comply with in routine practice. Such low sensitivity is not acceptable for a screening test, particularly in a population with such a high prevalence. The sensitivity of the national algorithm (clinical signs screening + direct microscopy examination) was estimated at 23.9% in this study. It can therefore be estimated that of the 52 TB+ participants only 12 would have been screened with the national algorithm. It is worth noting the acceptable level of sensitivity (71.7%) of the clinical signs screening + Xpert MTB/RIF® algorithm, which means that the fairly costly Xpert MTB/RIF® test could have been performed on only half of the participants after a screening based on the clinical signs, drastically reducing the cost whilst maintaining good sensitivity.

→ **The comparison of the different algorithms highlights the poor performance in this population of algorithms based on the direct microscopy examination, particularly the national algorithm used routinely in Côte d'Ivoire (sensitivity of 23.9%). The clinical signs screening + Xpert MTB/RIF® algorithm has good sensitivity and could be used in certain conditions, in addition to systematic use of the Xpert MTB/RIF® algorithm.**

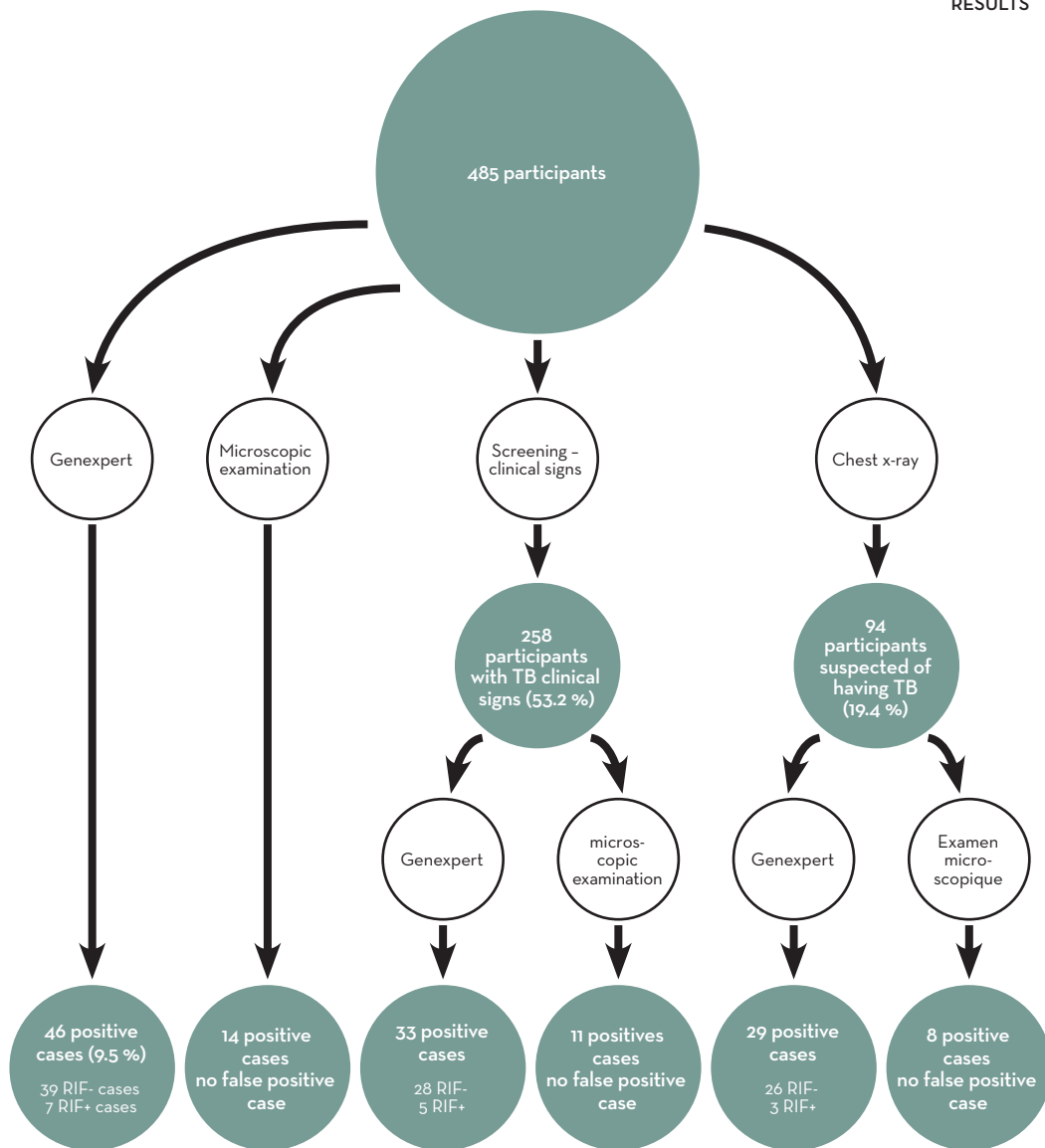


Figure 11 Comparison of the different screening algorithms (N=485)

	Se	NPV
Systematic Xpert MTB/RIF®	100 %	100 %
Systematic microscopy examination	30.4 %	93.2 %
Screening of clinical signs then Xpert MTB/RIF®	71.7 %	97.1 %
Screening of clinical signs then direct microscopy	23.9 %	92.6 %
Chest X-ray then Xpert MTB/RIF®	63.0 %	96.3 %
Chest X-ray then direct microscopy	17.4 %	92.0 %

Table 7 Performance of the different screening algorithms (N=485)

## TREATMENT COMPONENT OF THE STUDY

### Diagram and efficacy of treatment

This component entailed referring the PWUD starting treatment for their TB for care and treatment and supporting them with a package of community activities. Thus, as mentioned above, 40 of the 52 participants who screened positive for TB came to collect their results and were referred for care and treatment and also participated to a package of community activities. A diagram illustrating this second part of the study is given in Figure 12.

In total, 24 of the 40 participants were cured of their tuberculosis, giving a **treatment efficacy rate of 60%**. Of the remaining 40%, three were treatment failures, seven were lost to follow-up, four died during the study and two were still in treatment, i.e. awaiting the end-of-treatment laboratory results at the time of writing this report.

In the treatment failure group there was one case of an RR-TB patient who, despite having confirmed resistance to rifampicin, was offered the first line treatment. One of the patients who died had been imprisoned for two months after having started his treatment two weeks previously. He was then found to be in a very poor general state on his release from prison and died within a few weeks. Thus some of the cases of treatment failure and death were linked to external events which hindered the provision of suitable, continued treatment.

→ **In this population, which is particularly difficult to reach and follow up, a high level of treatment efficacy (i. e. 60%) was attained during this study. In the remaining 40%, there were three treatment failures, seven lost to follow-up, four deaths and two patients whose final status was not available. These results highlight the importance of bringing together a network of actors, including the prison authorities, to**

**facilitate the continuation of TB treatment and avoid any interruption in treatment.**

### Volume of community activities

The package of community activities included five main components (see the Methodology section for details):

- family mediation visits;
- self-help groups;
- personalised monitoring interviews;
- support for taking treatment (e.g. accompanying the patient to the CAT and reimbursement of transport costs for going to the CAT);
- other activities (e.g. nutritional and financial support, looking for people lost to follow-up, etc.).

Figure 13 shows the volume of the first three components rolled out during the study.

It can be seen that more than half of the participants received family mediation visits, and that 34 participants (85%) participated in the self-help groups and received follow-up interviews. Moreover, of the 24 participants who were cured, 17 (71%) received at least one family mediation visit, 100% participated in at least one self-support group and 23 (96%) received at least one follow-up interview.

→ **These results show that the level of acceptability for the community activities was high among the PWUD in Abidjan. Based on observations in the field and the high levels of participation in the activities among the patients cured of their TB, it can be said that these activities improved TB treatment adherence.**

### Global cascade of TB screening and care and treatment.

Here the cascade encompasses the two parts of the study, from awareness-raising to treatment. The results are shown in Figure 14.



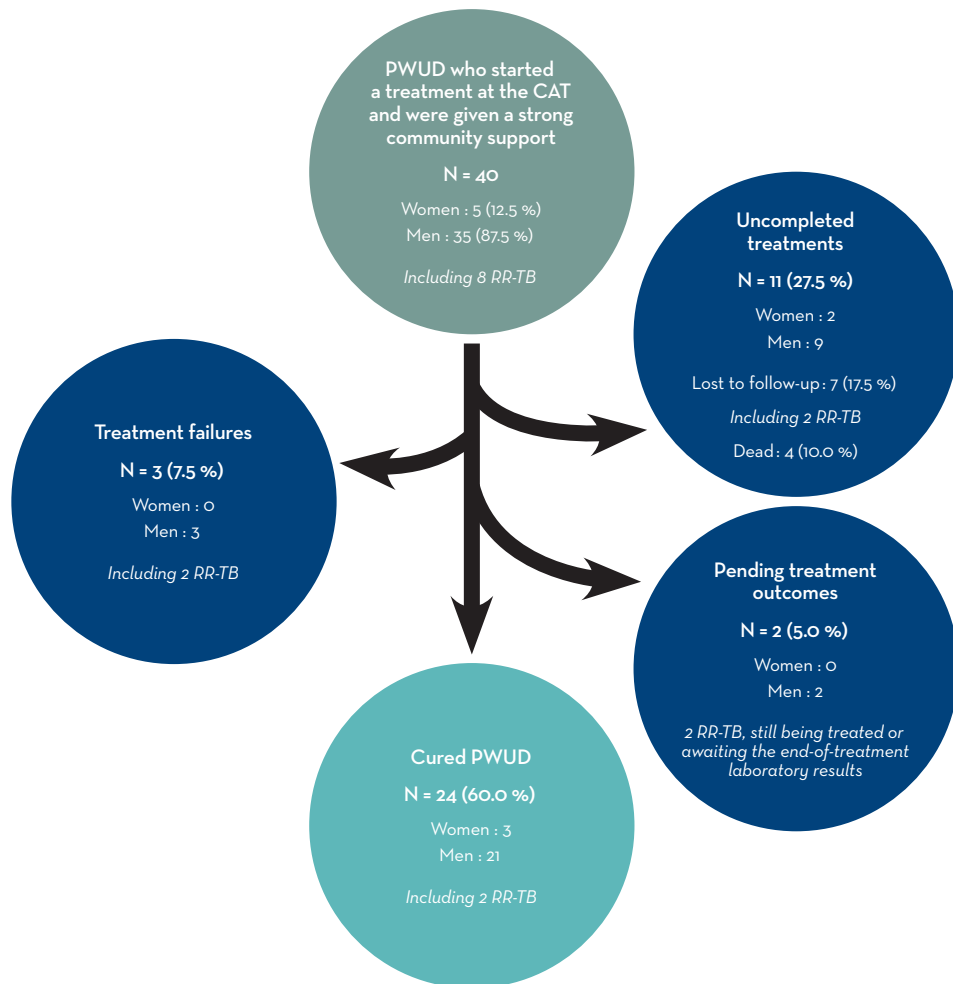


Figure 12 Diagram of the treatment component of the study (N=40)

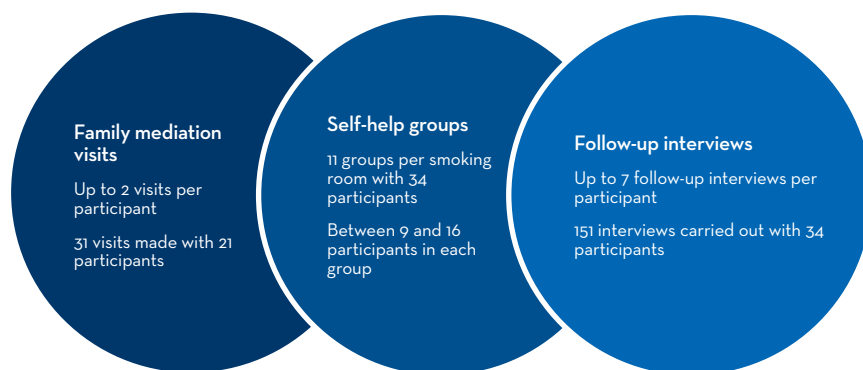
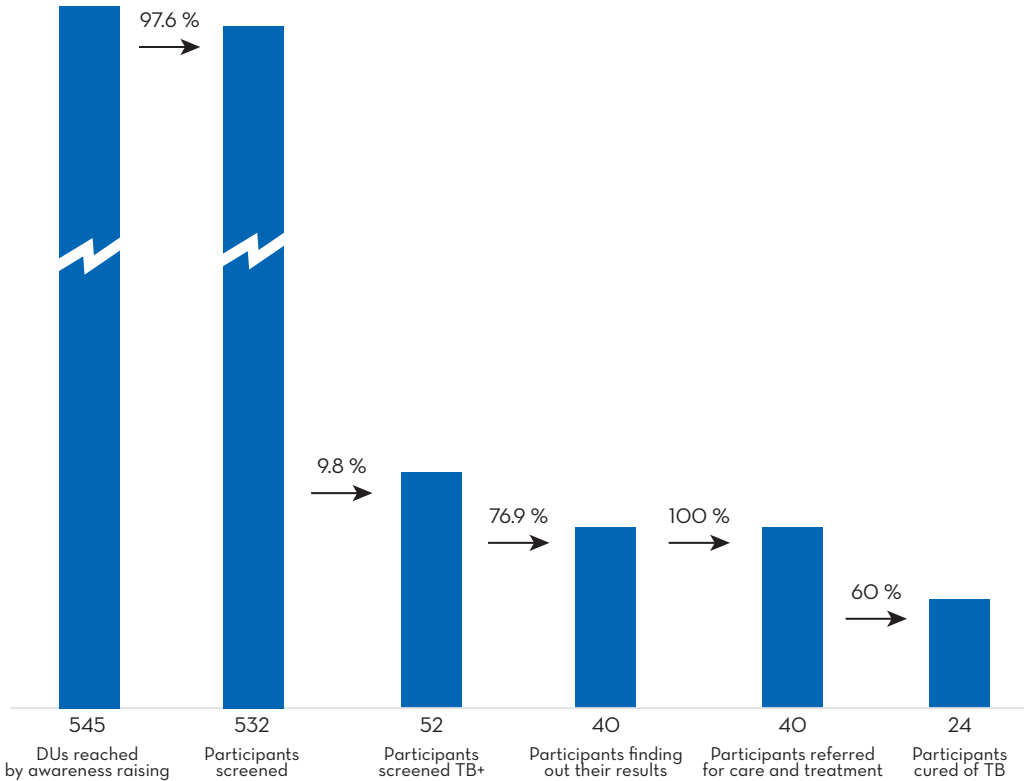


Figure 13 Volume of the community activities rolled out during the study

This graph demonstrates that the two stages where additional effort is required to limit the number of participants lost to follow-up are the results retrieval stage (23.1% lost to follow-up) and the treatment stage (40% of people not cured of their TB). However, these numbers should be treated with caution as, for example, 10% of the 40% of people not cured of their TB died during the study.



**Figure 14** Global cascade of TB screening and care and treatment (N=545)

# DISCUSSION

By using a community-based approach this cross-sectional and prospective study recruited 532 PWUD in two Abidjan smoking spots, and systematically offered them pulmonary tuberculosis screening with the Xpert MTB/RIF® assay. The participants who tested positive benefited from a community-based support initiative to help them with taking their tuberculosis treatment. Almost 10% of participants in the study received a positive diagnosis of pulmonary tuberculosis. 60% of the TB+ participants who came to collect their results and who were offered the community-based support initiative and access to tuberculosis treatment were declared cured.

## PROFILE OF THE PWUD IN THE SAMPLE

The PWUD recruited for this study were mainly men, fairly young, with an average age of 35 years. More than 60% of them were living with their family or with friends, which suggests that links with family and friends were maintained to a certain degree by a considerable proportion of the participants. However, 13% of the participants were without stable accommodation (institution/smoking spot/ on the street), suggesting a high level of vulnerability and breakdown in family relationships. Almost 60% of the group had a job (formal or informal); thus they were integrated into the employment market in some way and had their own financial resources. A third of them were not involved in any social or employment activity; a lack of financial resources and social and professional isolation are factors which lead to vulnerability. A large majority (>80%) were not in a relationship, suggesting a level of emotional solitude. Almost two thirds of the participants had secondary or higher level education, showing that the majority had received some schooling. However, 30% of the participants had received almost no education (no schooling or only primary education).

Our sample was fairly heterogeneous, with some of the participants having their own financial resources, links with their family and friends, and a basic level of education, and others having

an accumulation of vulnerability factors (no stable accommodation, no job and a low level of education). These participants with vulnerability factors were more numerous in the Treichville smoking spot. Despite the small number of smoking spots in the study (two), this suggests that the smoking spots have a heterogeneous population and a concentration of particularly vulnerable groups in certain smoking spots, emphasising the importance of working closely with people in the field so that the realities of the different smoking spots are clearly understood.

The participants in the study had taken heroin, with two thirds also taking crack. Injecting drug use was almost non-existent, according to the participants. This confirms the results of the bio-behavioural study conducted in 2014, as well as observations made in the field, that there are very few people who inject drugs among the Abidjan PWUD.<sup>5</sup> It is important to gather this type of information on the drug consumption profile, as users who inject drugs have different requirements in terms of support and health challenges. For example, establishing injection prevention activities may be relevant for a population of PWUD who do not inject drugs.

Half of the participants had a history of imprisonment. These results were similar to those from the study conducted in 2014<sup>5</sup>. The fact that drug use is illegal increases the risk of imprisonment for the PWUD. Irrespective of the reasons for the imprisonment, these results are worrying, as imprisonment can increase the risk of transmitting or contracting tuberculosis, mainly due to the extreme overcrowding experienced by prisoners and the conditions in the prison.<sup>31,38</sup>

Imprisonment can also be the cause of interruptions in treatment, which may have a dramatic effect on the health of those imprisoned, as shown by the case of one study participant who died a few weeks after being released from prison (treatment was interrupted during imprisonment).

Another factor that could lead to interruptions in treatment is the mobility of PWUD. During operations by law enforcement agencies to destroy and dismantle places where drugs are consumed, the smoking spots are destroyed and some people are arrested. These operations lead to people moving to other smoking spots to await the establishment of new smoking spots or the re-establishment of those that have been destroyed. These movements make monitoring and community-based support very difficult and lead to interruptions in treatment.

Thus the mobility of this population is a barrier to the establishment of sustainable medical follow-up and can increase the risk of tuberculosis transmission if medical follow-up is disrupted or people experience greater overcrowding caused by imprisonment and/or the destruction of smoking spots. High-quality community follow-up can find these people again and re-establish medical follow-up if necessary.

## TB AND HIV PREVALENCE

The estimated prevalence of pulmonary tuberculosis among the participants in this study was 9.8%, almost 50 times that of the general population in Côte d'Ivoire (i.e. 0.2%).<sup>6</sup> Firstly, this study confirms that vulnerable people who use drugs who consume heroin and cocaine are disproportionately affected by TB. This suggests the need to consider them a key population in the fight against TB and to implement specific actions targeted at this population. These results confirm the hypothesis that the prevalence of TB had been underestimated during the 2014 biobehavioural study (see Justification for the study; estimated prevalence of 1.8%). The TB screening algorithm used during this first study was probably a determining factor in the underestimation of the prevalence. The routine screening with the Xpert MTB/RIF<sup>®</sup> assay in this study provided a more reliable estimate which is closer to reality.

In addition to the overall figure of 9.8%, this study also showed large disparities between

the smoking spots, with a 13.4% prevalence at Treichville compared with 7.0% at Yopougon. These results illustrate that some locations may attract concentrations of people with multiple vulnerability factors and increased health needs. This emphasises the importance of the community-based approach and close links in the field to identify the most 'at-risk' areas and target the activities towards the places and people whose needs are greatest.

Regarding antibiotic resistance, this study found an RR/MDR-TB prevalence of 17% in the people with pulmonary tuberculosis (compared with 2% in the general population). These data confirm that the PWUD are a population who are particularly at risk of developing resistant forms of TB. This result illustrates that the use of screening methods which rapidly identify any resistance is vital to ensure suitable treatment is provided. Moreover, it is essential to implement actions to improve the adherence to and effectiveness of treatment in this population in order to avoid the development of antibiotic resistance.

This study estimated a HIV prevalence of 5.6%, twice that of the general population.<sup>37</sup> This prevalence is lower than was estimated during the 2014 biobehavioural study.<sup>22</sup> This may be explained by sample differences (in the first study the proportion of people who inject drugs was higher) or by men who have sex with men. The prevalence among women who use drugs was very high (21.7%) and a similar result was also found by the 2014 study.<sup>5</sup> Despite the low sample number, these results suggest that women who inject drugs have an accumulation of risk factors for HIV infection. Similar results have been reported in the literature, with female PWUD having different risk factors for HIV infection, including the selling of sexual services, limited ability to negotiate condom use and reduced access to HIV prevention services.<sup>39-41</sup> Given the prevalence of HIV and TB in this population, systematic TB screening for HIV positive PWUD and systematic screening for HIV in TB+ PWUD is vital for early detection and immediate

provision of treatment. Actions aimed specifically at women who use drugs are also required.

Concerning factors associated with TB infection, the only factors identified as being significantly associated with TB infection in the sample were linked to living conditions (smoking spot, being unemployed) and HIV infection. Precarious living conditions had already been identified as a factor associated with TB infection in the 2014 study.<sup>22</sup> Living conditions and HIV infection have also been described in the literature as important factors associated with TB.<sup>10,11,13</sup> Other factors described in the literature, such as a history of TB, imprisonment and sharing crack pipes, were not found in this study. Regarding history of TB, this variable was solely based on participant reporting, so it may have limited validity. There was a strong correlation between a history of TB and the smoking spot (20% of people with a history of TB in the Treichville sample compared with 9% of participants in Yopougon), so this variable is also closely linked to living conditions. One hypothesis in relation to imprisonment could be that if the majority of imprisonments are only for a brief period, the increased risk of being infected with TB is not as high in this population. Another hypothesis is that the living conditions in the smoking spots are so precarious that imprisonment per se does not entail an increased risk in this population. However, even though this variable was not found as a TB-associated factor, it is reasonable to think that criminalisation of drug use contributes to marginalisation and increased vulnerability for PWUD, which increases the risk of TB infection and hinders access to screening and treatment. Finally, with regard to sharing crack pipes, almost all the participants shared their equipment, so the statistical power was too low to determine whether or not sharing was associated with TB infection in this population.

## TB SCREENING IN CÔTE D'IVOIRE

One of the first results from this study concerned the feasibility of TB screening in this population.

A significant amount of community work before the study meant that almost all the people who were offered TB screening accepted it. This shows that a community-based approach makes screening in mobile units in locations where drugs are consumed entirely feasible. These outreach screening strategies are particularly relevant for populations such as PWUD, who have problems accessing health services, despite their very significant needs. An integrated approach with a mobile unit offering a range of health services, including HIV and TB screening and other routine care, is particularly appropriate for this population.

The results for the care and treatment algorithm show a very low level of sensitivity for the direct microscopy examination compared to the Xpert MTB/RIF<sup>®</sup> assay. The direct microscopy examination is known to be only moderately sensitive (around 50%), but it is also possible that difficulties with managing the specimens or problems analysing them could further reduce the sensitivity of this test in day-to-day practice. Fewer than 25% of the TB+ participants would have been diagnosed if the national algorithm, based on identification of clinical signs then a direct microscopy examination, had been used. It is difficult to accept that this algorithm should be offered to a group in which 10% of members have pulmonary tuberculosis.

A potentially valuable algorithm might be one based on the identification of clinical signs followed by sputum analysis with the Xpert MTB/RIF<sup>®</sup> assay. This algorithm would allow the Xpert MTB/RIF<sup>®</sup> analyses to be performed on only half of the participants, with a sensitivity of around 70-75%. In a situation where people come regularly to a community health facility, an initial systematic Xpert MTB/RIF<sup>®</sup> test could be offered, then, as part of routine, long-term follow up, screening based on identification of clinical signs followed by Xpert MTB/RIF<sup>®</sup> analysis would identify people on the patient list who have recently contracted tuberculosis.

The sensitivity of the algorithm based on an X-ray followed by Xpert MTB/RIF<sup>®</sup> analysis was also potentially acceptable (63%), but it seems

difficult to envisage scaling up the X-ray component, as this would require qualified personnel and is expensive in Côte d'Ivoire.

Two major points have emerged from this study in relation to resistance to tuberculosis drugs: firstly the diagram (Figure 5) illustrates the operational and structural difficulties of conducting antibiotic resistance analyses in Côte d'Ivoire. It also takes a long time to obtain the results. Even though this was a research project with clear procedures and dedicated staff, managing the specimens, following up the tests and obtaining the results was very complicated. It is easy to believe that this complexity would be even more significant in day-to-day practice and that the time taken to obtain the results might extend to several weeks or even months, making swift changes to treatment impossible. Moreover, despite the low sample numbers, the results confirm the high correlation between rifampicin resistance and multi-drug resistance, as suggested in the literature. This reinforces the argument for using the Xpert MTB/RIF<sup>®</sup> assay as a screening tool in this population with a high rate of RR/MDR tuberculosis.

The Xpert MTB/RIF<sup>®</sup> is therefore an indispensable tool for screening for TB in PWUD in Côte d'Ivoire. Apart from the very high sensitivity of this test it enables rapid identification of rifampicin resistance (and therefore of cases of MDR-TB in the great majority of instances) and the results are obtained swiftly. One of the major limitations to the use of Xpert MTB/RIF<sup>®</sup> in this population is the time it takes to obtain the results, due to limited equipment which is not routinely available for patients who use drugs in Côte d'Ivoire. In this study the time between taking the specimen and the results becoming available was seven days, although it only takes two hours to analyse the specimens. This delay makes it more likely that patients will be lost to follow-up; so in this study 16.9% of patients did not return for their results.

Using the Xpert MTB/RIF<sup>®</sup> test with dedicated TB screening equipment in a mobile unit would reduce the time taken to obtain the results and

limit the number of patients lost to follow-up at this stage. In addition to this mobile equipment, the Xpert MTB/RIF<sup>®</sup> test could also be performed with dedicated equipment in locations where there are high numbers of PWUD (such as community health facilities that support PWUD, or prisons). Systematic screening could thus be routinely provided. This would require specific budgets to be established. The cost of the Xpert MTB/RIF<sup>®</sup> test is currently the major limitation to the routine use of this test for PWUD.

### TB CARE AND TREATMENT: EFFECTIVENESS AND COMMUNITY-BASED SUPPORT

During this study, 40 TB+ patients were referred for treatment and participated in a community-based support programme. Of these, 60% were declared cured of TB at the end of their treatment. The literature clearly identifies that PWUD have specific problems with adherence to treatment,<sup>18, 28, 33, 34</sup> but there are very few data on the efficacy of TB treatment in non-injecting PWUD.

Research for a thesis undertaken in Côte d'Ivoire investigated 29 PWUD who were followed up routinely at four CATs. The work showed that only six PWUD (21%) were declared cured at the end of their treatment and 18 (62%) were lost to follow-up. Even though these results should be treated with caution due to the low numbers and methodological limitations, the fact remains that these results suggest that the treatment in our study was more effective (with community support) than when PWUD are routinely managed at the CATs. Data from the field also suggest that there is a very low success rate in this population when managed routinely for several reasons (ineffectiveness of the standard DOT strategy, reluctance by medical teams to offer tuberculosis treatment to PWUD and mobility of PWUD). Results from the literature suggest that 'standard' DOT taken at the health facility is not the most effective method for populations

like PWUD who have specific challenges with adherence. Several studies suggest that community supported DOT is more suitable than DOT provided at the health facility.<sup>42,43</sup> Furthermore, several studies evaluating community support treatment models involving peer educators show better results in terms of treatment adherence and effectiveness than the routine standard strategy<sup>44,45</sup>. Thus it is reasonable to conjecture that the good treatment efficacy results obtained during this study were, to a considerable extent, related to the community support activities offered in parallel with the treatment. The high level of participation in the community activities seen among the people who were successfully treated suggests that these activities were relevant and that the participants gained some benefit from them.

Despite these good results, there is still some way to go to reach the level of effectiveness obtained in the general population (i.e. 80%). In fact 40% of TB+ patients in our sample could not be cured of their tuberculosis. Of these, 11 did not complete their treatment and four of these died during the study. One of these deaths was clearly linked to a break in treatment caused by imprisonment. Furthermore, three people were declared as treatment failures, two of whom had RR-TB. A 'standard' treatment had been offered to one of these two RR-TB participants, despite a screening result showing rifampicin resistance. These results suggest the importance of improving care and treatment of TB+ PWUD and particularly of adapting treatment if the patient is found during screening to have resistance to rifampicin. It is also necessary to work with the prison authorities to continue tuberculosis treatment during imprisonment. This would reduce breaks in treatment and thereby the health risks to the individual, as well as the risk of TB transmission and the development of resistance. Our results are encouraging as only seven of the 40 people were lost to follow-up (17.5%) in this particularly difficult-to-monitor population.

In order to limit the number of people lost to follow-up, the literature stresses the need for integrated services that offer comprehensive care and treatment, combining harm reduction and care and treatment for the addiction (including offering substitution treatments) with access to HIV, hepatitis and tuberculosis screening services and treatment.<sup>27</sup> Community involvement in these integrated services is vital to establish trust and improve follow-up.

Finally, stigmatisation can be a real barrier to treatment. TB+ PWUD may be evicted from the smoking spots if their TB is confirmed and known to other PWUD. This stigmatisation is mainly caused by ignorance about modes of transmission and prevention, and therefore the fear of infection. For some PWUD, living in the smoking spots is a last resort. Driving TB+ PWUD away from one smoking spot means they will move to another one and will feel they have to conceal their disease as far as possible to ensure they are accepted in the new smoking spot. This situation leads to a risk of treatment being interrupted due to the distance from the care and treatment centre, increasing the risk of the development of resistance and transmission of the disease. All these circumstances highlight the importance of an integrated approach, including community involvement to support the PWUD while they are taking their TB treatment, and continuing the community information and awareness-raising activities in the smoking spots to reduce the level of stigmatisation and discrimination. At the present time, this support is not available at the TB care and treatment facilities in Côte d'Ivoire.

## **COMMUNITY SUPPORT MODEL: SUCCESS, PROBLEMS AND SCALING UP**

The first point to mention about the community support model proposed in this study is the very high level of acceptability among the target population, with very high participation rates in the various components offered. This suggests



that the work done in advance (harm reduction project and preliminary work on the research project) had built up trust with the PWUD, facilitating acceptance of the activities.

Feedback suggests that the strengths of this community model are as follows:

- Inclusion of the target community via peer educators: feedback from the teams on the ground suggests that the presence of PEs was a fundamental element in the trust established. The PEs have extensive knowledge of the target population, they know the group's codes and can manage to gain their trust so that sustained links can be forged with the PWUD.
- Diverse profiles and skills, with a good mix of peers and non-peers in the teams on the ground: the synergy of the profiles and expertise seems to have facilitated the acceptance of the activities. For example, for family mediation visits, acceptance by the family was sometimes greater during the visit when a non-peer agent was involved rather than a PE. Conversely, for individual support the PWUD preferred to be monitored by a PE in some cases.
- Diversity of the activities offered: numerous different activities were offered for this community model (individual monitoring with regular meetings, nutritional support, financial support for some expenses, family mediation visits, self-help groups and accompanying patients to the CAT). These activities were identified by work in the field in advance which assessed the PWUD needs and proposed suitable activities. Thus each PWUD was free to choose which activities to participate in, and to benefit from those activities which seemed most relevant to their situation.
- Links with health workers: in this model referral to health facilities was done systematically so that TB treatment could be started. The teams on the ground worked closely with the medical teams at the treatment centres. A high level of trust was established between

the various teams which facilitated referrals and care and treatment.

However, despite the high quality of this model, the following issues remained:

- In some cases the personal relationships between the PWUD and the PEs were very strong and exclusive. This meant that a PE leaving the team could cause problems for follow-up of certain PWUD who wanted to be monitored specifically by that PE. A session to reflect on the possibility of pooling links with the PWUD could help in thinking about how to optimise this model.
- The major limitation in this model is its cost. High-quality, individual monitoring requires a considerable amount of human resources. In this study 15 full-time staff were dedicated to monitoring 40 TB+ PWUD. So there are questions about the sustainability of this model. Despite the cost, the results seem to be sufficiently encouraging for discussions to be held in Côte d'Ivoire on continuing and integrating this community support model as part of the care and treatment of PWUD.
- Finally, the question arises of how to scale up this model. It is a model comprising numerous activities, requiring teams with specific profiles and skill sets and involving a certain level of cost. Moreover, one of the challenges concerns the status of the community actors. Recognition of experiential knowledge and the community actors remains a major challenge in a number of countries, including Côte d'Ivoire. To scale up this community model would require: (i) the establishment of a specific status for the community actors (the PEs in particular); (ii) formalisation of the model to be scaled up; (iii) finding dedicated funding to support this model sustainably; and (iv) having an integrated approach, involving the medical actors, community actors and other actors, such as the prison services, in order to ensure a global approach and to be able to offer effective and high-quality monitoring for PWUD.

# LIMITATIONS

This study had a certain number of limitations.

Firstly, the sample was recruited from a small number of smoking spots (two), so the representativeness of the sample was limited. Therefore it may not be possible to extrapolate the results to the whole PWUD population in Abidjan. However, given the services offered to the participants in this study, having a sample population based on a system of sampling from several smoking spots, asking some people and not others in a smoking spot to participate in the study, would not have been in line with the community approach used during the harm reduction project, and would not have established the bond of trust between the research project teams and the PWUD.

Secondly, contrary to our original intentions, the study could only be conducted in two smoking spots, which limited the diversity of the DU profiles and the number of participants recruited. These limitations were the reason that the recruitment target (750 participants) could not be achieved. There were a number of external constraints, including the destruction of smoking spots by the police. Consequently, the number of participants in the treatment component of the study was lower than initially anticipated (40 vs 50). However, this sample was still a considerably sized sample from a population which is difficult to reach and monitor and for whom very few data are available. The results show that the smoking spot effect may be considerable, therefore it would be interesting to be able to organise a study in a larger number of smoking spots to confirm this hypothesis. As this study was only conducted in Abidjan, similar data from other cities in the country would be required.

Thirdly, for several reasons there were limitations in relation to some of the questions in the questionnaire:

1. in certain cases the practices were either relatively frequent (e.g. sharing crack pipes) or relatively rare (e.g. injecting) so that the statistical power was too limited for these variables to be included in the analyses;
2. for other questions, in particular those on knowledge about methods of transmission and clinical signs, the group was not 'ignorant' due to the community awareness-raising work done before the study, so the results overestimated the knowledge about TB in this population of PWUD;
3. moreover, it is possible that there was a social desirability bias for certain questions (e.g. injecting) and the replies underestimated some risky practices among the PWUD.

Finally, the algorithm analysis could have been more powerful if we had had the culture results for all the participants in the study. This would have allowed us to compare the Xpert MTB/RIF® results with the culture results, rather than considering the Xpert MTB/RIF® result as the reference result. Nevertheless, this was a secondary objective of the study and the study was not designed with this in mind. Moreover, given the difficulties already mentioned in obtaining the culture results and the antibiotic resistance for the 52 participants with positive Xpert MTB/RIF® results, it would probably be very difficult to obtain these results for all the 532 participants in the study.

# LESSONS LEARNED

This section details the lessons learned from this operational research project conducted in a PWUD population in Côte d'Ivoire.

**establish this link and create appropriate conditions for implementing the research study.**

## PREPARATION FOR THE STUDY

- **It is important to involve national programmes from the design stage of the study**, so that these actors can contribute from the first phases of the study. This will enable the context to be better taken into account. It will also allow the programmes to have greater ownership of the study results, and therefore guarantee better dissemination of them, particularly if the national algorithms are to take the results into account. Moreover, the involvement of the authorities is vital since drug consumption is illegal in Côte d'Ivoire. It is therefore crucial to have the approval of the authorities to plan this type of research project.
- **Evaluation of the project by an ethics committee** is a regulatory and ethical obligation. It is important to integrate this step into the study's provisional timetable and to anticipate the amount of time it will take for the ethics committee to evaluate and give its opinion before the start of the study.
- **Setting up a national steering committee**, as soon as the protocol has been written, with experts in the field of the study who are not directly involved in it, will provide a better perspective on the challenges involved and relevant feedback during the implementation of the study. This will also help to orient the analysis of the data in relation to the context and requirements.
- Research projects in smoking spots can only be envisaged if there is a bond of trust between the operational team and the smoking spot, especially with the babatché (i.e. the individual who decides on access to the smoking spots). Thus, **prior to the study, the community-based approach of working with the community actors will**

## IMPLEMENTING THE STUDY

- **The role of the community, the peer educators in particular, is indispensable throughout the entire implementation of the study.** First of all, the preliminary phases consist of awareness-raising and informing the PWUD about the study, the objectives, the process and also their rights and any potential adverse effects. The involvement of peer educators in this process will enable the PWUD to understand and accept this information better. This makes it possible to achieve better participation rates in the study. Next, their role in the screening and especially the follow-up of the participants returning for their results is essential. In the study there was little mobilisation of the PEs during this phase and a considerable number of participants (particularly the TB+ ones) never came back to retrieve their results and were lost to follow-up, with the consequent risk to the individual's health and the risk of TB transmission. Finally, the community approach and the involvement of the PEs throughout the care and treatment of TB+ participants seems crucial, as the study results have shown.
- **Management of laboratory analyses (such as sputum), the inputs and return of the results was especially complex** with facilities that were not always responsive and stock-outs for the inputs. It is important that these various elements and the times for the different actors involved in the study are considered, so that bottlenecks can be anticipated and given special attention (dedicated staff, specific organisation, etc.).
- **It is vital that the operational team contains a project manager dedicated to the research.** Moreover, the distribution

of tasks between the research project and the operational project must be clearly established for the teams. It is advisable to have, wherever possible, a dedicated team for the research project. Otherwise there is a considerable risk that the whole team would be mobilised on the research project which could disrupt the programme's routine activities.

- **Data management must be considered in advance, with the establishment of the necessary tools before the start of the project and a well-defined division of tasks within the team.** It is strongly recommended that this should be done internally or with a genuine research partner, rather than with an external consultant who may not have a full overview of the project and who might develop unsuitable or poor-quality tools.
- **From the health perspective, even if the study concentrates on a single disease, it is essential to integrate the care and treatment of other co-morbidities present in the study population,** particularly chronic diseases. In this study on TB, co-infection with

HIV was not subject to specific monitoring. We thus noted the deterioration of some co-infected patients' state of health due to their poor adherence to ARV treatment.

## AFTER THE RESEARCH

- **The time needed for database cleansing, archiving, analysis and dissemination of the results must be taken into account,** especially for the project manager's contract. At least six months after the end of the study will be required. This is a very intense phase that should not be managed solely by the operational team.
- **Reflection on the next steps after the study is absolutely indispensable.** The study's results must, as a minimum, lead to changes in the operational team's practices. Moreover, opportunities for advocacy must be envisaged for modifications to guidelines and algorithms at the national level.



Meeting of the study's steering committee on 28 March 2018

# **SUMMARY AND RECOMMENDATIONS**

## SUMMARY

We have been able to draw the following conclusions from the results of this study:

- **It is feasible to roll out a systematic TB screening programme in Abidjan in areas where drugs are consumed (smoking spots). With the community approach and a commitment to long-term work (especially prior to the programme), acceptance among PWUD is high.** The mobile and outreach strategies are well adapted and possible for this PWUD population, as long as a community approach is used to establish a bond of trust.
- **There is a very high prevalence of TB and drug-resistant TB among the PWUD population.** The TB prevalence is almost 50 times higher than in the general population (9.8% vs 0.2%). Vulnerability seems to be a very significant factor in the risk of contracting TB. Criminalisation of drug use probably contributes to this vulnerability and reduces access to screening and treatment in this population.
- **Female PWUD seem to have specific challenges compared to male PWUD, particularly in relation to infection with HIV.** The prevalence of HIV is particularly high in this population (>20%), which suggests more frequent high-risk practices for HIV in this group.
- **The level of stigmatisation and discrimination against TB+ PWUD is very high in the PWUD community.** This is a barrier to screening and treatment.
- **For several reasons it is essential to be able to offer this population systematic screening based on Genexpert:**
  1. the sensitivity of this test is much better than the other screening tests so the number of false negatives will be reduced in this population with a very high prevalence of TB;
  2. the sample analysis technique is straightforward so staff will not require specific skills, and it is not particularly operator-dependent;
  3. the results can be obtained quickly and this will limit the number lost to follow-up;
  4. in this population with a high prevalence of RR/MDR-TB, rifampicin resistance could be identified very early, allowing for treatment adjustment and prevention of treatment failures.
- **Setting up a community-based support programme to help the TB+ PWUD patients take their treatment is feasible.** This programme included a variety of activities and was offered and implemented by teams on the ground with a range of profiles and skill sets. The high rate of participation in the activities by PWUD suggested a high level of acceptance among the TB+ PWUD of this programme.
- **With this community support model, a 60% treatment effectiveness rate was obtained in this vulnerable population for whom adherence to treatment is a challenge.** Although there is a lack of data with which to compare these results, the level of effectiveness seems to be much higher than without a support network. However, consideration must be given to limiting the participants lost to follow-up, particularly between screening and returning for the results.





Awareness-raising rally for World Tuberculosis Day 2018, based on the results in this report.

## RECOMMENDATIONS

Based on these conclusions, the following recommendations have been formulated:

- **There is a very pressing need to consider the PWUD as a key population in the fight against TB at the national level, and in Abidjan in particular.** Country-wide elimination of TB cannot be achieved unless the specific human and financial resources are made available and activities targeted specifically at this population are rapidly implemented.
- **The national algorithm must be revised to include screening with Genexpert for PWUD, as is currently the case for other key populations (e.g. PLWHIV).** Some locations, such as the community centres for care and treatment of PWUD, seem particularly well suited to providing Genexpert-based screening for PWUD. There must be a dedicated budget so the Genexpert-based screening can be offered in these locations.
- **When establishing activities targeted at PWUD, it is vital to consider integrated action models that include harm reduction activities and access to holistic care and treatment for drug use (including HIV, TB, hepatitis B and hepatitis C screening, opioid substitution therapy and basic healthcare) together with a strong community approach.** These integrated models allow for a global approach to the health of PWUD and improve access to health services and monitoring for this population.
- **It is vital that a community-based support model is supported, formalised and made sustainable for the PWUD,** to create links with the PWUD in the smoking spots, to carry out information and awareness-raising activities, to facilitate implementation of mobile, local action and to support TB+ and/or HIV+ PWUD during referral and treatment.
- **To reduce the level of stigmatisation and discrimination against TB+ PWUD, it is vital that there is support for information and awareness-raising activities about TB (symptoms, transmission and treatment) by peer educators in the places where drugs are consumed.**
- **It is important to integrate the PWUD into TB research projects, both in Côte d'Ivoire and at international level, whether in clinical research on new treatments or in operational research, so we can have more data on this population and guide public policy on the basis of the data.** For example, there are very few data on female PWUD, even though this population face specific challenges and need services designed with them in mind.
- **Finally, a comprehensive review of decriminalisation of drug use is needed, both in Côte d'Ivoire and globally,** in order to limit the marginalisation and vulnerability of this group and to reduce the number of imprisonments linked to drug use. This would provide better access to harm reduction, prevention and health services for this population.

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# ANNEXES

## ANNEXE 1

## Why we choose to use the term ‘people who use drugs’ (PWUD) instead of ‘people who inject drugs’ (PWID) in Côte d’Ivoire?

A **psychoactive substance**, or drug, is a substance which when it is ingested or administered alters the mental processes such as cognitive functions. **There are a variety of ways to consume drugs:** inhaling, injecting, swallowing, snorting (nasal route) or trans-rectally. These methods of consumption all have inherent and specific risks to the user’s health.

**Injecting drugs** (any drug which can be and/or is designed to be injected with a needle) are mainly opioids (such as heroin) and cocaine but also other substances or medications that can be dissolved in water. Injecting is the most effective method to maximise the effects with the smallest amount of the substance; therefore it is often used where poverty, high prices, scarcity and/or poor quality of supply are common. Nevertheless, injection is now the administration method most commonly associated with dependency and marginalisation, making it highly stigmatised in society and even sometimes by populations of people who use drugs.

**To the best of our knowledge, injecting drug use is very uncommon in Côte d’Ivoire.** In 2014, Médecins du Monde conducted a study in Abidjan among 450 regular users of heroin and cocaine (crack). The results showed that almost all of the people who use drugs took heroin and cocaine by inhalation (98% and 96.5% respectively).

Despite the **very low numbers of people who inject drugs** (3.4% reported having injected in the 30 days preceding the research), **there was a high prevalence of infectious diseases:** HIV (5.4% of people who use drugs and 3.7% in the general population), tuberculosis (9.8% of people who use drugs and 1.8% in the general population) and viral hepatitis B and C (11% and 2.8%). Various studies in the region of coastal West Africa have found similar rates. Injection is therefore not the main factor in predisposition to infectious diseases.

MdM and its partners ran the **first harm reduction programme with vulnerable people who use drugs** in Abidjan. This programme highlighted that, over and above the method of drug consumption, the behaviours associated with this consumption can lead individuals to take risks with their health (such as unprotected sex, multiple partners through sex work, neglecting their health, poor nutrition, effects of psychotropic substances and multiple drug use). Even though people who do not inject drugs do not contract HIV by sharing injection equipment, this group is more vulnerable to sexually transmitted HIV than the rest of the population. Moreover, the precarious lifestyle of these dependent users favours the transmission of tuberculosis.

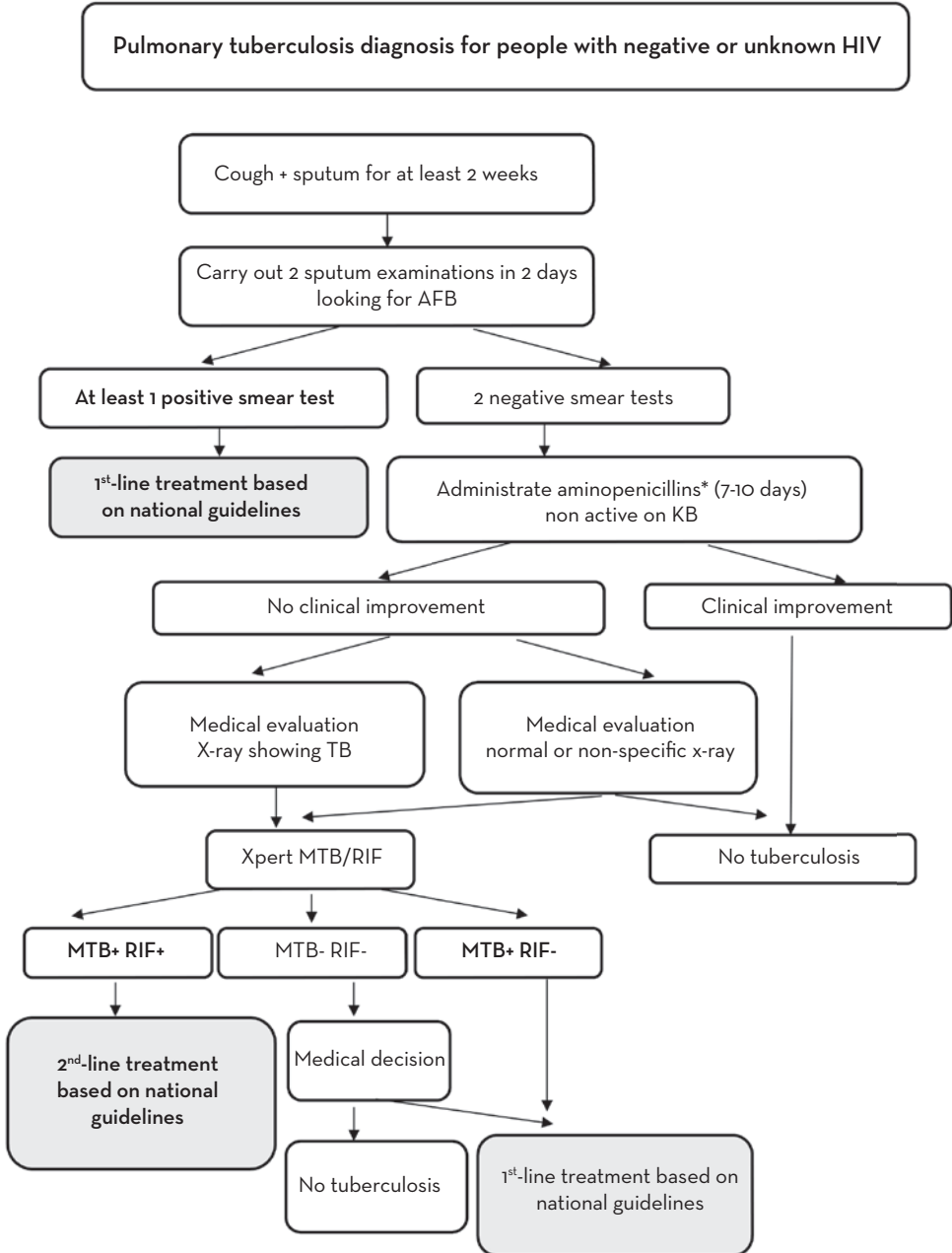
**In West Africa**, the generalised use of the terms ‘people who inject drugs’ (PWID) or ‘consumers of injection drugs’ (CIDs) can give the impression that only those people who inject are affected by the health risks linked to drug consumption. In addition, **this definition effectively excludes all non-injecting drugs** (cannabis, alcohol, khat, certain medications, etc.) and the behaviour patterns associated with addictive behaviour.

**At MdM we believe that a global approach is needed for any work to reduce the risks connected with drug use.** To restrict interventions to injection products alone would risk us missing health problems that could be caused by drugs and undermine the universality of access to rights.

We therefore believe that the use of the terms ‘people who use drugs’ (PWUD) is more appropriate, even though we recognise that the specific risks associated with injection for people who inject must be the subject of specific considerations.

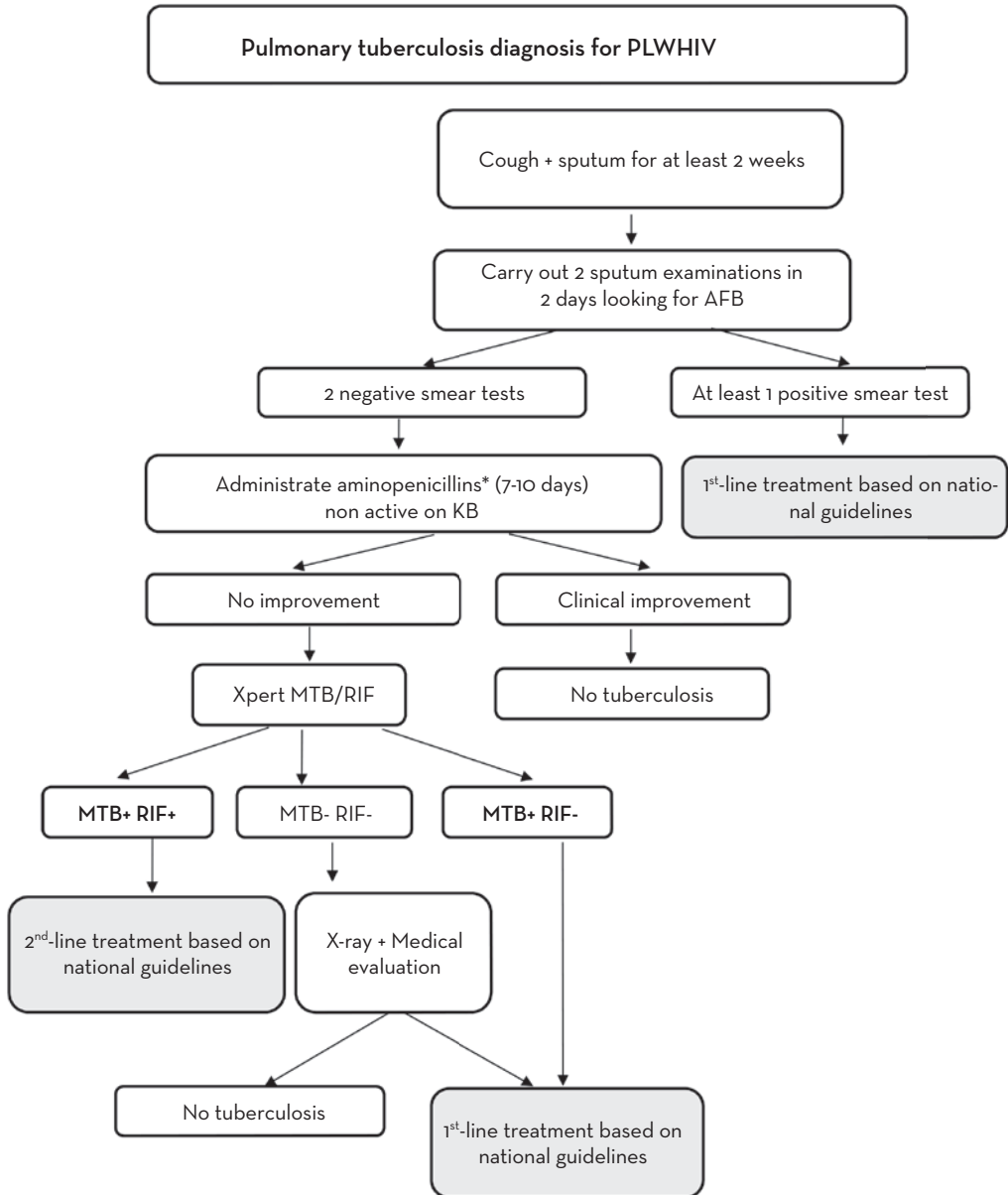
## ANNEXE 2

### National tuberculosis screening and treatment algorithms in Côte d'Ivoire



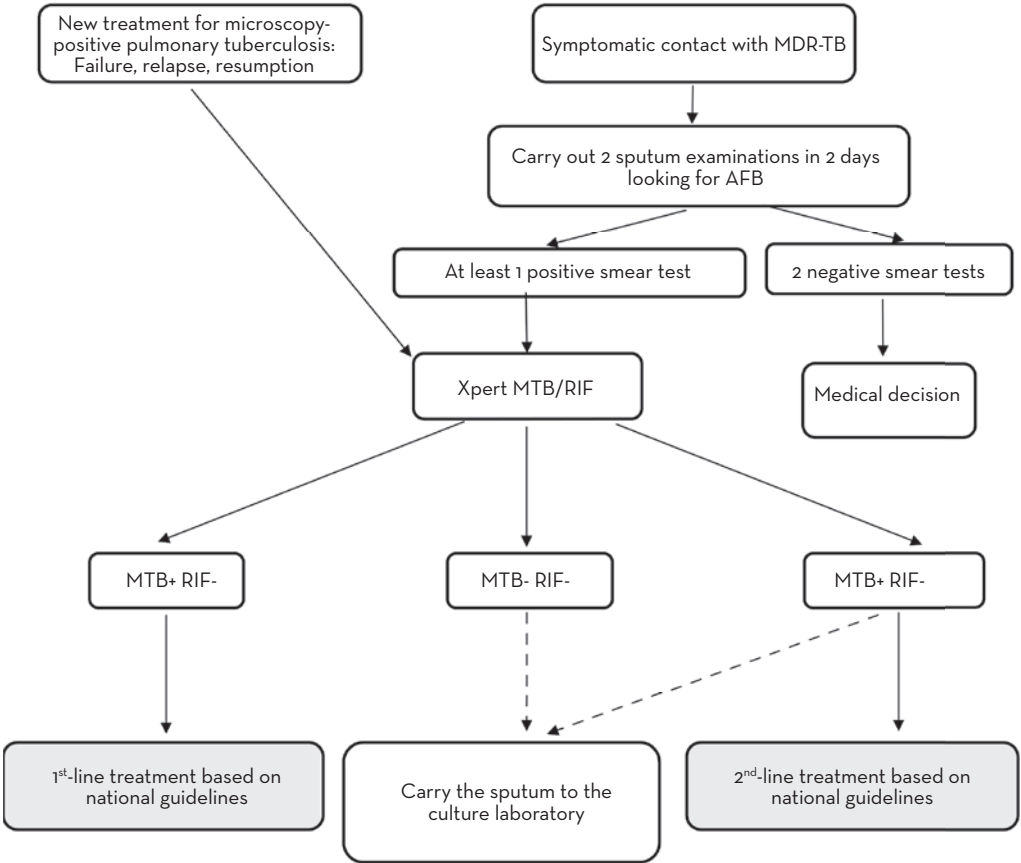
\*Avoid antibiotics active on Koch bacillus (fluoroquinolones, combination amoxicillin/ clavulanic acid, azithromycin, clarithromycin). Avoid cotrimoxazole.





\* Cough > 2 weeks or night sweats or weight loss > 3 kg (6.6 lb) in 1 month or fever > 3 weeks or contact active TB

**For people with suspected MDR-TB**  
Failure, relapse, resumption, symptomatic contact with MDR-TB



### Indication for tuberculosis treatments<sup>1,2</sup>

New cases: first-line treatment: 2RHZE/4RH<sup>3</sup> - six months

Retreatment:<sup>4</sup> retreatment regimen:  
2RHZES/1RHZE/5RHE<sup>3</sup> - eight months

RR-TB: second-line treatment regimen:  
4KmMfxPtoHCfzEZ/5MfxHCfzEZ<sup>3</sup> - nine months after the  
results from the initial laboratory test results

After the culture results have been obtained (three to six weeks), the first-line treatment or retreatment will be withdrawn and replaced with second-line treatment if there is a positive culture result (but the GeneXpert result shows sensitivity to rifampicin). The initial tests for MDR-TB should then be performed before changing the treatment regimen.

In the national directives on care and treatment of drug-resistant TB, there is no treatment protocol offered for single-drug-resistant TB (apart from RR-TB) and extensively drug-resistant TB.

1. Côte d'Ivoire, 'Directives Nationales pour la prise en charge de la tuberculose multirésistante en Côte d'Ivoire', (in French) ['National directives for the treatment of multi-resistant tuberculosis in Côte d'Ivoire'] 2nd edition, 2013. Programme National de Lutte contre la Tuberculose.

2. Côte d'Ivoire, 'Guide technique de prise en charge de la tuberculose en Côte d'Ivoire', (in French) ['Technical guide on the treatment of tuberculosis in Côte d'Ivoire'] 4th edition, 2014. Programme National de Lutte contre la Tuberculose.

3. R: Rifampicin / H: Isoniazid / Z: Pirazinamide / E: Ethambutol / S: Streptomycin / Km: Kanamycin / Mfx: Moxifloxacin / Pto: Prothionamide / Cfz: Clofazimine.

4. Patients in relapse, patients treated after a treatment failure, patients treated after having been lost to follow-up, other patients already treated, i.e. patients who have already received tuberculosis treatment, but whose results from the last course are not known or not documented.

## ANNEXE 3:

### study questionnaire

#### TUBERCULOSIS HISTORY:

(Indicate the reply to the question here)

YES  NO

Interviewer's name : .....

*The instructions for interviewers are shown in italics. Read aloud the statements given between the square brackets [].*

*Tick only one answer per question unless instructed otherwise. If the participant states a reason other than those listed, specify this reason.*

*Unless she/he writes another reason in the box, let the respondent reply and tick the box corresponding to their answer. DK = Don't know. DTA = DTA*

#### SOCIO-DEMOGRAPHIC SITUATION

*[We'll start with some questions about your socio-demographic situation.]*

##### 1. Record the respondent's sex

<sub>1</sub> Male <sub>2</sub> Female <sub>3</sub> Other

##### 2. How old are you?

.....years <sub>88</sub> DK <sub>99</sub> DTA

##### 3. How many children do you have?

..... <sub>88</sub> DK <sub>99</sub> DTA

##### 4. How long have you lived in Abidjan?

<sub>1</sub> Less than a year <sub>2</sub> One year or longer  
<sub>3</sub> Always (since birth)  
<sub>88</sub> DK <sub>99</sub> DTA

a) If one year or longer, which year did you arrive?

..... <sub>88</sub> DK <sub>99</sub> DTA

##### 5. What commune do you live in?

<sub>1</sub> Adjamé <sub>2</sub> Yopougon <sub>3</sub> Treichville  
<sub>4</sub> Autre : ..... <sub>88</sub> DK <sub>99</sub> DTA

##### 6. Where do you live?

<sub>1</sub> Own home <sub>2</sub> Living with family  
<sub>3</sub> Living with family <sub>4</sub> Bunkhouse/Institution  
<sub>5</sub> No fixed abode <sub>6</sub> On the street  
<sub>7</sub> In a smoking spot <sub>8</sub> Autre :  
<sub>88</sub> DK <sub>99</sub> DTA

##### 7. Do you have the following where you live:

**Mains water (Côte d'Ivoire water company supply)?**

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

##### Electricity?

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

##### 8. Which ghettos do you frequent? *Multiple answers possible*

Yopougon :

<sub>1</sub> Yao Sehi <sub>2</sub> Gesco <sub>3</sub> La Plage  
<sub>4</sub> Other ghetto in Yop : .....

Treichville :

<sub>5</sub> Gragra <sub>6</sub> Coloss  
<sub>7</sub> Other ghetto in Treich : .....

Adjamé :

<sub>8</sub> Washington <sub>9</sub> Jamaïque  
<sub>10</sub> Other ghetto in Adjamé : .....

Other commune : <sub>11</sub> Other ghetto : .....

<sub>88</sub> DK <sub>99</sub> DTA

##### 9. What job do you have at the moment?

<sub>1</sub> Employed <sub>2</sub> Informal work  
<sub>3</sub> Pupil / Student <sub>4</sub> Trader  
<sub>5</sub> No work <sub>6</sub> Other : .....  
<sub>88</sub> DK <sub>99</sub> DTA

##### 10. What is your family situation?

<sub>1</sub> Single (never married)  
<sub>2</sub> Married  
<sub>3</sub> Living with a partner (cohabiting)  
<sub>4</sub> Widower/Widow <sub>5</sub> Divorced /Separated  
<sub>6</sub> Other : ..... <sub>88</sub> DK <sub>99</sub> DTA

11. Have you ever been to school?

<sub>1</sub> Yes <sub>2</sub> No

a) If yes, what is your highest level of education?

<sub>1</sub> Primary <sub>2</sub> Secondary <sub>3</sub> Higher education <sub>4</sub> Vocational training

<sub>5</sub> Religious school <sub>6</sub> Other :.....

<sub>88</sub> DK <sub>99</sub> DTA

12. Could you read and understand a letter or newspaper article in French?

<sub>1</sub> Yes <sub>2</sub> With difficulty <sub>3</sub> No

<sub>88</sub> DK <sub>99</sub> DTA

13. Approximately how much money do you have to live on per week? ..... CFAF <sub>1</sub>

*If they don't know, ask the question again asking how much per day:.....CFAF <sub>2</sub>*

<sub>88</sub> DK <sub>99</sub> DTA

### DRUG USE:

[We are now coming to questions about your drug consumption practices.]

14. What drugs have you taken in the past 30 day	Heroin (Pao) <input type="checkbox"/> <sub>1</sub> Yes <input type="checkbox"/> <sub>2</sub> No <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	Crack (Yo) <input type="checkbox"/> <sub>1</sub> Yes <input type="checkbox"/> <sub>2</sub> No <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	Cocaine - Powder <input type="checkbox"/> <sub>1</sub> Yes <input type="checkbox"/> <sub>2</sub> No <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	Cannabis <input type="checkbox"/> <sub>1</sub> Yes <input type="checkbox"/> <sub>2</sub> No <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	Alcohol <input type="checkbox"/> <sub>1</sub> Yes <input type="checkbox"/> <sub>2</sub> No <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	Tobacco <input type="checkbox"/> <sub>1</sub> Yes <input type="checkbox"/> <sub>2</sub> No <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	Medical drugs (Bleue bleue, Rivo...) <input type="checkbox"/> <sub>1</sub> Yes <input type="checkbox"/> <sub>2</sub> No <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	Other <input type="checkbox"/> <sub>1</sub> Yes : ..... <input type="checkbox"/> <sub>2</sub> No
<b>a. Frequency of drug use in the past 30 days (read the answers)</b>								
One or more times per day <i>If yes, number of times per day</i>	<input type="checkbox"/> <sub>1</sub> combien...	<input type="checkbox"/> <sub>1</sub> combien..	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>1</sub> combien...	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>1</sub>
One or more times per week but not every day	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>2</sub>
One or more times per month but not every week	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>3</sub>
DK	<input type="checkbox"/> <sub>88</sub> DK	<input type="checkbox"/> <sub>88</sub> DK	<input type="checkbox"/> <sub>88</sub> DK	<input type="checkbox"/> <sub>88</sub> DK	<input type="checkbox"/> <sub>88</sub> DK	<input type="checkbox"/> <sub>88</sub> DK	<input type="checkbox"/> <sub>88</sub> DK	<input type="checkbox"/> <sub>88</sub> DK
DTA	<input type="checkbox"/> <sub>99</sub> DTA	<input type="checkbox"/> <sub>99</sub> DTA	<input type="checkbox"/> <sub>99</sub> DTA	<input type="checkbox"/> <sub>99</sub> DTA	<input type="checkbox"/> <sub>99</sub> DTA	<input type="checkbox"/> <sub>99</sub> DTA	<input type="checkbox"/> <sub>99</sub> DTA	<input type="checkbox"/> <sub>99</sub> DTA
<b>b. Your age the first time you took drugs</b>								
	..... <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	..... <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	..... <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	..... <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	..... <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	..... <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	..... <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA	..... <input type="checkbox"/> <sub>88</sub> DK <input type="checkbox"/> <sub>99</sub> DTA

**15. Have you ever injected a drug?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

If yes, how old were you the first time you injected drugs?

- ..... <sub>88</sub> DK <sub>99</sub> DTA

*If NO → go to question 22*

**16. When was the last time you injected drugs?**

- <sub>1</sub> Today  
<sub>2</sub> Within the last 7 days (this week)  
<sub>3</sub> Within the last 30 days (this month)  
<sub>4</sub> Within the last year  
<sub>88</sub> DK <sub>99</sub> DTA

**17. Where do you get your syringes?**

- <sub>1</sub> Chemist <sub>2</sub> Street seller  
<sub>3</sub> Other user <sub>4</sub> Other : .....  
<sub>88</sub> DK <sub>99</sub> DTA

**18. The syringe and needle that you used last time you injected drugs were:**

- <sub>1</sub> Already used <sub>2</sub> New and sterile  
<sub>88</sub> DK <sub>99</sub> DTA

**19. Have you reused your own syringe at least twice in the last month?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

**20. Have you shared syringes with other people at least once in the last year?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

**21. If you have shared or re-used syringes in the last year, do you normally disinfect them?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

a) If yes, what mean(s) did you use?

- <sub>1</sub> Water <sub>2</sub> Bleach  
<sub>3</sub> Boiling <sub>4</sub> Disinfectant products  
<sub>5</sub> Other : ..... <sub>88</sub> DK <sub>99</sub> DTA

*Ask questions 22 to 26 if the participant has smoked crack or heroin over the last 30 days (see table):*

**22. Do you share your pipe (zép) with other people?**

- <sub>1</sub> Always <sub>2</sub> Sometimes <sub>3</sub> Never  
<sub>88</sub> DK <sub>99</sub> DTA

**23. Do you know what a zép mouthpiece is?**

*Please explain (tick 'know' if the explanation given is correct)*

- <sub>1</sub> Know <sub>2</sub> Don't know  
<sub>88</sub> DK <sub>99</sub> DTA

**24. Do you use zép mouthpieces?**

- <sub>1</sub> Always <sub>2</sub> Sometimes <sub>3</sub> Never  
<sub>88</sub> DK <sub>99</sub> DTA

a) Si No, pourquoi ? .....

**25. Do you know how to do 'asso pao divisé'?**

*Please explain (tick 'know' if the explanation given is correct)*

- <sub>1</sub> Know <sub>2</sub> Don't know  
<sub>88</sub> DK <sub>99</sub> DTA

**26. Have you ever done 'asso pao divisé'?**

- <sub>1</sub> Yes <sub>2</sub> Parfois <sub>3</sub> No  
<sub>88</sub> DK <sub>99</sub> DTA

*Ask question 27 if the participant has snorted cocaine over the last 30 days (see table):*

**27. Do you share your equipment for snorting with other people?**

- <sub>1</sub> Always <sub>2</sub> Sometimes <sub>3</sub> Never  
<sub>88</sub> DK <sub>99</sub> DTA

**28. Have you overdosed (lost consciousness after taking drugs) within the last 12 months?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

**29. Do you know the facilities available for drug problems?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

a) If yes, which ones? (*Multiple answers allowed, let the participant answer*)

- <sub>1</sub> Remar  
<sub>2</sub> Croix Bleue  
<sub>3</sub> CRFLD  
<sub>4</sub> Bingerville Psychiatric Hospital  
<sub>5</sub> KAOTRI  
<sub>6</sub> IDK mental health servc  
<sub>7</sub> Médecins du Monde/YaPasDrap  
<sub>7</sub> Other(s) : .....  
<sub>88</sub> DK <sub>99</sub> DTA

**30. Have you already received care for drug problems?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

If yes, for which substance(s)? (*List, multiple answers possible*)

- <sub>1</sub> Heroine  
<sub>2</sub> Cocaine/crack  
<sub>3</sub> Medications  
<sub>4</sub> Other(s) : ..... <sub>88</sub> DK <sub>99</sub> DTA

If yes, where did you receive care the most recent time? ..... <sub>88</sub> DK <sub>99</sub> DTA

#### IMPRISONMENT:

[*Now there are some questions about prison*]

**31. Have you ever been in prison?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

a) If yes, were you in prison for taking drugs?

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

b) If yes, when was the most recent time you were imprisoned?

- <sub>1</sub> Less than a year ago <sub>2</sub> > 1 year  
<sub>88</sub> DK <sub>99</sub> DTA

c) Were you in contact with any prisoners who had tuberculosis during your most recent imprisonment?

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

d) Did you take drugs in prison?

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

e) If yes, which ones? (*Multiple answers possible*)

- <sub>1</sub> Heroine  
<sub>2</sub> Cocaine/crack  
<sub>3</sub> Psychoactive medications  
<sub>4</sub> Other(s) : .....  
<sub>88</sub> DK <sub>99</sub> DTA

#### SEXUAL ACTIVITY

[*We are changing the subject slightly and going to talk about your sexual activity. Some questions might be very personal, please continue to answer as accurately as possible.*]

**32. Have you had sexual intercourse over the last 12 months?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

If yes, how many different partners have you had over the last 12 months?

- ..... partenaires <sub>88</sub> DK <sub>99</sub> DTA

*If NO → go to question 37*

**33. Over the last 12 months, have you used a condom at least once during sexual intercourse?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

If yes, how often have you used a condom over the last 12 months?

- <sub>1</sub> Always <sub>2</sub> Often  
<sub>3</sub> Occasionally <sub>3</sub> Rarely  
<sub>88</sub> DK <sub>99</sub> DTA

If yes, where did you get the condom the last time you used one?

- <sub>1</sub> Given by the Ya pas drap project/ Mdm HR  
<sub>2</sub> Another organisation  
<sub>3</sub> From the chemist <sub>4</sub> From a shop  
<sub>5</sub> Autre : ..... <sub>88</sub> DK <sub>99</sub> DTA

**34. Have you had sexual intercourse in exchange for money over the last 12 months?**

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

If yes, is sex work your main source of earnings?

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

If yes, did you use a condom during your most recent sexual intercourse with a client?

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

**35. Have you had sexual intercourse in exchange for drugs over the last 12 months?**

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

**36. Have you had sexual intercourse with a same-sex partner in the last 12 months?**

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

If yes, do you think of yourself as a man who has sex with men (MSM) or a lesbian?

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

**TB AND HIV**

[Thank you for those answers, we are now going to talk about tuberculosis and HIV/AIDS]

**37. Have you already heard people talking about an illness called tuberculosis or KB (Koch bacillus)?**

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

**38. What is the cause or causes of tuberculosis??**  
(Multiple answers possible)

<sub>1</sub> Microbe/germ/KB/bacteria

<sub>2</sub> God's will <sub>3</sub> A curse

<sub>4</sub> Other :..... <sub>88</sub> DK <sub>99</sub> DTA

**39. What are the methods of transmission of tuberculosis? (List the options)**

	Yes	No	Maybe	DK	DTA
Airborne (someone coughs in your face)	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Contaminated blood from a person with tuberculosis	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Unprotected sexual intercourse with a person with tuberculosis	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
From mother to child	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Dirty food and/or water	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Sharing Pao and/or Zep	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>

**40. What are the signs of tuberculosis/KB/TB? (List the options)**

	Yes	No	Maybe	DK	DTA
Cough > 2 weeks	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Fever	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Cough and bloody sputum (haemoptysis)	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Putting on weight	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Itching	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Pain in the lungs	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Night sweats	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>



41. Do you know where you can be screened for tuberculosis?

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

If yes, where? *(Multiple answers possible, let the participant answer)*

<sub>1</sub> At a tuberculosis centre CAT /TC  
<sub>2</sub> At any health centre/ hospital  
<sub>3</sub> At a private clinic  
<sub>4</sub> Traditional healer  
<sub>5</sub> Marabout  
<sub>6</sub> Other :..... <sub>88</sub> DK <sub>99</sub> DTA

42. Can you be treated for tuberculosis?

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

*If NO → go to question 45*

If yes, where can you be treated for tuberculosis? *(Multiple answers possible, let the participant answer)*

<sub>1</sub> At a tuberculosis centre CAT /TC  
<sub>2</sub> At any health centre/ hospital  
<sub>3</sub> At a private clinic  
<sub>4</sub> Traditional healer  
<sub>5</sub> By staying at home  
<sub>6</sub> In the village  
<sub>7</sub> Other: .....  
<sub>88</sub> DK <sub>99</sub> DTA

43. What methods do you know for treating tuberculosis? *(Multiple answers possible, let the participant answer)*

<sub>1</sub> Praying  
<sub>2</sub> With medications sold at the chemist  
<sub>3</sub> With medications bought in the street (tikafrani)  
<sub>4</sub> With medications given at health facilities (CAT / hospital /etc.)  
<sub>5</sub> With plants  
<sub>6</sub> Going to see a traditional healer  
<sub>7</sub> Resting at home  
<sub>8</sub> Going back to the village  
<sub>9</sub> Other :..... <sub>88</sub> DK <sub>99</sub> DTA

44. Can you be cured of tuberculosis?

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

a) If yes, how long does it take? *(Multiple answers possible, list the answers)*

<sub>1</sub> Two weeks <sub>2</sub> Six months <sub>3</sub> Eight months  
<sub>4</sub> Nine months <sub>5</sub> > Twelve months  
<sub>6</sub> Other:..... <sub>88</sub> DK <sub>99</sub> DTA

45. Where have you got all the information you have just given me on TB?

<sub>1</sub> Family /Friend  
<sub>2</sub> Awareness-raising in the ghetto  
<sub>3</sub> Health centre/CAT  
<sub>4</sub> Radio/ TV/newspaper info  
<sub>5</sub> Other:..... <sub>88</sub> DK <sub>99</sub> DTA

ACCESS TO SCREENING AND TB and HIV CARE

*[We are now going on to questions about your access to healthcare.]*

46. Are you currently receiving treatment for tuberculosis?

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

*If NO → go to question 48*

a) Si yes, since when ? for \_\_\_\_ months <sub>88</sub> DK <sub>99</sub> DTA

b) Where are you monitored? ..... <sub>88</sub> DK <sub>99</sub> DTA

c) Do you take your treatment every day?

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

*Go to question 49*

47. Have you already had a positive sputum test for tuberculosis

<sub>1</sub> No <sub>2</sub> Yes <sub>88</sub> DK <sub>99</sub> DTA

*If NO or DK or DTA → Go to question 48*

a) If yes, was it resistant pulmonary tuberculosis

<sub>1</sub> No <sub>2</sub> Yes <sub>88</sub> DK <sub>99</sub> DTA

b) What did you do? (*Give the options, the question is about the most recent diagnosis*)

- <sub>1</sub> You did not take any treatment
  - <sub>2</sub> You took treatment until it was completed and you were cured at the end of the treatment
  - <sub>3</sub> You took treatment until it was completed but you were not cured at the end of the treatment
  - <sub>4</sub> You started treatment but you did not finish it
- <sub>88</sub> DK   <sub>99</sub> DTA

c) How did people in the ghetto react when they knew that you had tuberculosis?

- <sub>1</sub> Did not go to the ghetto
  - <sub>2</sub> They never knew
  - <sub>3</sub> No particular reaction
  - <sub>4</sub> Positive reaction (give details): .....
  - (support, help, moral support)
  - <sub>5</sub> Negative reaction (give details) : .....
  - (rejection, blamat)
  - <sub>6</sub> Extremely negative reaction (give details) : .....
  - (exclusion, violence)
  - <sub>7</sub> Other : .....
- <sub>88</sub> DK   <sub>99</sub> DTA

→ Go to question 49

48. When did you have your most recent screening (sputum test) for tuberculosis?

- <sub>1</sub> During the last 12 months
  - <sub>2</sub> More than 12 months ago
  - <sub>3</sub> Never
- <sub>88</sub> DK   <sub>99</sub> DTA

49. Do you know your HIV status

- <sub>1</sub> Yes   <sub>2</sub> No   <sub>88</sub> DK   <sub>99</sub> DTA

If NO, DK or DTA → Go question 50

a) If yes, what is your HIV status?

- <sub>1</sub> Negative   <sub>2</sub> Positive   <sub>88</sub> DK   <sub>99</sub> DTA

Si NO or DK or DTAs → Go to question 50

If you are positive:

- b) How long have you known your status?  
..... (months) ..... (year of diagnosis)
- <sub>88</sub> DK   <sub>99</sub> DTA

c) Are you monitored?

- <sub>1</sub> Yes   <sub>2</sub> No   <sub>88</sub> DK   <sub>99</sub> DTA

d) If yes, in which facility?

- .....<sub>88</sub> DK   <sub>99</sub> DTA

e) Are you currently receiving an antiretroviral treatment?

- <sub>1</sub> Yes   <sub>2</sub> No   <sub>88</sub> DK   <sub>99</sub> DTA

f) If yes, do you take your treatment every day?

- <sub>1</sub> Yes   <sub>2</sub> No   <sub>88</sub> DK   <sub>99</sub> DTA

→ Go to question 51

50. When did you have your most recent HIV screening?

- <sub>1</sub> During the last 12 months
- <sub>2</sub> More than 12 months
- <sub>3</sub> Jamais   <sub>88</sub> DK   <sub>99</sub> DTA

STIGMATISATION AND DISCRIMINATION

[We are now going to talk about the reaction that someone might have to a person who has tuberculosis.]

51. Has anyone in your circle had TB this year?

- <sub>1</sub> Yes   <sub>2</sub> No   <sub>88</sub> DK   <sub>99</sub> DTA

If NO → Go to question 51.c

a) If yes, how did you react when you knew that he/she was ill with tuberculosis?

*Let the person answer and fill in the response that is the closest to their reaction*

- <sub>1</sub> No particular reaction
- <sub>2</sub> Positive reaction (give details): .....
- (support, help, moral support)
- <sub>3</sub> Negative reaction (give details): .....
- (fear, rejection, blame)
- <sub>4</sub> Extremely negative reaction (give details): .....
- (exclusion, violence)
- <sub>5</sub> Other:.....<sub>88</sub> DK   <sub>99</sub> DTA

b) If this person visited the ghetto, how did the people in the ghetto react when they knew that your friend who uses drugs was ill with tuberculosis

*Let the person answer and fill in the response that is the closest to their reaction*

- <sub>1</sub> S/he did not visit the ghetto  
<sub>2</sub> They never knew  
<sub>3</sub> No particular reaction  
<sub>4</sub> Positive reaction (give details): ..... (support, help, moral support)  
<sub>5</sub> Negative reaction (give details): ..... (fear, rejection, blame)  
<sub>6</sub> Extremely negative reaction (give details): ..... (exclusion, violence)  
<sub>7</sub> Other :..... <sub>88</sub> DK <sub>99</sub> DTA

*c) If no, would you help/support a friend who uses drugs who is ill with tuberculosis*

- <sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

**52. If you had or have tuberculosis, do you think that**

*Read the statements and give the possible responses*

	Yes	No	Maybe	Does not apply	DK	DTA
You would feel ashamed	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>		<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
The other PWUD would avoid you	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>		<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
The other PWUD would throw you out of the smoking spot	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>		<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Your sexual partner(s) would Declined to answere to have sexual intercourse with you?	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
You would be a danger to your family and friends?	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>		<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
You would tell someone?	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>		<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>

**53. Answer the following statements with 'completely agree', 'agree somewhat' or 'do not agree'**

*Read the statements and give the possible responses*

	Completely agree	Agree somewhat	Do not agree	DK	DTA
A PWUD who screens positive for tuberculosis (TB+ DU) should no longer go to the smoking spot	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
A TB+ PWUD is a danger to their community	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
A TB+ PWUD should be thrown out of the smoking spot	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
A TB+ PWUD is able to take their tuberculosis treatment like any other patient	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
A TB+ PWUD should stop taking drugs to be able to have access to treatment	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>

**54. Which of the following activities would you agree to do?**

*Read the activities and give the possible responses*

	Yes	No	Maybe	DK	DTA
Eat with a PWUD who had tuberculosis?	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Accompany a TB+ PWUD to a tuberculosis centre?	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Help a TB+ PWUD to take their treatment properly?	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Identify a spot in the smoking spot where a TB+ PWUD can rest or sleep without infecting other people?	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>
Ask a TB+ PWUD not to come to the smoking spot to protect other PWUD?	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>88</sub>	<input type="checkbox"/> <sub>99</sub>

**ASSESSMENT OF THE POPULATIONN**

The last questions...

**55. Did you take part in the study conducted by Médecins du Monde and its partners in May-June 2014 at Croix-Bleue, on the levels of HIV/AIDS and hepatitis among PWUD?**

<sub>1</sub> Yes <sub>2</sub> No <sub>88</sub> DK <sub>99</sub> DTA

**56. How many people who use heroin and/or crack/cocaine do you think there are in Abidjan?**

..... heroin/cocaine/crack users in Abidjan <sub>88</sub> DK <sub>99</sub> DTA

Thank you for taking part in this survey, your answers are valuable and will help us to improve access to health for people who use drugs.

## ANNEXE 4

## definition of the indicators used to characterise the performance of the algorithms

The indicators used to characterise the performance of the algorithms are given below. This table presents the terms used for the method of calculating the indicators.

	Affected by the disease studied	Not affected by the disease studied
Screened positive with the test	True positives	False positives
Screened negative with the test	False negatives	True negatives

**Sensitivity (Se)**

Sensitivity is the capacity of a test to give a positive result in people affected by the disease in question. It is calculated using the following formula:

$$Se = (\text{True positives}) / (\text{True positives} + \text{False negatives})$$

**Specificity (Sp)**

Specificity is the capacity of a test to give a negative result in people not affected by the disease in question. It is calculated using the following formula:

$$Sp = (\text{True negatives}) / (\text{True negatives} + \text{False positives})$$

**Positive predictive value (PPV)**

The positive predictive value is the probability that an individual has the disease in question when the test result is positive. It is calculated using the following formula:

$$PPV = (\text{True positives}) / (\text{True positives} + \text{False positives})$$

**Negative predictive value (NPV)**

The negative predictive value is the probability that an individual does not have the disease in question when the test result is negative. It is calculated using the following formula:

$$NPV = (\text{True negatives}) / (\text{True negatives} + \text{False negatives})$$

## ANNEXE 5

### definition of the terms used to characterise antibiotic resistance

The following definitions were used to characterise the antibiotic resistance of *Mycobacterium Tuberculosis* strains to Category I tuberculosis drugs:

- Mono-resistant: resistant to a single tuberculosis drug, apart from rifampicin;
- Poly-resistant: resistant to at least two tuberculosis drugs, apart from rifampicin;
- Multi-resistant: resistant at least to rifampicin and isoniazid.



