



# Factors Related to the Delay in Diagnosis and Treatment of Pulmonary Tuberculosis in the Territory of Malemba Nkulu, Haut Lomami Province in the Democratic Republic of the Congo

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## Abstract

**Introduction:** The territory of Malemba Nkulu experiences the highest rates of pulmonary tuberculosis detection in the country. This rate exceeds the detection rate for the entire Haut Lomami province for pulmonary tuberculosis, surpasses the national average detection rate, and the estimated detection rate by the WHO for the Democratic Republic of the Congo. The aim of this study was to determine the patient delay and the health system delay, as well as to identify the factors associated with these delays. **Methods:** A cross-sectional study was conducted, and a semi-structured questionnaire, along with documentation referring to the patients' medical records, served as our data collection tools. We collected data from 786 pulmonary tuberculosis patients with positive microscopy attending the diagnosis and treatment health centers (DTHC) in the four health districts of the Malemba territory, Haut Lomami province. We investigated the patient delay and the health system delay, and we also identified the factors related to these delays. The study covered a period from January to December 2022. The response rate was 47.6%, meaning 374 patients agreed to answer our questionnaire out of 786 selected. The data were analyzed using Epi Info version 7. **Results:** We found in these patients the median values of patient delay, health system delay, and total delay, which were respectively 62 days, 2 days, and 64 days. Two hundred fifty-eight patients (69%) consulted traditional or spiritual healers before seeking regular medical care. This group of patients experienced a median delay of 121 days, while one hundred sixteen patients

(31%) who did not consult these healers had a median delay of 60 days. Among these 116 patients who had not previously consulted traditional or spiritual healers, 21 (18%) preferred to take roots at home, with a median delay of 150 days. Of these 374 patients, only 13 (11%) had directly consulted health centers and public hospitals, experiencing a median delay of 33 days. The risk factors associated with longer patient delays that were identified are: the reliance on informal and untrained caregivers, traditional or spiritual healers, self-medication, and the use of home remedies before the diagnosis of tuberculosis. The distance of the patient's home from the nearest health center, the lack of awareness about the free treatment of tuberculosis by patients, the lack of understanding of the origin of tuberculosis symptoms, and especially the belief in a supernatural cause of the disease have been identified as factors leading to significant delays in patients seeking appropriate care. **Conclusion:** The wait time for the patient and the healthcare system in this territory is very high, and as a result, it significantly contributes to the hyper-detection of this disease in the area. Reducing the patient wait time also requires that the population be well-informed about the free treatment for tuberculosis. On their part, private health institutions, traditional and spiritual healers should also be informed and trained by the anti-tuberculosis program on the clinical manifestations and the possibility of free treatment.

## Subject Areas

Public Health

## Keywords

Pulmonary Tuberculosis, Malemba Nkulu, Diagnostic Delay, Treatment, Related Factors, DRC

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## 1. Introduction

Tuberculosis remains a major cause of morbidity and mortality, and a public health problem worldwide, affecting a third of the global population. It causes about 10 million illnesses each year and is one of the leading causes of death. It kills three people every minute [1] [2].

The delay in diagnosis and treatment of open pulmonary tuberculosis can worsen the condition of the disease and prolong the duration of transmission. This leads to significant morbidity and increases the risk of death. Furthermore, undiagnosed cases of open pulmonary tuberculosis and untreated pulmonary tuberculosis constitute, at a high level, reservoirs for transmission of the disease in the community. Early detection and correct treatment of infectious tuberculosis cases are known to be the basis of strategies to reverse the incidence of the disease and are important for the effective control of tuberculosis as they cure the sick, interrupt transmission, and improve program control [3].

The indicators that reflect the urgency for tuberculosis case detection by patients

and health services include respectively the “patient delay” and the “health system delay”. Defined as the time elapsed between the onset of the first symptoms of the disease and the first visit to a healthcare facility, the first delay depends on economic, geographical, and socio-cultural factors in developing countries. The second is the time elapsed between the first medical consultation in that facility and the start of anti-tuberculosis treatment. The sum of these two delays, referred to as total delay, contains indicators that are also indicators of the contagiousness of patients [2].

This is why strategies aimed at reducing the time between the onset of tuberculosis symptoms and the initiation of effective chemotherapy can impact the duration of contagiousness in the community and thus reduce the number of new infections [4] [5].

Around the world, national tuberculosis control programs use passive case detection screening as the standard detection strategy [6]. This strategy, which is based on the diagnosis and treatment of infectious cases that present themselves to health services, also depends on the motivation, knowledge, financial capacity of patients, and the degree of suspicion of health agents, in addition to the effectiveness and accuracy of diagnostic services [7].

Motivated by the lack of studies on this subject in the territory of Malemba Nkulu, we propose in this study to examine the factors related to the delay of patients and that of the health system in the diagnosis and treatment of pulmonary tuberculosis patients visiting the diagnosis and treatment centers for tuberculosis in the territory of Malemba.

## 2. Methodology

We conducted a cross-sectional study on the factors related to the delay of patients and that of the health system in the diagnosis and treatment of pulmonary tuberculosis patients visiting the diagnosis and treatment centers for tuberculosis in the territory of Malemba.

## 3. Results

### 3.1. Patient Delay

#### 3.1.1. Effect of Traditional or Spiritual Healers

The reading of **Table 1** indicates that among the 374 patients who correctly answered the question regarding whether they consulted traditional or spiritual healers beforehand, the median time between the onset of tuberculosis symptoms and the patient’s first consultation at an accredited health facility for tuberculosis diagnosis was 62 days. The number of patients who had previously consulted traditional or spiritual healers represented 69% of the total, with a median delay of 121 days. Patients who had not previously consulted traditional or spiritual healers made up 31% of the total, with a median delay of 60 days. Compared to the duration (delay) of 21 days recommended by the program in the DRC as a threshold, both collected data are significantly higher.

**Table 1.** Delay or time taken by patients depending on whether they consulted traditional or spiritual healers before the medical consultation.

Distribution of patients	Frequency	Percentage	Median delay (in days)	Extremes
Sick individuals who consulted traditional or spiritual healers before the diagnosis	258	69	121	(2 - 1095)
Sick people who did not consult traditional or spiritual healers before the diagnosis.	116	31	60	(2 - 460)
Totals	374	100	62	(2 - 1400)
Recommended deadline by the program and the WHO	-	-	21	-

### 3.1.2. Effect of Other Healthcare Structures and Alternative Practices

**Table 2** allows us to highlight two main observations among patients who had not previously consulted traditional and spiritual healers. On one hand, self-medication, taking roots at home, and consulting private health facilities alone represent 84% of the total of 116 patients who did not consult spiritual and traditional healers, with a peak of 49% related to self-medication. On the other hand, the highest median delay was 365 days and pertained to patients who remained simply passive at home without doing anything (2%) and those who turned to first responders (3%).

**Table 2.** Time taken by patients based on whether they consulted other care structures and alternative practices before the medical consultation (N = 116).

Distribution of patients	Frequency	Percentage	Median delay (in days)	Extremes
Modern self-medication	57	49	180	(1 - 1825)
Taking roots at home	21	18	150	(1 - 1825)
Private health facilities (dispensaries, clinics, polyclinics...)	20	17	210	(21 - 365)
Health center and public hospitals	13	11	33	(1 - 365)
Rescuers	3	3	365	(21 - 365)
They simply remained passive at home	2	2	365	(360 - 1095)
Totals	116	100	62	(2 - 1400)
Threshold recommended by the program (PNT) and WHO	-	-	21	-

### 3.1.3. Effect of the Unawareness of the Free Treatment of Tuberculosis

**Table 3** shows that patients who knew that the treatment for tuberculosis was free in public facilities made up 59%, and had a median delay of 27.5 days, while patients who did not know this (41%) experienced a median delay of 90 days.

**Table 3.** Delay or time taken by patients due to the unawareness of the free treatment of tuberculosis before medical consultation (N = 374).

Group of patients	Frequency	Percentage	Median delay (in days)	Extremes
Sick people knowing that the treatment for tuberculosis is free	221	59	27.5	(6 - 730)
Patients do not know that the treatment for tuberculosis is free	153	41	90	(0 - 1095)
Totals	374	100	62	(2 - 1400)

### 3.1.4. Effect of the Distance between the Patient's Place of Residence and the Nearest Health Center

It appears from **Table 4** that patients living at a distance between 0 and 10 kilometers accounted for 16% of the total number of patients who answered this question correctly. Their median delay was 60 days. Furthermore, the proportion of patients living beyond 10 kilometers was 84%, with a median delay of 120 days.

**Table 4.** Delay or time taken by patients due to the distance between their place of residence and the nearest health center before the consultation (N = 374).

Distance	Frequency	Percentage	Median delay (in days)	Extremes
Patients living between 0 and 10 km	60	16	60	(6 - 730)
Patients living more than 10 km away	314	84	120	(6 - 1095)
Total	374	100	62	(2 - 1400)

### 3.1.5. Effect of Ignorance of Tuberculosis Symptoms

**Table 5** demonstrated that 32% of patients who attributed the manifestations of tuberculosis to other diseases (bronchitis, asthma, AIDS, malaria...) experienced a median delay of 90 days. 24% of patients attributed their symptoms to a simple cough, with a median delay of 60 days. In third place is the group of patients who suspected bad luck or a supernatural origin (witchcraft, fetishes, gris-gris...), which accounted for 28%, with a median delay of 150 days. Finally, the patients who thought of tuberculosis constituted the smallest percentage (16%), with a median delay of 30 days.

**Table 5.** Delay of patients due to their lack of understanding of the origin of their disease symptoms (N = 374).

Thoughts of the sick	Frequency	Percentage	Median delay (in days)	Extremes
Sick individuals who thought about a witchcraft curse (sorcery, fetishes, charms...)	105	28	150	(6 - 730)

**Continued**

Patients who thought they had a simple cough	90	24	60	(6 - 1095)
Patients thinking about other diseases (HIV, asthma, diabetes, bronchitis, malaria)	119	32	90	(3 - 1095)
Patients who thought of tuberculosis	60	16	30	(3 - 1825)
Total	374	100	62	(2 - 1400)

**3.1.6. Justification for Delays by the Patients**

In **Table 6**, several reasons are put forward by patients to justify the difficulties encountered before diagnosis and their late access to the nearest public health facility, due to the long distance to be covered (median delay of 67 days, 49%), lack of financial resources (median delay of 181 days, 29%), information received from other patients saying there was a stock shortage in health facilities (median delay of 14 days, 17%), and 19 patients reported both the reason of long distance and lack of financial means (median delay of 61 days, 5% of cases).

**Table 6.** Reasons for long delays mentioned by the patients themselves as being the cause of their delay or the difficulties encountered before diagnosis (N = 374).

Reasons put forward by the patients	Frequency	Percentage	Median delay (in days)	Extremes
Long distance	183	49	67	(8 - 740)
Lack of financial means	108	29	181	(8 - 732)
Out of stock in the CSDT	64	17	14	(6 - 84)
Long distance and lack of financial means	19	5	61	(1 - 737)
Total	374	100	62	(2 - 1400)

**3.2. Delay of the Health System (Treatment Delay)**

Out of a total of 374 patients who participated in our study, all responded to the question regarding the date of notification of the positive sputum result and the date of initiation of anti-tuberculosis treatment. These patients experienced a median delay (health system delay or treatment delay) of 2 days. Compared to the delay accepted by the national tuberculosis control program in the DRC, the delay found in our study is longer (see **Table 7**).

**Table 7.** Delay of the health system (duration between the day of arrival at the tuberculosis treatment center, the day the positive laboratory result is announced, and the day treatment with anti-tuberculosis chemotherapy is initiated (N = 374).

Patients	Frequency	Percentage	Median delay	Extremes
Total sick (all the patients)	374	100	2	0 - 30
Threshold recommended by the program (PNT)			Same day (delay = 0 days)	

## 4. Discussion

### 4.1. Patient and Healthcare System Delays (Treatment Delay)

Despite the implementation of the TDO for several years in the territory of Malemba Nkulu, the incidence of tuberculosis shows little regression. Our study showed that the delays of patients and the healthcare system (treatment delay) in this territory were very high, and as a result, they contribute significantly to the over-detection of this disease in the territory. Comparatively, the influence of patient delays, which is stronger than that of the healthcare system, results from several social, economic, cultural, and organizational constraints. This is why the reliance on traditional or spiritual healers, self-medication, and the use of herbal remedies at home has resulted in considerable delays for tuberculosis patients before seeking diagnosis and treatment in public health facilities. The alarming poverty of our rural populations, the influence of their level of education, and the distance of their homes from health centers are the reasons that help to better understand the origin of the significant delays faced by patients regarding appropriate care.

Our study showed that patients experienced a median total delay of 64 days, with the patient delay contributing significantly compared to the healthcare system delay (62 vs. 2 days). Furthermore, our investigations also reveal that the time between the onset of tuberculosis symptoms and the first consultation is twice as long (121 days) for patients who previously consulted traditional or spiritual healers before the diagnosis, compared to those who did not (60 days). Compared to the duration of 21 days recommended by the National Tuberculosis Program, both collected data are significantly higher.

While the tuberculosis treatment program in the DRC recommends starting treatment for patients on the same day the results are announced, our study showed a significant delay in the onset of treatment after positive results due to frequent stock shortages of inputs for combating this disease. Out of a total of 374 patients who met the inclusion criteria, 258 patients (69%) consulted traditional or spiritual healers before the diagnosis of tuberculosis. They experienced a median delay of 121 days. The 116 patients (31%) who did not consult traditional or spiritual healers before the first medical consultation had a median delay of 60 days.

Out of these 116 patients who had not previously consulted traditional or spiritual healers before the diagnosis of tuberculosis, 57 (49%) resorted to self-medication with modern medicine without a medical prescription, with a median delay of 180 days; 21 (18%) only took roots at home and experienced a median delay of 150 days; 20 (17%) consulted private medical facilities, with a median delay of 210 days; 3 (3%) consulted first responders (commonly referred to as red cross) with a median delay of 365 days; and finally, 2 (2%) simply remained passive at home without doing anything until the day they went to a government health facility for a tuberculosis diagnosis. They experienced a median delay of 365 days.

It follows from the above that on one hand, the socio-cultural gravity still exerts a strong influence in the environments of developing countries, and on the other

hand, the fight against poverty is a key strategy in addressing multiple aspects of the pathology under study. As for the delay in the health system (treatment delay), we must highlight here the frequency of stockouts of tuberculosis control inputs at the intermediate and peripheral levels. This stockout, which has become commonplace even in our public health facilities, continues to play a significant role in prolonging patient wait times and especially impacting the healthcare system. Regarding the recourse to traditional or spiritual healers, self-medication, the use of herbal remedies, consultations with private facilities, and ignorance of the free healthcare services related to tuberculosis, our results corroborate those of previous studies. Indeed, by examining the total median delays, we found that in certain studies [8], this timeframe was very close to the one we recorded. In other studies, however, it was sometimes lower [2], earlier he was superior [9] compared to our results. We thought that the differences recorded could result notably from the regional specificities of the sites where the studies were conducted.

Similarly, regarding the influence of the distance between the patients' places of residence and those where the nearest health centers are located, our results align with those of Shiferaw *et al.* [9]. As for the delay caused by the healthcare system, the median delay of 2 days found in our study is greater than that found in China [4]. In contrast, our results are far inferior to those found in Malaysia [10], and in Ghana [2].

#### **4.2. Factors Associated with Long Delays (Setbacks)**

Considering the factors influencing the delay, just like in our study and in India [4], Bonadonna *et al.* [2], in Peru, it was also found that patients who had attended private facilities before the diagnosis of tuberculosis experienced a longer delay than those who had directly consulted public health services. In addition, patients who tended to self-medicate without a medical prescription also experienced considerable delays. Regarding the study in India [1], the author demonstrated that the factors associated with long delays were the first contact, especially if the first action was self-medication and seeking care from private providers, including traditional or spiritual healers, pharmacies, and allopathic providers. This aspect aligns well with the results found in our study. The limitation of this study is that we only selected patients who presented at the CSDT and who had a positive result from sputum smears, leaving aside other forms of tuberculosis and patients who presented at other healthcare facilities.

### **5. Conclusion**

The reduction of the patient's delay, which is regrettable, also requires that the population be greatly informed about the free treatment of tuberculosis. For their part, private health institutions, traditional and spiritual healers should also be informed and trained about the possibility of diagnosing tuberculosis and promptly refer patients to health centers and government hospitals for appropriate investigation.

## Conflicts of Interest

The authors declare no conflicts of interest.

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