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Epidemiological profile of extrapulmonary tuberculosis in the Centre-Est region of Burkina Faso, 2021–2023

Saïdou-Mady Bagaya[1], Issaka Bebane[2], Morou Nikiema[1], Kouka Joseph Ouedraogo[1], Djibril Boro[1], Kobena Naon[1], Dahourou Sou[1], Issa Guire[1], Franck Palamanga Obulbiga[3], Denis Yelbeogo[4]

[1]Regional Health Directorate, Centre-Est Region, Ministry of Health, Burkina Faso
[2]Regional Hospital Centre of Tenkodogo, Centre-Est Region, Ministry of Health, Burkina Faso
[3]Health Emergency Operations Centre, Ministry of Health, Burkina Faso
[4]Field Epidemiology Training Program (FETP) Coordination, Frontline and Intermediate, Burkina Faso

Corresponding author: Saïdou-Mady Bagaya, Regional Health Directorate, Centre-Est Region, Ministry of Health, Burkina Faso, bagayasm@yahoo.fr | ORCID: 0009-0003-2507-5244

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Abstract

Introduction: Extrapulmonary tuberculosis (EPTB) accounts for a variable proportion of tuberculosis cases in Africa and remains difficult to diagnose due to its often atypical clinical presentation. In Burkina Faso, epidemiological information on EPTB is limited, particularly in the Centre-Est region, which faces a fragile security context disrupting access to care. We described the epidemiological profile of EPTB cases reported between 2021 and 2023.

Methods: We conducted a descriptive cross-sectional study covering the period from January 1, 2021, to December 31, 2023. All bacteriologically confirmed or clinically/radiologically diagnosed cases of EPTB were included. Sociodemographic, clinical, diagnostic, and treatment outcome data were collected using a KoboToolbox electronic form and analyzed with STATA 15.1.

Results: Among 1,581 tuberculosis cases notified during the study period, 191(12%) were extrapulmonary forms. The median age was 35 years (IQR: 19–54), and males accounted for 68.6% (131/191) of cases, with a male-to-female sex ratio of 2.18. The most affected occupational groups were unemployed individuals, 36.7% (70/191) and farmers, 27.2% (52/191). The most frequent anatomical sites were osteoarticular 53.9% (103/191), pleural 26.7% (51/191), and abdominal 7.3% (14/191). Bacteriological confirmation was achieved in 5.8% (11/191) of cases. Treatment outcomes showed 82.2% (157/191) success, 6.8% (13/191) default, and 11.0% (21/191) mortality.

Conclusions: EPTB remains likely underdiagnosed in the Centre-Est region of Burkina Faso. The predominance of osteoarticular forms, together with a default rate above the national target and a high mortality rate in a context of insecurity, highlights the need to strengthen diagnostic capacities and adapt community follow-up strategies to improve patient management.

Keywords: Burkina Faso; Epidemiology; Health Services Accessibility; Treatment Outcome; Extrapulmonary Tuberculosis

Citation

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Introduction

Tuberculosis is an infectious disease caused by the Mycobacterium tuberculosis complex and is primarily transmitted through airborne droplets. Although it predominantly affects the lungs, it can also involve other organs, resulting in extrapulmonary manifestations [1].

Extrapulmonary tuberculosis (EPTB) is usually paucibacillary, which complicates bacteriological confirmation. Its atypical and nonspecific clinical presentation often hinders timely diagnosis and management. Among people living with HIV, EPTB may represent more than half of all tuberculosis cases [2].

In 2023, the World Health Organization (WHO) estimated that 10.8 million people developed tuberculosis worldwide, leading to approximately 1.25 million deaths [1]. Extrapulmonary forms are thought to represent 15–20% of notified cases [3]. In Africa, a 2024 meta-analysis reported an overall prevalence of 26%, with regional variation from 16% in West Africa to 32% in East Africa [4].

In Burkina Faso, the overall tuberculosis incidence was estimated at 44 cases per 100,000 population in 2023 [5]. However, national reports focus mainly on pulmonary disease, providing little information on EPTB [5,6]. In the Centre-Est region, published data remain scarce, although diagnosis and treatment centres (DTCs) regularly encounter such cases [7].

In some areas of the region, insecurity has led to the partial or complete closure of health facilities and significant population displacement [8,9]. This study described the epidemiological, clinical, and treatment characteristics of EPTB cases reported between 2021 and 2023 in the DTCs of the Centre-Est region, in order to strengthen strategies for patient management and prevention.

Methods

Study setting

The Centre-Est region of Burkina Faso borders Togo and Ghana, covers an area of 15,288 km², and had an estimated population of 1.75 million in 2023 [10]. It comprises three provinces and 30 communes. The economy is largely based on agriculture, with artisanal gold mining widely practised [11]. Health services include a regional hospital center, several district-level medical centers with surgical units, and a network of primary health facilities (Centres de Santé et de Promotion Sociale, CSPS). Tuberculosis care is organized around nine diagnosis and treatment centers (DTCs) distributed across the seven health districts. These facilities ensure case detection, diagnostic confirmation, and treatment follow-up, while CSPS support specimen collection and community-based patient monitoring [12].

Study design and period

We conducted a descriptive cross-sectional study covering the period from January 1, 2021, to December 31, 2023.

Study population

The study included all patients recorded as new or relapse tuberculosis cases in the nine diagnosis and treatment centers (DTCs) of the Centre-Est region during the study period. Eligible participants were patients diagnosed with extrapulmonary tuberculosis, either bacteriologically confirmed (by microscopy, Xpert MTB/RIF, or culture) or clinically and/or radiologically diagnosed. Extrapulmonary tuberculosis cases with missing or insufficient data that did not allow confirmation of the anatomical site, diagnostic method, or treatment outcome were excluded.

Sampling strategy

An exhaustive sampling approach was applied, including all cases that met the inclusion criteria.

Data sources and collection

Data were extracted from standardized tuberculosis registers maintained in DTCs and entered into an electronic form designed on the KoboToolbox platform.

Study variables

Variables analyzed included sociodemographic characteristics (age, sex, occupation, and residence), clinical and diagnostic features (site of extrapulmonary involvement, diagnostic method), and the proportion of EPTB among all notified tuberculosis cases.

Data analysis

Data were analyzed using STATA version 15.1. Results are presented as frequencies, proportions, and ratios, with distributions by age, sex, site of involvement, and treatment outcomes (overall and site-specific).

Operational definitions

Treatment outcomes were defined according to the Burkina Faso National Tuberculosis Control Program guidelines.
Cured referred to patients with bacteriologically confirmed tuberculosis at treatment initiation who had negative bacteriological results (smear or culture) during the last month of treatment and on at least one previous occasion.
Treatment completed referred to patients who completed their full course of anti-tuberculosis treatment without evidence of treatment failure, including patients with clinically diagnosed extrapulmonary tuberculosis for whom bacteriological confirmation or end-of-treatment results were not available.
Treatment success corresponded to the sum of patients classified as cured and those who completed treatment.
Default (lost to follow-up) referred to patients who

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Table 1. Distribution of extrapulmonary tuberculosis cases by sociodemographic characteristics, Centre-Est region, Burkina Faso (2021–2023)

Characteristics	Frequency (n=191)	Percent (%)
Age (years)		
<15	27	14.1
15–24	39	20.4
25–34	28	14.7
35–44	30	15.7
≥45	67	35.1
Sex		
Male	131	68.6
Female	60	31.4
Occupation		
Unemployed	70	36.7
Farmer	52	27.2
Gold miner	32	16.8
Trader	19	10.0
Student	12	6.3
Salaried worker	6	3.1
Health district		
Tenkodogo	66	34.6
Garango	37	19.4
Koupéla	36	18.9
Pouytenga	26	13.6
Zabré	18	9.4
Bittou	5	2.6
Ouargaye	3	1.6

interrupted anti-tuberculosis treatment for at least two consecutive months after treatment initiation.
Death was defined as any death occurring during the course of anti-tuberculosis treatment or before treatment initiation, regardless of the cause.

Ethical consideration

Authorization to use tuberculosis surveillance data was obtained from the Regional Health Directorate of the Centre-Est region and the National Tuberculosis Control Program. This study used routine programmatic data and did not involve direct contact with patients. All data were anonymized prior to analysis by removing personal identifiers. Access to the database was restricted to the study investigators. Data were stored in password-protected electronic files to ensure confidentiality and data security. Data consistency and completeness checks were performed during data entry and analysis to ensure data integrity.

Results

From 2021 to 2023, a total of 1,581 tuberculosis cases (new and relapse) were reported in the Centre-Est region. Of these, 12% (191/1,581) were extrapulmonary. The 191 patients had a median age of 35 years (IQR: 19–54). Adults aged 45 years and older accounted for 67 cases (35.1%). Males accounted for 131 cases (68.6%), with a male-to-female sex ratio of 2.18. Regarding occupation, 70 patients (36.7%) were unemployed and 52 (27.2%) were farmers. The districts of Tenkodogo and Garango reported 66 (34.6%) and 37 (19.4%) cases, respectively, whereas Ouargaye and Bittou reported 3 (1.6%) and 5 (2.6%) cases (Table 1).

Most cases (94.2%; 180/191) were clinically diagnosed, while 11 cases (5.8%) were bacteriologically confirmed, using Xpert MTB/RIF or culture. HIV status was documented for 180 patients, among whom 11 (6.1%) tested positive. Osteoarticular tuberculosis accounted for 103 cases (53.9%), including 99 cases with vertebral involvement (Pott's disease). Pleural tuberculosis accounted for 51 cases (26.7%) (Table 2).

Treatment outcomes differed according to anatomical site. Among abdominal forms, 4 of 14 patients died (28.6%). Among pleural forms, treatment success was recorded in 47 of 51 patients (92.2%). For osteoarticular forms, default was recorded in 10 of 103 patients (9.7%) and death in 9 patients (8.7%). Among lymph-node forms, 2 of 12 patients died (16.7%), while among other extrapulmonary sites, 2 of 11 patients died (18.2%) (Table 3).

Discussion

The proportion of extrapulmonary tuberculosis observed in our setting was lower than that reported in hospital-based studies from Burkina Faso and other African countries [13–16]. Rather than indicating a truly lower burden of disease, this finding likely reflects underdiagnosis, related to the paucibacillary nature of extrapulmonary forms, their often non-specific clinical presentation, and limited access to confirmatory diagnostic tests.

In practice, the diagnosis of extrapulmonary tuberculosis frequently relies on invasive procedures such as pleural puncture or biopsy, followed by specialized investigations including histopathology, culture, or Xpert MTB/RIF [17,18]. These diagnostic approaches require adequate laboratory infrastructure and trained personnel, which are rarely available in peripheral health facilities in our context. Security constraints further restrict access to care and exacerbate these diagnostic challenges. The very low level of bacteriological confirmation observed in this study highlights important operational constraints within the health system of the Centre-Est region. Limited availability of diagnostic tools such as Xpert MTB/RIF, culture, or histopathology at peripheral health facilities represents a major constraint. Disruptions in sample transport and referral pathways related to insecurity likely explain the predominance of clinically diagnosed cases.

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Table 2. Distribution of extrapulmonary tuberculosis cases by anatomical site, Centre-Est region, Burkina Faso (2021–2023)

Anatomical site	Cases (n=191)	Percentage (%)
Osteoarticular	103	53.9
Pleural	51	26.7
Abdominal (peritoneal, intestinal)	14	7.3
Lymph nod	12	6.3
Other (meningeal, pericardial, mammary)	11	5.8

The geographical distribution of extrapulmonary tuberculosis cases showed a clear predominance in health districts hosting or located near referral facilities. Higher case detection in Tenkodogo may be explained by the presence of the regional hospital, which is equipped with specialist staff and diagnostic tools. Similarly, proximity to this facility may facilitate patient referral and access to confirmatory investigations in neighboring districts such as Garango. In contrast, districts such as Ouargaye and Bittou, which are more affected by insecurity and have limited access to specialized diagnostic services, reported fewer cases. This pattern likely reflects barriers to healthcare access rather than a lower occurrence of disease. These geographic disparities call for strengthening peripheral diagnostic capacity, including decentralization of imaging and access to Xpert MTB/RIF testing, as well as improvement of referral and sample transport systems. In addition, implementation of adapted community-based follow-up strategies in districts most affected by insecurity is needed to reduce inequalities in access to diagnosis and care for extrapulmonary tuberculosis.

The marked male predominance observed in our study (68.6% of cases) is consistent with findings reported in other settings in Africa and Asia [19–21]. This pattern may be explained by occupational exposure in artisanal gold mining and agriculture. It may also be related to risk behaviours more common among men, such as tobacco smoking and heavy alcohol consumption, which are known to increase susceptibility to tuberculosis, including extrapulmonary forms [23]. In contrast, lower case detection among women may reflect barriers to healthcare access rather than reduced exposure. Insecurity-related constraints on women's mobility, together with persistent socioeconomic inequalities, may limit their timely access to health services, particularly for extrapulmonary forms requiring specialized diagnostic investigations [8,11]. This situation suggests a probable under-detection of extrapulmonary tuberculosis among women and underscores the need to strengthen community-based screening and improve access to care for women in the most affected districts.

The age distribution observed in this study is consistent with known epidemiological patterns of tuberculosis. The predominance of adults aged 45 years and older may be explained by cumulative lifetime exposure to Mycobacterium tuberculosis, a higher prevalence of comorbidities, and age-related immune decline, which may predispose to extrapulmonary disease. At the same time, the substantial proportion of young adults aged 15–24 years affected (20.4%) may reflect increased exposure related to mobility and occupational activities. In the Centre-Est region, many individuals in this age group are engaged in artisanal gold mining, an environment often characterized by overcrowding, poor ventilation, silica dust exposure, and precarious living conditions, all of which increase the risk of tuberculosis infection.

Socioeconomic vulnerability also appears to play an important role in the occurrence of extrapulmonary tuberculosis. The predominance of unemployed individuals (51.3%), farmers (26.7%), and gold miners (16.7%) highlights the contribution of poverty, overcrowding, and high-risk work environments. These findings are consistent with reports from other African settings [22,23] and emphasize the importance of preventive strategies targeting vulnerable populations and high-risk occupational settings.

From a clinical perspective, osteoarticular tuberculosis was the predominant extrapulmonary form in our setting (53.9% of cases), contrasting with findings from several African studies in which pleural and lymph node involvement are more frequent [14,24]. This pattern may reflect contextual diagnostic factors rather than true epidemiological differences. The availability of radiography and Xpert MTB/RIF in district hospitals facilitates the detection of spinal and osteoarticular forms, which often present at a more advanced clinical stage and with more pronounced symptoms. In contrast, pleural and lymph node forms, which are frequently less symptomatic or require invasive diagnostic procedures, may be underdiagnosed in peripheral health facilities.

Regarding treatment outcomes, the overall treatment success rate observed in this study (82.2%) remained below the target set by the Burkina Faso National Tuberculosis Control Program (≥85%). Although comparable to results reported in some Central African settings, it was lower than those observed in Ethiopia [24,25]. Overall mortality was 11.0%, with particularly high rates among patients with abdominal (28.6%), lymph node (16.7%), and other severe extrapulmonary forms.

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Table 3. Distribution of extrapulmonary tuberculosis cases by anatomical site and treatment outcome, Centre-Est region, Burkina Faso, 2021–2023 (n = 191)

Anatomical site	Cases n (%)	Treatment Success n (%)	Default n (%)	Death n(%)
Lymph node	12 (6.3)	10 (83.3)	0	2 (16.7)
Pleural	51 (26.7)	47 (92.2)	1 (2.0)	3 (5.9)
Osteoarticular	103 (53.9)	84 (81.6)	10 (9.7)	9 (8.7)
Abdominal[1]	14 (7.3)	9 (64.3)	1 (7.1)	4 (28.6)
Other[2]	11 (5.8)	8 (72.7)	1 (9.1)	2 (18.2)
Total	191 (100)	157 (82.2)	13 (6.8)	21 (11.0)

[1]Abdominal :peritoneal, intestinal, [2]Other: meningeal, pericardial, mammary

Several factors may explain these findings. Insecurity affecting parts of the region likely limits timely access to healthcare, delays diagnosis, and disrupts continuity of treatment. In addition, the predominance of clinically diagnosed cases without bacteriological confirmation may reflect management at a more advanced clinical stage of disease. Finally, the high proportion of severe forms, particularly abdominal and osteoarticular tuberculosis, as well as the possible presence of comorbidities such as HIV infection, may have contributed to the elevated mortality observed. These findings underscore the need to strengthen early case detection, improve access to confirmatory diagnostic tools, and adapt patient follow-up and management strategies for extrapulmonary tuberculosis, particularly in settings affected by insecurity.

Study limitations

The main limitation of this study was the low rate of bacteriological confirmation for extrapulmonary tuberculosis. Most diagnoses were established on clinical grounds, with only about 6% confirmed by laboratory tests. This may have led to misclassification of disease sites and potential over- or under-diagnosis depending on the availability of Xpert MTB/RIF, culture, or histopathology. Despite this limitation, our findings provide valuable insight into the burden of EPTB in the Centre-Est region and inform strategies to strengthen case detection and management.

Conclusions

Our findings indicate that extrapulmonary tuberculosis is likely underdiagnosed in the Centre-Est region of Burkina Faso, accounting for only 12% of reported TB cases. Osteoarticular disease, particularly Pott's disease, predominated. The overall treatment success rate (82.2%) fell short of the WHO target, with substantial rates of treatment default and mortality, especially in districts affected by insecurity.

These results underscore the need to strengthen diagnostic capacity in peripheral facilities, expand access to specialized investigations, and reinforce community-based follow-up strategies. Targeted efforts are required for economically vulnerable populations and health districts in fragile security contexts to reduce loss to follow-up and improve treatment outcomes for EPTB.

What is Already Known About this Topic

- Extrapulmonary tuberculosis (EPTB) accounts for 15–20% of global tuberculosis cases.
- In Africa, it is more frequent, with an estimated prevalence of around 26%.
- Diagnosis is often difficult due to atypical clinical signs and limited access to specialized tests.
- In Burkina Faso, available data are scarce and mainly concern pulmonary forms.

What This Study Adds

- Provides the first detailed description of the epidemiological profile of EPTB in the Centre-Est region of Burkina Faso.
- Reveals an unusual predominance of osteoarticular forms, in contrast to patterns observed in other African settings.
- Identifies a treatment success rate below the WHO target, with high proportions of death and treatment default.
- Highlights the impact of insecurity and socioeconomic vulnerability on continuity of care and treatment outcomes.

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Authors' Contributions

Bagaya Saïdou-Mady: study conception, supervision, data analysis, and manuscript drafting. Issaka Bebane, Issa Guire, Kouka Joseph Ouedraogo Djibril Boro: data

collection, validation, and organization. Morou Nikiema, Kobena Naon, Dahourou Sou, Djibril Boro: contribution to data analysis and interpretation of results. Franck Palamanga Obulbiga, Denis Yelbeogo: critical revision of the manuscript and substantial improvements.

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Conflict of Interest Statement

The authors declare no competing interests.

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