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Traditional Health Practitioners: Catalyzing a Breakthrough in TB Case Detection in Northeastern Nigeria

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ABSTRACT: Background: Tuberculosis (TB) control in conflict-affected regions with limited healthcare infrastructure remains a significant public health challenge. This study evaluated the effectiveness of engaging Traditional Health Practitioners (THPs) as community-based actors to enhance TB case detection and linkage to care.

Methods: In a 24-month community-based intervention across two states, 60 trained THPs were deployed to screen individuals for TB symptoms, facilitate referrals for diagnosis, and support linkage to care. Diagnostic confirmation was performed using GeneXpert testing, and outcomes in intervention Local Government Areas (LGAs) were compared with those in control LGAs receiving standard care.

Keywords: *Traditional Health Providers, tuberculosis case detection, North-eastern Nigeria, community engagement, GeneXpert, task shifting.*

1. Introduction

Tuberculosis (TB) remains a persistent global health emergency, with an estimated 10.6 million new cases and 1.3 million deaths reported in 2022 alone. Nigeria bears a disproportionate burden, consistently ranking among the world's top six high-burden countries for TB, TB/HIV co-infection, and drug-resistant TB (World Health Organization [WHO], 2023). Despite concerted efforts, the country's TB case detection rate (CDR) for bacteriologically confirmed pulmonary TB stagnates around 46%, far below the global target of 90% (NTBLCP, 2022; WHO, 2023).

This detection gap is starkly magnified in North-eastern Nigeria, a region grappling with protracted insurgency, massive internal displacement, and severely fragmented health **systems** (Abdulkadir et al., 2022; Oga et al., 2020). Security constraints limit access to formal healthcare facilities, disrupt supply chains, and hinder outreach programs (Oga et al., 2020). Consequently, TB Case Detection rate (CDRs) in this region are critically low, estimated at less than 50% (NTBLCP, 2022), creating fertile ground for ongoing transmission and hindering progress towards national and global TB elimination targets. Reaching missed cases in such challenging, often security-compromised settings demands innovative, community-centric approaches that bypass traditional facility-based models (Dos Santos et al., 2021; Uyei et al., 2020).

Traditional Health Providers (THPs)—encompassing herbalists, spiritual healers, bone setters, and traditional birth attendants—represent a critical, yet underutilized, component of the health landscape in this context. THPs serve as the *de facto* first point of contact for illness for more than 70% of rural and peri-urban populations across Northern Nigeria, enjoying deep-rooted cultural trust and accessibility, especially where formal health services are scarce or distrusted (Abdulraheem et al., 2020; Kayode et al., 2021). Their pervasive presence within communities, including hard-to-reach and conflict-affected areas, positions them uniquely to identify individuals with TB symptoms early (Briggs et al., 2021). However, despite their potential, THPs have historically been marginalized within formal TB control programs (Dos Santos et al., 2021; Kayode et al., 2021). Barriers include mutual scepticism between allopathic and traditional systems, lack of structured referral

pathways, insufficient training on TB for THPs, and the absence of supportive policy frameworks (Dos Santos et al., 2021; WHO, 2018). This exclusion represents a significant missed opportunity for early case finding and linkage to care, particularly in regions like the North-east where conventional strategies falter.

While evidence exists supporting community health worker (CHW) involvement in TB case-finding (Uyei et al., 2020), rigorous evaluations of structured programs integrating THPs specifically into TB detection networks within active conflict or post-conflict settings in Africa are notably scarce (Oga et al., 2020). Most existing studies focus on CHWs or facility-based approaches, failing to leverage the unique social capital and access of established traditional systems (Briggs et al., 2021; Dos Santos et al., 2021). Furthermore, there is limited documentation on the operational feasibility and quantitative impact of integrating THPs with modern diagnostics like GeneXpert and ensuring effective linkage to DOTS within such complex environments.

This study, therefore, aimed to evaluate the impact and feasibility of a novel, structured program designed to integrate Traditional Health Providers into the TB case detection and referral network in Adamawa and Yobe states, North-eastern Nigeria. By addressing this critical evidence gap, the research seeks to inform strategies for closing the persistent TB detection gap in Nigeria's most vulnerable regions and similar conflict-affected settings globally.

2. Methods

2.1. Study Setting and Group Allocation:

The quasi-experimental study was implemented within four purposively selected Local Government Areas (LGAs) across Adamawa and Yobe States in North-East Nigeria. The intervention LGAs were Gombi and Mubi South in Adamawa State, and Damaturu (the state capital) and Geidam in Yobe State. To rigorously evaluate the intervention's impact, two control LGAs were carefully selected: Song in Adamawa State and Fika in Yobe State. These control LGAs were matched as closely as possible to their intervention counterparts based on three critical dimensions: (1) Demographics, including population size, density, age distribution,

and major ethnic/socio-cultural groups; (2) TB Epidemiology, specifically pre-intervention TB notification rates, estimated TB prevalence, and case detection ratios; and (3) Health System Structure, ensuring a similar number and level of primary and secondary health facilities. This matching strategy aimed to enhance the validity of comparisons between the intervention and control groups.

2.2. Intervention: Integrating Traditional Health Practitioners (THPs) into TB Case Finding

A structured four-pillar intervention was implemented in Adamawa and Yobe States, Nigeria (January 2021–December 2022) to leverage THPs' community trust for improved TB detection.

Pillar 1: Mapping & Community Engagement involved systematically identifying 170 THPs through community leaders and health registries, with GIS geotagging of their practices to visualize distribution relative to health facilities. Structured community dialogues co-facilitated by leaders and NTBLCP staff addressed TB stigma, promoted awareness, explained THPs' new roles, and identified care-seeking barriers.

Pillar 2: THP Training & Equipping engaged 60 selected THPs (30 per state, 15 per LGA) in a standardized 5-day WHO-adapted workshop covering TB pathogenesis, symptom recognition (persistent cough >2 weeks, fever, weight loss), safe sputum collection (spot-morning-spot technique), infection control, referral procedures, and ethics. Participants received starter kits with sputum containers, carbon-copy referral slips, IPC supplies (sanitizer, masks), and educational job aids.

Pillar 3: Active Case Finding (ACF) & Referral integrated TB symptom screening into every routine THP consultation. Presumptive TB cases identified during consultations underwent immediate sputum collection, with samples transported via dedicated motorcycle couriers or patients to 12 designated GeneXpert sites using standardized referral documentation.

Pillar 4: Diagnostic Follow-up & Linkage ensured GeneXpert results were recorded and returned to THPs within 72 hours via carbon-copy feedback. Confirmed cases received active tracing and support (counseling, transport) for DOTS initiation, while

GeneXpert-negative patients with persistent symptoms underwent further assessment. Contact tracing for confirmed cases followed WHO guidelines.

Study Design & Setting

A quasi-experimental pre-post study with matched controls was conducted across four LGAs: intervention sites (Gombi/Mubi South in Adamawa; Damaturu/Geidam in Yobe) and control LGAs (Song in Adamawa; Fika in Yobe), matched for demographics, TB burden, and health infrastructure.

Data Collection, Management & Analysis

Data Sources included programmatic records (THP screening registers, referral slips, laboratory/GeneXpert registers, TB treatment registers) and aggregated quarterly TB notification rates from the NTBLCP's DHIS2 database for intervention and control LGAs.

Data Management involved monthly collation, cleaning, and verification of program data, with triangulation against DHIS2 entries to ensure accuracy. Key output indicators (presumptives screened, samples tested, positives identified/linked) were calculated monthly.

Data Analysis used Poisson regression models to estimate Rate Ratios (RR) with 95% CIs for the primary outcome (quarterly TB notification rate/100,000 population). Primary comparisons included: 1) Pre-intervention (Q1-Q4 2020) vs. intervention (Q1 2021–Q4 2022) periods in intervention LGAs; 2) Intervention vs. control LGAs across the entire study period (2020–2022), adjusting for temporal trends. Secondary analyses assessed program yield (positivity rate, linkage-to-care) and THP-sourced notifications.

Ethical Considerations

Approval was obtained from Adamawa and Yobe State Research Ethics Committees. The intervention was delivered as an NTBLCP program with community engagement. Analysis used aggregated, anonymized surveillance data; informed

consent was obtained from participating THPs, and patient confidentiality was maintained throughout care delivery per national guidelines.

3. Results

3.1 Program Outputs and Diagnostic Yield

During the 24-month intervention period (January 2021–December 2022), integrating Traditional Health Practitioners (THPs) into TB detection efforts achieved the following outcomes:

- **Coverage**: All 60 THPs (30 per state) screened 26,637 individuals, averaging approximately 1,110 screenings per month.
- **Presumptive TB Identification**: THPs identified 4,423 presumptive TB cases, representing 16.6% (rounded to 17%) of those screened.
- **Referral and Testing**: Of these, 4,224 cases (95.5%) were referred for diagnostics. Of the referred cases, 4,101 (97.1%) underwent GeneXpert testing, indicating strong compliance with referral pathways. The remaining 2.9% (123 cases) were not tested due to transportation challenges or patient non-compliance.

Table 1: Summary of Intervention Outputs (Jan 2021–Dec 2022)

Indicator	**Value**	**Notes**
THPs trained and equipped	60 (30 per state)	
Individuals screened	26,637	Averaging 1,110/month
Presumptive TB cases identified	4,423	~16.6% of screened individuals
Referred for diagnostics	4,224	95.5% of presumptive cases
Received GeneXpert testing	4,101	97.1% of referred cases
Referred but not tested	123	2.9%, due to transport/patient issues

The intervention demonstrated the THPs' effectiveness in reaching over 26,600 individuals, highlighting their role as accessible frontline health actors. The 97.1% testing completion rate underscores a well-functioning referral system, while the

16.6% presumptive TB detection rate reflects the THPs' competence in symptom screening within high-burden areas.

Operational Gaps Identified:

- **Non-referrals**: Approximately 4.5% of symptomatic individuals (199 persons) were not referred, potentially due to patient refusal or workflow challenges.
- **Testing Gaps**: 2.9% of referred cases (123 individuals) did not undergo testing due to logistical barriers such as transportation difficulties or patient drop-out.

Table 2: Summary of Intervention Outputs by Gender (Jan 2021–Dec 2022)

Indicator	**Total**	**Male (%)**	**Female (%)**	**Notes**
THPs trained and equipped	60	—	—	Gender-neutral indicator
Individuals screened	26,637	12,487 (46.9%)	14,150 (53.1%)	Slightly higher female participation
Presumptive TB cases identified	4,423	2,145 (48.5%)	2,278 (51.5%)	Gender parity in identification rates
Referred for diagnostics	4,224	2,045 (48.4%)	2,179 (51.6%)	Referral rate aligned with screening
Received GeneXpert testing	4,101	1,986 (48.4%)	2,115 (51.6%)	Testing compliance consistent across genders
Referred but not tested	123	59 (48.0%)	64 (52.0%)	Logistical barriers affected both genders equally

This breakdown shows slight female predominance in screening and diagnostic pathways, potentially reflecting higher health-seeking behavior among women in the intervention areas.

The intervention demonstrated the THPs' effectiveness in reaching a balanced gender distribution while screening over 26,600 individuals. The 97.1% testing completion rate

underscores a well-functioning referral system, and the detection rate of 16.6% reflects the THPs' competence in symptom screening.

Table 3: Diagnostic Yield by Intervention LGAs (Adamawa and Yobe States)

State	LGA	Individuals Screened	Presumptive TB Cases Identified	Yield (%)	Cases Referred for Testing	Yield (%)	GeneXpert-Confirmed Cases	Diagnostic Yield (%)
Adamawa	Gombi	6,400	950	14.8%	920	96.8%	310	4.8%
Adamawa	Mubi South	6,750	1,100	16.3%	1,070	97.3%	450	6.7%
Yobe	Damaturu	6,987	1,200	17.2%	1,160	96.7%	400	5.7%
Yobe	Geidam	6,500	1,173	18.0%	1,074	91.6%	450	6.9%
Total	—	**26,637**	**4,423**	**16.6%**	**4,224**	**95.5%**	**1,610**	**6.0%**

The table highlights the significant achievements of the TB intervention across four LGAs in Adamawa and Yobe States, showcasing the effectiveness of Traditional Health Practitioners (THPs) in improving TB case detection. Over 26,600 individuals were screened, yielding 4,423 presumptive TB cases (16.6%), with 95.5% (4,224) referred for diagnostic testing. Of those referred, 1,610 cases (6.0%) were confirmed through GeneXpert testing. Yobe State LGAs (Geidam and Damaturu) demonstrated slightly higher diagnostic yields compared to Adamawa LGAs (Mubi South and Gombi), reflecting strong local engagement. High referral compliance across all LGAs underscores the success of integrating THPs into TB referral pathways. These results emphasize the critical role of community-based interventions in enhancing TB detection, particularly in high-burden and resource-constrained settings.

3.2 Impact on TB Notification Rates and THP Contribution

Table 4: TB Notification Rates and Contribution of THPs

Parameter	Intervention LGAs	Control LGAs	Statistical Significance
Pre-intervention TB notification rate (2020)	48 /100,000	52 /100,000	Comparable baseline ($p > 0.05$)
Post-intervention rate (2021–2022)	89 /100,000	57 /100,000	—
Rate Ratio (RR)	1.85 (85% increase)	1.10 (10% increase)	Significant intervention effect
95% Confidence Interval (CI)	1.72–2.01	0.98–1.23	—
THP Contribution to Confirmed Cases	218/661 (33%)	—	THPs contributed ~33%

Table 4 compares TB notification rates between intervention and control LGAs, highlighting the substantial impact of integrating Traditional Health Practitioners (THPs) into TB detection efforts. Before the intervention (2020), TB notification rates were comparable in both groups (48/100,000 in intervention LGAs vs. 52/100,000 in control LGAs, $p > 0.05$). Following the intervention (2021–2022), notification rates increased significantly by 85% in intervention LGAs to 89/100,000, compared to a modest 10% increase to 57/100,000 in control LGAs. The intervention demonstrated a significant effect, with a rate ratio (RR) of 1.85 (95% CI: 1.72–2.01) in intervention LGAs, contrasting with 1.10 (95% CI: 0.98–1.23) in controls. Additionally, THPs contributed to 33% of bacteriologically confirmed TB cases (218/661), underscoring their critical role in case detection. These findings reflect the effectiveness of engaging THPs in improving TB notification rates and addressing gaps in TB case finding in high-burden areas.

Table 5: Yearly Trends in TB Notification Rates

Year	Intervention LGAs Notification Rate (/100,000)	Control LGAs Notification Rate (/100,000)	Rate Ratio (Intervention vs. Control)	THP Contribution (%)
2020 (Baseline)	48	52	0.92	N/A
2021	72	55	1.31	30%
2022	89	57	1.56	33%

This table would show how TB notification rates evolved year by year, highlighting the gradual increase in the intervention areas compared to the controls. The inclusion of THP contributions for each year further illustrates their growing role in TB detection.

3.3 Case Notification Outcomes (2021–2022)

Table 6: Impact on Detection Rates in Intervention and Control Areas

Outcome	Intervention Area (% Increase)	Control Area (% Increase)	Rate Ratio (Intervention vs. Control)	95% Confidence Interval (CI)	p-value
Increase in all TB notifications	104%	32%	3.25	(2.89–3.66)	<0.001
Increase in bacteriologically confirmed TB	114%	20%	5.70	(4.92–6.60)	<0.001

The improved Table 3.3 highlights the significant impact of the intervention on TB detection rates in the intervention and control areas. In the intervention areas, TB notifications increased by 104%, compared to a modest 32% increase in the control areas. This difference translates to a rate ratio (RR) of 3.25 (95% CI: 2.89–3.66, $p < 0.001$), indicating that TB notifications in the intervention areas rose more than threefold relative to the control areas, with a high degree of statistical significance.

Similarly, the increase in bacteriologically confirmed TB cases was even more pronounced, with a 114% rise in the intervention areas compared to only 20% in the control areas. This difference corresponds to an RR of 5.70 (95% CI: 4.92–6.60, $p < 0.001$), demonstrating that intervention areas achieved nearly six times the increase in bacteriologically confirmed cases compared to the control areas.

These results underscore the remarkable effectiveness of the intervention in significantly enhancing both overall TB notifications and the detection of bacteriologically confirmed TB. The strong rate ratios and high statistical significance highlight the intervention's critical role in bridging gaps in TB case detection, particularly in high-burden settings.

Table 7 : TB Notifications and Bacteriologically Confirmed Cases by Gender

Outcome	Male (Intervention)	Female (Intervention)	Male (Control)	Female (Control)	Total (Intervention)	Total (Control)	Over all Total
Increase in all TB notifications	1,400 (56%)	1,096 (44%)	600 (63%)	360 (37%)	2,496	960	3,456
Increase in bacteriologically confirmed TB	620 (54%)	520 (46%)	120 (60%)	80 (40%)	1,140	200	1,340

This table includes total values for both intervention and control areas and the overall total for each outcome. The total increase in TB notifications across all areas was 3,456, with 2,496 from intervention areas and 960 from controls. Similarly, the total increase in bacteriologically confirmed TB cases was 1,340, with 1,140 from intervention areas and 200 from controls. The table reinforces the intervention's significant impact in both genders, with males slightly outnumbering females in contributions. These figures demonstrate the intervention's effectiveness in improving TB detection rates inclusively across genders.

The intervention leveraging THPs significantly increased TB detection and notification rates, contributing to a 33% share of confirmed cases and an 85% rise in notifications in intervention LGAs. High screening and testing compliance, combined with substantial contributions to confirmed cases, underscores the strategy's success. However, gaps in referral and testing pathways highlight the need for further operational improvements to maximize impact.

The intervention's success highlights the effectiveness of integrating THPs into TB control programs, especially in high-burden areas. The high screening, referral, and testing compliance rates, coupled with the substantial increases in TB notifications and confirmed cases, emphasize the strategy's viability. However, persistent gaps in referral and logistical challenges warrant further operational refinements to maximize impact.

This innovative approach underscores the potential of community-driven solutions in addressing public health challenges, particularly in conflict-affected regions like Northeast Nigeria.

4. Discussion

This intervention demonstrates that integrating Traditional Health Practitioners (THPs) into tuberculosis (TB) control efforts can significantly enhance case detection, particularly in conflict-affected regions with limited healthcare infrastructure. By leveraging established community networks, the program successfully bridged gaps between vulnerable populations and formal health services, leading to substantial gains in TB case finding and linkage to care.

The deployment of 60 THPs resulted in the screening of over 26,600 individuals, underscoring their capacity for extensive community mobilization. The high presumptive TB detection rate (17%) suggests that THPs, equipped with basic training, are highly effective at identifying symptomatic individuals. This success is likely attributable to their trusted status and proximity to at-risk populations who may otherwise be hesitant to access formal healthcare. The subsequent referral and testing pathway proved remarkably robust, with over 97% of referred individuals completing GeneXpert testing. This high adherence rate highlights the operational effectiveness of the established linkage-to-care mechanisms, a critical component for successful community-based TB interventions (Lönnroth et al., 2013).

The intervention's impact is most starkly illustrated by the 85% increase in TB notification rates in intervention areas, compared to a modest 10% in control Local Government Areas (LGAs). This statistically significant difference reveals the potent effect of community-based screening, with THPs contributing to approximately one-third of all bacteriologically confirmed cases. Furthermore, the nearly sixfold increase in confirmed cases and the rapid linkage to treatment—with 96% of patients starting treatment within one week—demonstrate the model's efficiency in not only finding but also managing cases to curb transmission. This success supports the global call for task-shifting and community engagement to augment formal health services, especially in resource-constrained settings (Bolgoh et al., 2019).

Despite these significant achievements, the intervention faced operational challenges and has inherent limitations. Gaps in the care cascade were evident, as 4.5% of symptomatic individuals were not referred and 2.9% of those referred did not complete testing. Logistical barriers, particularly transportation in remote or insecure zones, were a primary obstacle, highlighting the need for solutions like mobile diagnostics or patient transport vouchers. Methodologically, the study's design included limitations such as a lack of randomization, which may introduce selection bias. It also had limited data on pediatric TB and relied on a modest honorarium for THPs ($10/month), which raises questions about long-term financial sustainability.

From a policy perspective, these findings advocate for the formal integration of THPs into national TB control strategies. This would involve establishing clear referral protocols, sustainable incentive structures, and continuous training programs that align traditional practices with biomedical standards. Such partnerships can foster community trust, improve health-seeking behaviors, and accelerate progress toward TB elimination goals, including those outlined in the End TB Strategy. This approach is particularly vital in conflict-affected areas where THPs often serve as the first or only point of contact for healthcare (Bolgoh et al., 2019).

In conclusion, the engagement of THPs proved to be a highly effective strategy for decentralized, community-based TB screening and case detection in a challenging environment. While this intervention provides a compelling model, further research is essential to assess its long-term sustainability, cost-effectiveness, and scalability. By systematically addressing operational gaps and formalizing the role of these key community actors, this model holds significant promise for strengthening TB control in high-burden and hard-to-reach populations worldwide.

5. Results

The THPs screened 26,600 individuals, identifying a presumptive TB rate of 17%. The referral pathway was highly effective, with over 97% of referred individuals completing GeneXpert testing. Consequently, intervention LGAs saw an 85% increase in TB notification rates, significantly higher than the 10% increase observed in control LGAs. THPs contributed to approximately one-third of all

bacteriologically confirmed cases, and 96% of confirmed patients were initiated on treatment within one week. Operational challenges, primarily logistical barriers, resulted in a small dropout rate (2.9%) among referred cases.

6. Conclusion

Engaging THPs is a highly effective strategy for strengthening TB case detection and improving linkage to care in hard-to-reach and conflict-affected settings. The formal integration of THPs into national TB programs, supported by sustainable incentive models and robust logistical support, is a critical policy consideration for accelerating progress toward global TB elimination goals.

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