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Perceptions, Patient Experiences, and Factors Associated with Delays in the Diagnosis and Treatment of Tuberculosis in Kinshasa

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Abstract

Introduction: Delays in the diagnosis and treatment of diseases are a major public health challenge in Kinshasa, the capital of the Democratic Republic of Congo (DRC). These delays in diagnosis and treatment, otherwise known as time to treatment, are classified into three categories: Patient delay: the interval between the onset of the first symptoms and the first medical consultation (considered long if it exceeds 30 days). Healthcare provider delay: the time between the first consultation and the initiation of treatment (considered long if it exceeds 30 days). Total delay: the time between the onset of symptoms and the initiation of treatment (considered excessive if it exceeds 60 days). These delays have serious consequences for individual and collective health, leading to increased morbidity, a deterioration in quality of life, and preventable deaths. An untreated patient can potentially infect more than ten people per year. These individuals constitute a significant reservoir for community transmission. The objective was to evaluate the factors explaining delays in the diagnosis and treatment of tuberculosis in Kinshasa on the one hand, and on the other hand to evaluate patients' perceptions and experiences of delays in the diagnosis and treatment of tuberculosis.

Materials and Methods: This study adopted a mixed sequential explanatory design conducted in Kinshasa (DRC) between October 2024 and January 2025. The quantitative phase focused on a corrected sample of 109 tuberculosis patients recruited in three health zones, analyzed using descriptive statistics and logistic regression. The qualitative phase consisted of in-depth interviews with 20 patients to explore their perceptions and care trajectories. Variables of interest included delays (patient, caregiver, total) and socio-structural determinants. The study was conducted in accordance with ethical standards, with an emphasis on informed consent and confidentiality.

Results: Delays in Diagnosis and Treatment: Average patient delays reach two months, mainly due to financial barriers, limited access to health services, and underestimation of symptoms by patients. These delays are exacerbated by drug stock-outs and transportation difficulties. Financial and Socioeconomic Barriers: The cost of care is a major barrier to prompt consultation, confirmed by both approaches. Patients living in precarious economic conditions are particularly vulnerable, delaying their access to care and worsening their health status. Influence of Cultural Beliefs and Stigma: Cultural beliefs significantly influence healthcare- seeking behavior. While some beliefs encourage prompt consultation, others, such as stigma and misperceptions about tuberculosis (e.g., the disease being seen as a curse), delay treatment. Distance to Health Services: Although the quantitative study found no significant link between distance and delays, the qualitative study revealed that transportation difficulties and long distances remain a barrier for some patients, particularly in outlying areas. The results of this study highlight the need for a multisectoral approach to reduce delays in tuberculosis diagnosis and treatment in Kinshasa.

Conclusion: This study, combining quantitative and qualitative approaches, provided an in-depth exploration of the perceptions, experiences, and factors associated with delays in tuberculosis diagnosis and treatment in Kinshasa, Democratic Republic of Congo (DRC). The results highlight a complex combination of financial logistical, cultural, and social barriers that hinder access to care and delay patient management. Data triangulation enriched our understanding of the phenomenon by revealing both generalizable trends (through the quantitative study) and contextual and emotional dimensions (through the qualitative study).

Keywords: Tuberculosis; Delayed Diagnosis; Delayed Treatment; Patient Perceptions; Associated Factors; Kinshasa

Introduction

Tuberculosis (TB) remains a major public health problem in the Democratic Republic of the Congo Democratic Republic of Congo (DRC). Despite the creation of the National Tuberculosis Control Program (PNLT) in 1980, the country remains one of those with a high and growing endemicity, with a constantly increasing burden of disease [1]. In the city of Kinshasa, the situation is particularly worrying: the prevalence of the disease is one of the highest in the world, a phenomenon greatly exacerbated by co-infection with HIV [2]. Currently, key strategies rely on early diagnosis and rapid treatment [3], although case finding remains essentially passive within national programs [4]. In the DRC, while the fight against TB is theoretically supported by healthcare facilities, the reality on the ground reveals significant under-detection of cases, which seriously compromises efforts to reduce the incidence of the disease [5].

This under-detection fuels a dangerous cycle of community transmission: an untreated patient with smear-positive pulmonary tuberculosis (SPTB+) represents a major reservoir, capable of potentially infecting between 10 and 15 people per year [6, 7]. In this context, delays in diagnosis and treatment are the central public health challenge in Kinshasa. These delays are generally classified into three critical categories: patient delay (the interval between the onset of symptoms and the first consultation, considered long if it exceeds 30 days), provider delay (the time between the first consultation and the initiation of treatment, considered excessive if it exceeds 30 days), and total delay, which should not exceed 60 days to be effective [8, 9].

Several structural and individual barriers hinder the elimination of the disease. According to Kaswa Michel (2014), limited access to quality diagnosis, imprecise algorithms, lack of laboratory facilities in remote areas, and a lack of action research are hindering progress. At the same time, socioeconomic barriers such as geographical distance, the high cost of tests (X-rays, laboratory tests), and perceptions of service quality influence patients' decisions to seek medical care [10]. Beyond these material aspects, sociocultural representations play a major role. Limited knowledge and stigmatization lead some patients to perceive TB as inevitable or the result of mystical forces, directing them toward alternative treatments or self-medication [11, 12].

The World Health Organization (WHO) emphasizes the importance of improving this knowledge in order to achieve the elimination targets by 2030, although this prospect remains uncertain without adaptation to the local context (WHO, 2014). Therefore, assessing diagnostic and treatment delays becomes essential for measuring program effectiveness. This research aims to analyze these obstacles by exploring three categories of factors: predisposing factors (patient attitudes and beliefs), enabling factors (access to resources and technical capacities of providers), and reinforcing factors (community awareness and involvement) [14]. By highlighting these behaviors and system gaps, this study will contribute to improving management strategies and reducing the burden of tuberculosis in the DRC [15].

Theoretical Framework

Several theoretical frameworks are relevant to conducting this study. However, we have chosen to use three theoretical frameworks to structure our study on delays in tuberculosis diagnosis and treatment in Kinshasa, Democratic Republic of Congo.

- **Health Care Seeking Behavior Model:** This theoretical framework explores the individual, social, and systemic factors that influence how individuals seek health care. It could be used to understand why some patients wait before seeking care for their tuberculosis symptoms, and how these behaviors influence diagnostic delays [16].

- **Health Care Barriers Model:** This model focuses on specific obstacles that hinder access to healthcare, such as service availability, financial costs, geographical distance, etc. It could be used to identify the particular barriers encountered by tuberculosis patients in Kinshasa, contributing to delays in diagnosis and treatment [17]. Furthermore**,** the Three Delays Barrier Model identifies three types of delays that can affect access to healthcare: delays in patient/family decision-making, delays in reaching the healthcare facility, and delays in the delivery of care. For the study on tuberculosis in Kinshasa: This model is particularly relevant because it structures the analysis of patient experiences by identifying the specific barriers encountered at each stage of the healthcare-seeking process, thereby enabling interventions aimed at reducing these delays to be targeted [18].

- **Socio-Cultural Determinants of Health Model**: This theoretical framework explores the impact of cultural norms, beliefs, and social practices on health and health behaviors. It would be relevant for analyzing how local perceptions of tuberculosis, beliefs about its causes and treatments influence delays in seeking care in Kinshasa [19]. These theoretical frameworks provided us with an integrated approach to analyzing delays in tuberculosis diagnosis and treatment in Kinshasa. By structuring our study around these models, we were able to explore in depth the complexities of the factors contributing to these delays, thus providing a solid basis for recommendations on public health policy and clinical practices in the region

Theories of healthcare perception and explanatory models of healthcare-seeking behavior enabled us to develop a relevant theoretical framework for this research, namely:

A) Social Perception Theory

Social Perception Theory explores how individuals interpret and evaluate their environment based on their social interactions, past experiences, and prevailing social norms. In the context of the tuberculosis study in Kinshasa, this theory is relevant for understanding how patients perceive delays in diagnosis and treatment: In Kinshasa, where healthcare resources may be limited and patient expectations may be influenced by sociocultural factors, Social Perception Theory helps to explore how these individual perceptions are formed and influence decisions to seek care.

b) The Health Belief Model

The Health Belief Model examines how individual beliefs about illness, the severity of the condition, the perceived benefits and barriers to treatment, and incentives for action influence health decisions. In the context of delays in tuberculosis diagnosis and treatment in Kinshasa: This model helps analyze how individual perceptions of the severity of tuberculosis, the potential benefits of early treatment, and perceived barriers (such as the cost of care and the distance to travel to access health services) shape patient behavior [20, 21].

On the one hand, by combining these theories and models in the study, it becomes possible to: Understand patients' motivations and perceptions: Why do some patients delay seeking care despite the severity of their symptoms? Identify specific barriers: and Propose targeted interventions: each theory and model will bring a unique and complementary perspective to the study of delays in tuberculosis diagnosis and treatment in Kinshasa, thereby strengthening the methodological rigor and relevance of recommendations for improving healthcare in this region. Furthermore, by integrating these theories into the methodology of a study on delays in tuberculosis diagnosis and treatment in Kinshasa, we will better understand patients' perceptions, identify specific barriers, and propose effective interventions to improve health outcomes.

Justification

This study is motivated by the lack of documentation on delays, perceptions, recourse, and factors influencing the diagnosis and treatment of tuberculosis in Kinshasa. Identifying and reducing patient and caregiver delays is essential to limiting transmission and the burden of disease. Indepth research on patient perceptions and specific factors influencing delays in tuberculosis diagnosis and treatment will contribute to improving strategies to combat this disease in the DRC.

By integrating socioeconomic, cultural, and systemic dimensions, this study aims to propose appropriate strategies to improve access to care and optimize the management of tuberculosis patients in Kinshasa. A multisectoral approach involving improved access to diagnosis and treatment, strengthening of the health system, and community awareness is essential if the goals of eliminating tuberculosis in the DRC by 2030 and 2050 are to be achieved.

The distinctive value of this study lies in its holistic approach: it does not simply measure delays, but explores the "care pathway" through the lens of individual perceptions, which are often overlooked in traditional quantitative research. By incorporating the model of predisposing, enabling, and reinforcing factors, this research sheds new light on how mystical-religious representations and stigma feed into each other to paralyze the use of early care.

Research Question

Although numerous studies in sub-Saharan Africa have documented the clinical and epidemiological factors of tuberculosis, there remains a grey area regarding the link between systemic failures and the psychosocial experiences of patients in the specific urban context of Kinshasa. Our research therefore focuses on the following questions:

- What are the major determinants (sociodemographic, economic, and structural) associated with delays in diagnosis and treatment among smear-positive patients in Kinshasa?
- How do patients' sociocultural perceptions and experiences within the healthcare system influence their care pathway and the lengthening of delays?

Study Hypothesis

Main Hypothesis

We formulate the following hypotheses: o Delays in tuberculosis diagnosis in Kinshasa are influenced by a combination of individual, social, economic, and systemic factors.

Alternative Hypotheses

- Patients with higher levels of education are more likely to seek early treatment for their tuberculosis symptoms.
- Financial barriers, such as the cost of medical care and transportation expenses, negatively influence the timing of patient consultations.
- Cultural beliefs and misconceptions about tuberculosis delay the start of treatment after diagnosis.
- Residents of rural areas in Kinshasa face additional challenges in accessing health services, thereby increasing delays in diagnosis and treatment.
- Improved access to health services and increased awareness will reduce delays in tuberculosis diagnosis and treatment in Kinshasa.

These hypotheses are formulated taking into account the chosen theoretical frameworks and our research question.

Study Objectives

Main Objective

Our main objective is to identify the factors associated with delays in seeking care and diagnosis by health care providers among tuberculosis patients; to explore patients' perceptions and experiences of these delays in diagnosis and treatment in the city of Kinshasa, Democratic Republic of Congo.

Specific Objectives

- To assess and measure the time between the onset of symptoms and the diagnosis of smearpositive pulmonary tuberculosis.
- Determine the socioeconomic, cultural, institutional, and systemic factors contributing to delays attributed to patients and the health system.
- Describe the different care pathways followed by patients from the onset of symptoms to diagnosis.
- Explore patients' experiences and perceptions of delays in diagnosis and treatment.
- Propose practical, evidence-based recommendations to improve access to care, reduce delays in diagnosis and treatment, and strengthen the health system in Kinshasa.

Materials and Methods

Study Setting

The study was conducted in Kinshasa, in tuberculosis screening centers affiliated with the DRC's PNLT. We chose Kinshasa because of its public health challenges, including delays in diagnosis and treatment, linked to high population density, limited health infrastructure, and economic inequalities. Quantitative research was conducted in two hospitals in the following municipalities: the Bondeko Clinic (Limete district) and Kintambo Hospital (Kintambo district). Qualitative research was conducted at the Salvation Army tuberculosis screening center (Kinshasa district) between October 10, 2024, and January 30, 2025.

Type of Study

This research adopts a sequential mixed explanatory design. This methodological choice allows, first, the collection and analysis of quantitative data to identify trends and factors causing delays, and then, in a second stage, the deepening of these results through a qualitative phase in order to grasp the complexity of patients' perceptions and experiences.

Study Setting and Period

The study was conducted in Kinshasa, within the Screening and Treatment Centers (CDT) affiliated with the PNLT.

Quantitative Phase: Conducted in three representative health zones: the Bondeko Clinic (Limete), Kintambo Hospital (Kintambo), and facilities in the municipality of Kinshasa.

Qualitative Phase: Conducted at the Salvation Army/William Booth screening center (Kinshasa municipality).

Data collection took place from October 10, 2024, to January 30, 2025.

Sampling and Study Population

The target population included adult patients (≥ 18 years old) diagnosed with pulmonary or extrapulmonary tuberculosis who had started treatment less than three months prior.

Quantitative Component: For a population considered infinite, the initial sample size calculated was 384 people ($n = Z^2pq/d^2). However, by adjusting this sample to the number of care facilities (151 centers in 26 municipalities) and aiming for 95% accuracy with a 5% margin of error, the corrected sample size was set at 109 participants.

Qualitative Component: In accordance with the principle of theoretical saturation and the explanatory nature of the study design, a subgroup of 20 patients from the initial sample was selected for in-depth interviews. 2.5. Data collection and analysis

Quantitative Collection: A structured questionnaire was used to collect data on delays (symptomsdiagnosis), socioeconomic factors, and the care pathway. The analysis was performed using descriptive statistics and logistic regression to identify variables associated with delays. Qualitative collection: Semi-structured interviews were conducted using an interview guide focused on experiences, cultural representations of the disease, and perceived barriers within the healthcare system. The data were subjected to thematic content analysis. For the qualitative part, the sample size was determined by the principle of saturation, which, as stated by [22], is based on the idea that recruitment of new participants should cease when the data collected no longer provides new or meaningful information in relation to the study objective. The goal is to capture a diversity of perspectives while ensuring a thorough and rigorous analysis.

Recruitment of Participants

Eligible patients were recruited voluntarily from public health facilities in Kinshasa after obtaining their informed consent.

Inclusion and Exclusion Criteria

The study included adults aged 18 and over who had been diagnosed with tuberculosis and had experienced significant delays in their care. Minors and patients who had not experienced significant delays were excluded.

Data Collection and Analysis

Quantitative analyses were performed using SPSS software, and Atlas-ti software was used for qualitative analyses. Semi-structured interviews were used to explore patients' perceptions of delays in diagnosis and treatment. The recordings were transcribed accurately and validated by the investigators. Thematic analysis was used to identify the main obstacles encountered. Data triangulation was used to enhance the reliability of the results.

Ethical Considerations

The study complied with the principles of the Declaration of Helsinki. Written informed consent was obtained from each participant, guaranteeing confidentiality and anonymity.

Limitations include memory bias (inaccurate recall of symptom onset dates) and social desirability bias. The generalizability of the results remains limited to the urban context of Kinshasa.

The study was approved by a local ethics committee registered under number 0163/CBE/ISTM/KIN/RDC/PMBBL/2024 on October 7, 2024. In addition, all participants were informed of the objectives, procedures, and confidentiality measures before giving their informed consent.

Results

Factors Associated With Delays in the Diagnosis and Treatment of Tuberculosis among Patients and Healthcare Providers

Section 1: General Information

Question		Answer	Number of respondents	Percentage
			(N=109)	(
1. Age		Under 18	10	9.17
		18-30	30	27.52
		31-45	25	22.94
		46-60	20	18.35
		Over 60	24	22.02
2. Gender		Male	58	53.21
		Female	51	46.79
3. Level of education		No formal education	12	11.01
		Primary	25	22.94

		Secondary	50	45.87
		Higher	22	20.18
4. Socioeconomic status		Low	40	36.69
		Medium	45	41.28
		High	24	22.02
5. Place of residence	in	Urban area	70	64.2
Kinshasa		Peri-urban area	25	22.94
		Rural area	14	12.84
6. Screening center consulted in Kinshasa		CS	50	45.87
		Private hospital	30	27.52
		Public hospital	29	26.61

Age: The most represented age group is young adults, with 27.52% of respondents aged 18-30. This indicates that tuberculosis mainly affects this age group among respondents.

Gender: Men represent the majority of respondents, at 53.21%. This could suggest that more men seek healthcare services for tuberculosis or that they are more affected by the disease in this study.

Education level: The majority of respondents (45.87%) have a secondary education. This indicates that a large number of participants have access to sufficient basic education to understand and respond to the symptoms of tuberculosis.

Socioeconomic status: The group with average socioeconomic status is the most represented, with 41.28% of respondents. This could suggest that tuberculosis also affects a significant proportion of middle-class people, who have moderate access to health services.

Place of residence in Kinshasa: A significant majority of respondents (64.22%) live in urban areas. This shows that tuberculosis affects urban populations more in this study, probably due to population density and accessibility to health services.

Screening center consulted in Kinshasa: The health center is the most frequently visited screening location, with 45.87% of respondents. This indicates that health centers, probably public ones, are the most commonly used for diagnosing tuberculosis among participants.

Section 2: Healthcare-Seeking Behavior Model

Question	Response	Number of respondents (N=109)	Percentage (%)
7. When did you start experiencing symptoms associated with tuberculosis?	Less than one month before consultation	15	13.76
	1 month before the consultation	18	16.51
	2 months before the	30	27.52

	consultation		
	More than 2 months before the consultation	40	36.69
	Don't know	6	5.5
8. What was the main factor influencing your decision to seek medical advice?	The severity of symptoms	75	68.81
	Recommendation from friends or family	12	11.01
	Personal knowledge of	15	13.76
	tuberculosis		
	Waiting to see if symptoms disappear	7	6.42
9. Did you consult a healthcare professional as soon as symptoms appeared?	Yes	85	77.98
	No	24	22.02
11. What factors mainly contributed to the delay in diagnosis?	Waiting to see if the symptoms would disappear	15	13.76
	Difficulty accessing healthcare services due to lack of money	50	45.87
	Fears related to side effects	10	9.17
	I spent more time at small health centers	34	31.19
12. What factors mainly contributed to the delay in treatment?	Shortage of medication,	50	45.87
	Lack of transportation to get to the center	34	31.19
	Staff often arrive late, which tires me out	25	22.9

When tuberculosis symptoms began:

- The highest percentage (36.69%) of respondents indicated that they began experiencing symptoms more than two months before consulting a doctor. This suggests that a significant number of people wait before consulting a doctor, which could indicate a tendency to underestimate the severity of their symptoms or to hope for spontaneous improvement.

Factors influencing the decision to seek medical attention:

- The most influential factor in seeking medical attention (68.81%) is the severity of symptoms. This shows that the majority of people wait until they feel significantly unwell before seeking medical care, which could be linked to a delayed awareness of the seriousness of the situation.

Consulting a healthcare professional as soon as symptoms appear:

- 77.98% of respondents consulted a healthcare professional as soon as symptoms appeared, which shows a generally positive attitude towards seeking medical care quickly after the onset of symptoms. However, there remains a significant percentage (22.02%) of people who do not seek immediate consultation.

Factors contributing to delayed diagnosis (patient delay):

- The main factor contributing to delays in diagnosis is difficulty accessing healthcare services due to lack of money (45.87%), highlighting financial barriers as a major obstacle to accessing healthcare. This issue is crucial in the context of tuberculosis, as early diagnosis is essential to avoid serious complications.

Factors contributing to delays in treatment (provider delay):

Discontinuation of medication (45.87%) is the main cause of delays in treatment, which could lead to complications and the spread of the disease. The management of drug stocks and regularity in distribution appear to be key areas for improvement.

Overall: The data show that the majority of patients consult a health professional when symptoms become severe, but delays often occur due to financial factors and drug shortages. The greatest difficulties lie in access to care, particularly due to lack of financial resources, and delays in treatment due to drug stockouts.

Section 3: Model of Barriers to Healthcare

Question	Answer	Number of respondents (N=109)	Percentage
13. What barriers did you encounter when seeking care?	Cost of medical care	40	36.69
	Distance to travel to reach health services	30	27.5
	Availability of medical appointments	15	13.7
	Long waits in facilities	24	22.02
14. How would you rate the accessibility of health services in Kinshasa?	Very accessible	10	9.17
	Accessible	60	55.05
	Not very accessible	25	22.94
	Not at all accessible	14	12.84

Barriers encountered when seeking care: The main barrier encountered by respondents when seeking care is the cost of medical care, cited by 36.69% of respondents. This suggests that cost remains a major barrier to accessing care for a significant proportion of patients.

Accessibility of health services in Kinshasa: The majority of respondents (55.05%) consider that health services in Kinshasa are accessible. This shows that, despite certain obstacles, a significant proportion of patients consider health services to be relatively easy to access.

The most significant findings show that: The cost of medical care is a major barrier for a significant proportion of respondents, which can hinder access to necessary treatment. On the other hand, the majority of respondents consider that healthcare

services in Kinshasa are relatively accessible, although there are likely to be disparities depending on the resources available and the type of services sought.

Section 4: Model of Socio-Cultural Determinants of Health

Question	Answer	Number of respondents (N=109)	Percentage
15. Before your diagnosis, what were your beliefs about tuberculosis?	Cause of tuberculosis	20	18.35
	Means of transmission	50	45.87
	Effective processing	30	27.52
	Stigma associated with tuberculosis	9	8.26
16. How did your cultural beliefs influence your experience of tuberculosis diagnosis and treatment?	Beliefs affected my medical treatment	45	41.28
	Beliefs delayed consultation	35	32.11
	Encouraged to seek consultation quickly	29	26.61

The highest percentage indicates that the majority of respondents (nearly 46%) are aware of how tuberculosis is transmitted. This suggests that, overall, the population surveyed has an adequate understanding of how the disease is transmitted, which could potentially influence the decision to seek medical attention more quickly and take preventive measures. The highest percentage shows that cultural beliefs had a significant impact on respondents' medical treatment. This could mean that, in some cases, patients were influenced by their traditional beliefs, which could affect their adherence to the prescribed medical treatment or influence their decision to seek alternatives to conventional treatments.

The Table Below Summarizes the Results of the Logistic Regression:

Table 5

Independent variable	Coefficient (β)	Standard error	Odds ratio (Exp(β))	Confidence interval (95%)	p-value
Age (18-30 years)	0.42	0.28	1.52	[0.90, 2.56]	0.13
Age (31-45 years)	0.51	0.3	1.67	[0.92, 2.96]	0.09
Age (46-60 years)	0.23	0.34	1.25	[0.58, 2.68]	0.49
Gender (Male)	0.65	0.25	1.92	[1.16, 3.19]	0.01
Level of education (Secondary)	0.35	0.29	1.42	[0.84, 2.39]	0.21
Socioeconomic status (Medium)	0.52	0.31	1.68	[0.92, 2.87]	0.1
Cost of medical care (Barriers)	-0.98	0.42	0.38	[0.22, 0.68]	0.001
Distance to health services	-0.28	0.32	0.76	[0.43, 1.34]	0.38

Cultural beliefs (Quick consultation)	1.15	0.34	3.16	[1.76, 5.64]	0.0001

This table presents the results of a logistic regression, with the coefficients and associated values for each independent variable.

Age (18-30 years): Coefficient (β): 0.42, Odds Ratio: 1.52, p-value: 0.13 The odds ratio of 1.52 indicates that people aged 18 to 30 are approximately 1.5 times more likely to consult a healthcare professional immediately compared to the reference category (under 18), but this relationship is not statistically significant (p-value > 0.05), so we cannot say with certainty that being aged 18-30 has a strong influence on the decision to seek immediate medical attention.

Age (31-45): Coefficient (β): 0.51, Odds Ratio: 1.67, p-value: 0.09 The odds ratio of 1.67 suggests that people aged 31-45 are approximately 1.67 times more likely to seek immediate medical attention than people under the age of 18. Although the odds ratio is significant, the p-value (0.09) is slightly above the threshold of 0.05, which means that this association is not yet strong enough to be considered statistically significant.

Age (46-60): Coefficient (β): 0.23, Odds Ratio: 1.25, p-value: 0.49 The odds ratio of 1.25 means that people aged 46 to 60 are slightly more likely to seek immediate medical attention than people under 18, but this effect is small and not significant (p-value > 0.05). This suggests that age in this range does not have a major impact on the likelihood of seeking immediate medical attention.

Gender (Male): Coefficient (β): 0.65, Odds Ratio: 1.92, p-value: 0.01 Men are 1.92 times more likely than women to seek immediate medical attention. This result is statistically significant (p-value = 0.01), meaning that there is a significant difference between the sexes in terms of the decision to seek prompt medical attention.

Level of education (secondary): Coefficient (β): 0.35, Odds Ratio: 1.42, p-value: 0.21 People with a secondary education level are 1.42 times more likely to seek immediate medical attention than people with no formal education, but this effect is not statistically significant (pvalue > 0.05). Thus, secondary education level does not appear to have a direct impact on the decision to seek immediate medical attention.

Socioeconomic status (medium): Coefficient (β): 0.52, Odds Ratio: 1.68, p-value: 0.10 People with medium socioeconomic status are 1.68 times more likely to seek immediate medical attention than people with low socioeconomic status. However, the p--value of 0.10 indicates that this relationship is not statistically significant at the 0.05 threshold.

Cost of medical care (Barriers): Coefficient (β): -0.98, Odds Ratio: 0.38, p-value: 0.001 The cost of medical care is a major barrier to immediate consultation. People for whom the cost of care is a barrier are about 62% less likely to seek immediate consultation (odds ratio = 0.38), and this factor is highly significant (p-value = 0.001). This shows that one of the main reasons for delay in consultation is financial difficulty.

Distance to health services: Coefficient (β): -0.28, Odds Ratio: 0.76, p-value: 0.38 The odds ratio of 0.76 indicates that people who have to travel a greater distance to reach health services are slightly less likely (24% less) to seek immediate medical attention. However, this factor is not statistically significant (p-value > 0.05), suggesting that distance does not have a major impact on the likelihood of seeking prompt medical attention in this study.

Cultural beliefs (Prompt consultation): Coefficient (β): 1.15, Odds Ratio: 3.16, p-value: 0.0001 Cultural beliefs that encourage early consultation are a very important factor. People whose cultural beliefs encourage them to seek early consultation are approximately 3.16 times more likely to seek immediate consultation. This relationship is highly significant (p-value = 0.0001),

showing that cultural beliefs positively influence the decision to seek early consultation.

Summary of Results

Significant Factors

Gender (Male): Men are more likely to seek immediate care.

Cost of medical care: High healthcare costs reduce the likelihood of seeking immediate medical attention.

Cultural beliefs: Cultural beliefs that promote early consultation significantly increase the likelihood of seeking immediate medical attention.

Non-significant factors:

Age: No age group is significantly associated with seeking immediate medical attention. Education level: Secondary education is not significantly associated with seeking immediate medical attention.

Socioeconomic status: Average socioeconomic status has a positive but insignificant effect. Distance to health services: Although distance may influence consultation, this effect is not significant in this study.

The results suggest that being male, financial barriers, and cultural beliefs play a key role in the decision to seek immediate consultation with a healthcare professional. People with cultural beliefs that favor prompt consultation and men are more likely to seek prompt consultation. However, the cost of medical care remains a major barrier that delays consultation.

Patients' Perceptions and Experiences of Delays in the Diagnosis and Treatment of Tuberculosis in the City of Kinshasa

Table 6

Theme	Sub-theme	Verbatim	Saturation in a sample of 20 patients
1. Perception of delays in diagnosis and treatment	**Perception of health services**	Health services for tuberculosis in Kinshasa are often overburdened and sometimes ineffective	R1, R2, R3, R4, R5, R6, R7, R8
		Long queues and delays in obtaining results are common.	R1, R3, R4, R5, R7, R8, R9, R10
	Past interactions with health services	I quickly obtained the confirmed positive diagnosis result at the CSDT, but I had to wait several weeks to obtain tuberculosis treatment after initial tests due to a shortage of medication.	R2, R3, R5, R6, R7, R8, R9, R11
		Every day without treatment was critical because I felt I was doomed to die.	R1, R3, R4, R6, R8, R9, R10
	Assessment of delays in diagnosis and treatment	I experienced a two-month delay in getting a correct diagnosis at a TB treatment center because I was always going to a small clinic for my cough. The delays had a negative impact on my health and my ability to work.	R2, R4, R5, R7, R11

2. Personal beliefs about tuberculosis	**Beliefs about the severity of tuberculosis**	Tuberculosis is a serious disease in Kinshasa, but I believe that tuberculosis is a disease that can be cured with the medication received at the CSDT. However, before treatment, I had other concerns about my illness (I often thought that a member of my family was angry with me).	R1, R2, R4, R5, R6, R7, R8, R10
		Every day without treatment can make the situation worse. Tuberculosis is truly a deadly disease if you don't get treated as soon as possible.	High (R3, R5, R7, R8, R10, R11)
	Barriers to treatment	The benefits include recovery and a return to normal life.	R2, R3, R6, R9
		Barriers such as the cost of testing for the disease discourage people from seeking early treatment. The biggest barrier for me was the cost of care, but also the lack of money for transportation to get to the center often because I live far away. But also the long waiting times to obtain medication during shortages expose our family members to the risk of infection.	R4, R5, R6, R8, R10
3. Personal and family experiences	**Decisions when tuberculosis is suspected**	We tried local remedies at first, thinking it was just a simple cough.	R1, R3, R5, R6, R7, R8
		We finally decided to consult a local clinic, but there were no tests available for tuberculosis.	R2, R4, R6, R7, R8, R10
	Factors influencing when to seek care	Rapid weight loss and high fever. The worsening of symptoms and signs (cough , rib pain, lack of peace and rest) finally prompted me to request further tests.	R2, R5, R7, R10
		I wasted a lot of time in small health centers where they only treated minor coughs and were unable to make the correct diagnosis, which meant that I had to wait two months before finding out my real diagnosis.	R1, R3, R4, R6, R9
	Experience of delayed arrival at the health facility	I had to wait for hours to see a doctor despite my precarious condition.	R2, R4, R6, R8, R9, R10
		This gave me the impression that my health was not a priority.	R1, R3, R5, R7, R9, R11
	Delays in providing care	It took several days to start treatment because the necessary medications were not available.	R2, R3, R5, R7, R9, R10, R11
4. Conclusions and outlook	**Impact on daily life**	It has turned my life upside down. My husband left me, and even my friends abandoned me because of this disease. I am concerned about the quality of care I am receiving. My marriage was damaged, my husband left me, I am very isolated within my family because of the disease, and I have almost no friends left.	R1, R4, R5, R8, R9
		I fear that delays will compromise my recovery.	R2, R3, R7, R8

	Suggestions for improving care	More awareness is needed to encourage early screening and investment in infrastructure to reduce waiting times.	R2, R4, R6, R8, R10
		Ensuring a steady supply of medication is crucial.	R3, R5, R7, R9

Analysis of the results of this qualitative survey on patients' perceptions of tuberculosis diagnosis and treatment in Kinshasa reveals several recurring themes and key points that shed light on the reality of the care pathway for tuberculosis patients. Each theme addresses a specific dimension of the patient experience, whether it be perceptions of health services, personal beliefs about tuberculosis, personal and family experiences, or perspectives on improving care.

Perceptions of Delays in Diagnosis and Treatment

Patients express major dissatisfaction with the health services available for tuberculosis screening and treatment in Kinshasa. Delays in diagnosis and treatment are cited as critical issues affecting their health and well-being. Several patients report long waiting lines and significant delays in obtaining results, indicating that health services are often overburdened and that the efficiency of processes is hampered by poor organization.

Furthermore, drug shortages exacerbate the situation, causing critical periods where patients wait several weeks before receiving their treatment. This delay in care appears to have dramatic consequences, as the lack of treatment is perceived as a factor that can lead to death but also as an increased risk of spreading the disease. The perception of delays highlights a lack of responsiveness in the healthcare system when faced with urgent situations, which exacerbates patients' feelings of vulnerability. In addition, some patients report difficulties in obtaining a correct diagnosis, particularly in small health centers, where tuberculosis tests are not always available. This leads to delays of several months before the correct diagnosis is made.

Personal Beliefs about Tuberculosis

Patients' beliefs about tuberculosis influence their behavior and how they perceive the disease. Although the majority of patients recognize the seriousness of tuberculosis, they consider the disease to be curable thanks to the treatments received at TB treatment centers. However, before starting treatment, some patients expressed personal apprehensions, particularly due to cultural beliefs related to stigma, where they thought their illness was caused by a spell or a curse.

The waiting time for treatment is perceived as critical, as some patients believe that each day without treatment increases the severity of the disease, which can lead to premature death if care is not provided quickly. Patients also report economic barriers that hinder their access to care. These obstacles include the cost of tests and treatment, as well as a lack of means to travel regularly to the health center. These difficulties are particularly significant in the context of drug shortages, as they prolong treatment and increase the risk of transmission of the disease within the family.

Personal and Family Experiences

Patients express emotional and psychological difficulties related to their illness. Some responses reveal that local remedies were used before the official diagnosis, which delayed adequate treatment. This delay in seeking care is attributed to a lack of awareness about the symptoms of tuberculosis, which leads to a significant delay (around two months) before consulting a healthcare professional. The trigger for consulting a healthcare facility seems to be the worsening of symptoms, such as rapid weight loss, high fever, and rib pain.

Several patients also complain that they had to go to inadequate health centers that did not have the necessary infrastructure to make an accurate diagnosis, which further delayed treatment. Delays in the provision of care once a diagnosis has been made

are also common, particularly due to the unavailability of medication. Patients expressed a feeling of abandonment, especially when they had to wait several days to start treatment, which reinforced their frustration and their feeling of not being a priority in the healthcare system.

Outlook

The delays and challenges patients face have a significant impact on their daily lives. In addition to physical challenges, patients report significant social losses, such as family and social isolation due to the stigma associated with the disease. Marriage, family relationships, and friendships are affected by a tuberculosis diagnosis, with patients often struggling to cope with the social rejection they experience. Patients propose practical solutions to improve the healthcare system, such as increased awareness of tuberculosis and reduced waiting times through investment in healthcare infrastructure.

In addition, they emphasize the need to ensure a constant supply of drugs to avoid stockouts that delay the start of treatment and worsen the situation. This survey highlights several critical challenges that compromise the effectiveness of tuberculosis screening and treatment in Kinshasa. Delays in diagnosis, drug shortages, and economic and social barriers are the main obstacles encountered by patients in their care pathway. These factors must be taken into account to improve access to care and optimize tuberculosis management in the Congolese capital. Recommendations include raising awareness, improving health infrastructure, and reducing the costs associated with diagnosis and treatment.

Triangulation of Results

Triangulation of the results of the two studies provides a comprehensive picture of delays in tuberculosis diagnosis and treatment in Kinshasa: Triangulation of quantitative and qualitative results provides a better understanding of delays in tuberculosis diagnosis and treatment in Kinshasa. It reveals that these delays are influenced by financial, logistical, cultural, and social factors, and highlights the need for a multisectoral approach to improve the management of the disease. The recommendations from the two studies can guide public health policies to reduce delays and improve health outcomes.

Delays in Consultation and Diagnosis: Both studies converge to show that delays in consultation and diagnosis are influenced by financial barriers, limited access to health services, and social factors (stigma, isolation). The qualitative study adds an additional dimension by highlighting cultural beliefs and emotional difficulties that also delay seeking care. Financial and Logistical Barriers: Both studies identify the cost of care, stockouts, and transportation difficulties as major obstacles. Systemic challenges: Both studies emphasize the need to improve drug management, health infrastructure, and access to care. Both studies converge on similar solutions, including better stock management, reduced logistical barriers, and increased community awareness.

Barriers to Treatment: Both studies identify drug stockouts and logistical challenges (transportation, queues) as major barriers to treatment. The qualitative study enriches these findings by highlighting the emotional and social impact of these barriers on patients.

Patient Perceptions and Beliefs: Both studies show that patient perceptions play a key role in delays in seeking care. The quantitative study highlights the underestimation of symptoms, while the qualitative study expands on this idea by exploring cultural beliefs and social impacts (stigma, isolation). The qualitative study enriches the quantitative findings by exploring cultural beliefs, stigma, and emotional impacts that delay consultation.

Recommendations for Improving the Healthcare System: The two studies converge on similar recommendations, including: Improving drug supply and inventory management, reducing logistical barriers (transportation, queues), Raising community awareness to reduce stigma and encourage early consultation, investing in healthcare infrastructure to improve access to care.

Discussion

Triangulation of quantitative and qualitative data highlighted the multiple factors influencing delays in tuberculosis diagnosis and treatment in Kinshasa. These findings corroborate some previous studies while highlighting specific dimensions that enrich our understanding of the problem.

Delays in Diagnosis and Treatment: Quantitative data revealed that the average time to diagnosis is two months, mainly due to financial barriers, limited access to health services, and patients underestimating their symptoms. These findings are consistent with those of [23], which highlighted similar delays in sub-Saharan Africa due to economic and systemic constraints. The qualitative study complemented this analysis by identifying stigma and cultural beliefs as factors contributing to these delays, an aspect confirmed by the work of [4], which indicates that sociocultural perceptions of the disease strongly influence the use of healthcare.

Financial and Socioeconomic Barriers: The impact of healthcare costs on delays in seeking medical attention was statistically significant (OR = 0.38, p = 0.001), revealing that economic insecurity is a major barrier to accessing healthcare. These results are consistent with the conclusions of [24], which emphasize that the financial burden of tuberculosis, particularly due to indirect costs related to transportation and loss of income, is a major barrier to early treatment. The qualitative study refined this analysis by highlighting the emotional vulnerability of patients facing these economic difficulties, echoing the observations of [25] on the psychological impact of poverty on the care pathway of tuberculosis patients.

Influence of Cultural Beliefs and Stigmatization: Cultural beliefs significantly influence the speed of consultation (OR = 3.16, p = 0.0001). However, the qualitative study showed that certain misperceptions can delay seeking care. This finding is consistent with studies by Eastwood and Hill (2004), who identified social stigma and fear of discrimination as major factors delaying access to health services. Our results also echo those of Rocher (1994), who highlighted the role of beliefs in the adoption of self-treatment behaviors or the use of traditional medicine before consulting a doctor.

Distance between place of residence and health services: While the quantitative study found no significant correlation between distance and speed of consultation, qualitative data suggest that this factor remains an obstacle for some patients. These observations disagree with those of [26, 27], which identified distance as a determining factor in several similar contexts. It is possible that the density of health facilities in Kinshasa mitigates this effect, but that disparities exist between urban and peri-urban areas.

Recommendations for Improving Care: The recommendations from both approaches align with the need for better management of drug stocks, reduction of financial barriers, and increased awareness. These recommendations are consistent with those made in the World Health Organization report ", which advocates strengthening health systems to achieve the goal of eliminating tuberculosis by 2030. In addition, promoting telemedicine and decentralizing care could improve treatment, as suggested by studies from [28]. This discussion highlights the relevance of triangulating quantitative and qualitative approaches to understand the determinants of delays in tuberculosis diagnosis and treatment in Kinshasa. The integration of data allows for robust recommendations to be made to improve access to care and reduce health inequalities. Future research could further these analyses by exploring the impacts of targeted interventions on reducing delays and improving the quality of life of tuberculosis patients.

Conclusion

This study, combining quantitative and qualitative approaches, provided an in-depth exploration of the factors associated with

delays in tuberculosis diagnosis and treatment in Kinshasa, Democratic Republic of Congo (DRC). The results highlight a complex combination of financial, logistical, cultural, and social barriers that hinder access to care and delay patient management. Data triangulation enriched our understanding of the phenomenon by revealing both generalizable trends (through the quantitative study) and contextual and emotional dimensions (through the qualitative study).

Key Findings

Delays in Diagnosis and Treatment: Average diagnostic delays reach two months, mainly due to financial barriers, limited access to health services, and patients' underestimation of symptoms. These delays are exacerbated by drug shortages and transportation difficulties.

Financial and Socioeconomic Barriers: The cost of care is a major barrier to prompt consultation, as confirmed by both approaches. Patients living in precarious economic conditions are particularly vulnerable, which delays their access to care and worsens their health status.

Influence of Cultural Beliefs and Stigma: Cultural beliefs significantly influence healthcare-seeking behavior. While some beliefs encourage prompt consultation, others, such as stigma and misperceptions about tuberculosis (e.g., the disease being seen as a curse), delay treatment.

Distance to Health Services: Although the quantitative study found no significant link between distance and delays, the qualitative study revealed that transportation difficulties and long distances remain a barrier for some patients, particularly in outlying areas.

The results of this study highlight the need for a multisectoral approach to reduce delays in TB diagnosis and treatment in Kinshasa. The following recommendations emerge from both approaches:

Improve Access to Care: Reduce financial barriers by subsidizing the costs of care and offering free or low-cost services; Decentralize health services to reach peripheral areas and improve geographic access.

Strengthen the Health System: Manage drug stocks to avoid shortages; Train health personnel to speed up diagnosis and treatment; Invest in modern and accessible health infrastructure.

Raise Community Awareness: Launch awareness campaigns to combat stigma and promote early consultation; Educate populations about the symptoms of tuberculosis and the importance of early screening.

This study paves the way for future research aimed at:

- Assess the impact of proposed interventions (patient involvement in awareness campaigns) on reducing delays in diagnosis and treatment.
- Explore local dynamics in other regions of the DRC to identify specific barriers and adapt tuberculosis control strategies.
- Study the psychosocial impacts of tuberculosis on patients and their families in order to propose holistic interventions.

This study highlights the complex challenges faced by tuberculosis patients in Kinshasa and proposes concrete solutions to improve their care. By combining quantitative and qualitative approaches, it provides an in-depth understanding of the factors in-

fluencing delays in diagnosis and treatment, while highlighting the importance of an integrated approach to achieving the goals of eliminating tuberculosis by 2030 and 2050. Implementing the recommendations from this study could help reduce the burden of tuberculosis in Kinshasa and improve the quality of life for patients and their communities.

Conflicts of Interest

This study does not present any potential conflicts of interest worthy of special attention.

Statement on the Use of Artificial Intelligence

The authors declare that they used Gemini writing assistance during the drafting phase of this manuscript to improve the clarity and linguistic flow of the text. The tool was used exclusively for grammatical correction and the rephrasing of certain passages. All intellectual content, data analysis, and conclusions of the study were conceived and verified by the authors, who assume full responsibility for the originality and accuracy of the final document."

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