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A Qualitative Assessment of Challenges to Tuberculosis Management and Prevention in Northern Ethiopia

James Cowan[1], **Jessica Greenberg Cowan**[1,2], **Scott Barnhart**[1,3], **Solomon Demamu**[3], **Daniel Fiseha**[3], **William Graham**[1,3], **Endalkachew Melese**[3], **Letitia Reason**[1,3], **Fana Tefera Asfaw**[3], **Getachew Feleke**[1,3,4], and **Beniam Feleke**[5]

[1]The University of Washington

[2]Harvard University

[3]International Training and Educational Center for HIV/Health (I-TECH)

[4]Senior author

[5]Centers for Disease Control and Prevention (CDC)-Ethiopia

Abstract

Setting/Objective—The purpose of this study was to elicit Ethiopian hospital staff members' understanding of challenges to effectively preventing, diagnosing and treating tuberculosis (TB).

Design—Qualitative data was collected via in-depth interviews and focus group discussions with seventy-four healthcare workers including physicians, nurses, pharmacists and laboratory technicians in five hospitals in the Northern Ethiopian regions of Amhara and Tigray. There was no intervention.

Results—Focus groups and interviews shared a number of prominent common themes. Respondents identified numerous challenges including active case identification, infection control practices, diagnostics including the absence of tuberculosis culture and drug-susceptibility testing capacity, and the lack of infrastructure for diagnosing and treating multi-drug resistant tuberculosis (MDRTB). Pharmacists noted a need for improved procurement practices, and pediatric dosages for tuberculosis medications. Providers shared concerns regarding isoniazid preventive therapy (IPT), health workforce challenges and the risk of contracting TB at the workplace.

Conclusions—Healthcare workers in the Northern Ethiopian regions of Tigray and Amhara identified many challenges to effectively preventing, diagnosing and treating tuberculosis. These challenges are complicated by severe resource constraints and challenges in attracting and retaining health care workers in government hospitals in centers outside Addis Ababa.

Keywords

Tuberculosis; Ethiopia; Qualitative Assessment; Isoniazid Preventive Therapy; Medication Procurement

INTRODUCTION

Background

Sub-Saharan Africa is currently home to the worst tuberculosis epidemic of the last century. Over the last two decades, tuberculosis infection rates have been fueled by the HIV epidemic and enabled by weak health systems that have been unable to prevent the emergence of drug resistant strains of tuberculosis.[1] The World Health Organization (WHO) estimates that the incidence of tuberculosis across Africa more than doubled between 1990 and 2009, from 171 to 345 cases per 100,000 people.[2]

HIV has been a critical driver behind the rise in tuberculosis rates; people living with HIV are particularly at risk for infection. Several autopsy studies conducted in African communities demonstrate that 30-40% of HIV infected adults and 20% of children die from tuberculosis.[3,4] The HIV prevalence rate in Ethiopia is estimated at 2100 per 100,000 people.[5]

Ethiopia is home to roughly 80 million people and has one of the highest total burdens of tuberculosis on the continent, with an estimated incidence rate of 359 per 100,000 people, and a prevalence rate of 585 per 100,000.[2] According to Ministry of Health (MOH) data, tuberculosis is the fourth leading cause of hospital admission and the second cause of hospital death in Ethiopia.[6]

Ethiopia first established a National Tuberculosis Control Program in 1976, which has evolved considerably over the past three decades. At its core, the program depends on sputum smears and clinical acumen for diagnosis. At the time of this study in late 2009, no culture, drug-susceptibility testing or nucleic acid amplification techniques were available anywhere in the country, with the exception of one laboratory in Addis Ababa. Sputum smear detection rates are estimated at 27-36% for the entire country, significantly below the WHO goal of 70%.[7,8] The overall case detection rate in Ethiopia for tuberculosis is estimated at 50%. (Table 1)[2,7]

With the exception of one hospital in Addis Ababa, which initiated a pilot MDRTB treatment program in 2009, only first line drugs and streptomycin are available throughout the country. At the time of this study, the first line regimen included rifampicin, isoniazid, pyrazinimide and ethambutol (RIPE) with a continuation phase consisting of ethambutol (EH) and isoniazid (INH). At the time of the study, pediatric formulations were just beginning to be made available via the national formulary. Ethiopian Ministry of Health data shows an overall treatment success rate of 84%.[7]

This study contributed to a needs-assessment by the International Training and Educational Center for Health (I-TECH). I-TECH is a United States based, university affiliated global health organization working in more than fourteen countries on health systems strengthening. I-TECH collaborates with 42 hospitals in Amhara, Tigray, and Afar. These regions are home to approximately 30% of Ethiopia's population.

Study Objectives

The study aimed to explore health workers' views of current tuberculosis management and prevention strategies in government hospitals in Tigray and Amhara in order to identify factors affecting tuberculosis control in the region. Routine MOH measures of tuberculosis management and prevention are largely quantitative and do not illuminate health workers' perspectives regarding barriers to preventing, diagnosing and treating tuberculosis.

METHODS

Investigators spent 3-6 days at each of five study sites in November and December of 2009. Qualitative data were collected via in-depth interviews and focus group discussions. Investigators developed an open-ended interview questionnaire that focused on several WHO management strategies including case identification, infection control, isoniazid preventive therapy (IPT), treatment, integration of services and health workforce challenges. Interviews and focus groups lasted 30-60 minutes. Focus group participants were grouped by professional training in order to minimize the potential biasing effects that hierarchy might have on frank discussion.

Prior to each session, a written description of the study aims and risks to participants was provided. Written consent to participate was obtained. Interviews were conducted in English and were recorded and transcribed for later analysis. All identifiers were scrubbed from the transcriptions, and the original recordings were destroyed. Investigators analyzed transcripts and identified common themes, illustrating them with representative quotations. Focus group and individual interview data are combined because (i) the same questions were posed to focus groups and individual interviews; (ii) information received from the two methodologies did not differ in any systematic way.

Investigators obtained technical approval from CDC and Institutional Review Board approval from the University of Washington, Harvard University and the Ethiopian Public Health Association.

Selection and Description of Participants

Investigators selected a convenience sample of five government hospitals in the states of Tigray and Amhara, in five urban, semi-urban and rural communities. At each site, investigators initially met with department chairs and chief medical officers or their designees and provided a written description of the study aim and design. With the help of local hospital leadership, investigators identified and approached potential participants. Seventy-four subjects participated in the study, including 21 physicians, 31 nurses, 6 health officers, 4 pharmacists, and 11 laboratory technicians. Eighteen individual interviews were conducted, as well as 25 focus groups, each involving 2-4 subjects.

Study Limitations

The five study sites were selected as a convenience sample and may not be representative of Tigray, Amhara or Ethiopia's public sector hospitals at large. Second, only health care workers were enrolled as study subjects; patient perspectives do not inform study

conclusions. Study results may be subject to selection bias as well. While every effort was made to broadly recruit study subjects for interviews, participation at each site was voluntary. Furthermore, interviews were conducted in English, minimizing the participation of nursing assistants and health workers with limited English language skills.

RESULTS

Case Identification

Subjects at all five hospitals raised concerns regarding case identification. Respondents who observed that patients routinely delay presentation to the formal health sector for months to more than a year after symptoms develop and that these delays in care extend the period of transmissible infection and reduce the efficacy of treatment. (Table 2, Quote 1) Subjects attributed late patient presentation to travel distance, travel cost, seasonal farming demands, a lack of community education and the initial use of traditional medicines.

Interviews revealed no systematic method for screening household contacts of patients with active pulmonary infection. A number of respondents noted that low levels of household screening might be complicated by relatively minimal communication between diagnosing clinicians and follow-up DOTS clinics. (Table 2, Quote 2)

Diagnostics

Providers expressed significant frustration with diagnostic capabilities. (Table 3, Quote 1) Irregular supplies were one source of difficulty. One site did not have radiographic film available at the time of the study. A number of laboratory technicians noted that acid-fast bacilli (AFB) reagents are intermittently unavailable. None of the study sites had the capacity to offer AFB culture.

Almost all laboratory technicians and most providers were frustrated by low rates of sputum smear positive case detection rates. Laboratory technicians suggested a number of causes for low sputum positivity rates including poor quality sputum and reagents, inadequate standardization, technician technique and time constraints. Many subjects specifically expressed interest in building AFB culture capacity and improved microscopy technique.

Physician respondents raised concern that diagnostic limitations led to treatment of patients without true tuberculosis infection, and noted that patients often press for “anti-TB” medications without suggestive symptoms. (Table 3, Quote 2) Physicians reported that patients with lymphadenopathy, vague abdominal complaints or radiographs taken in the distant past prior to a previous round of treatment are often started on therapy.

Tuberculosis Treatment

Respondents were justifiably proud of the outpatient DOTS programs at their respective facilities. The treatment success rate for sputum smear positive cases in Ethiopia is estimated at 84% by the WHO, with similar rates in Amhara and Tigray. (Table 4)[2,7] A number of respondents attributed this success to the decentralization of the DOTS program from tertiary to regional hospitals. However, medication default/noncompliance was an area of shared concern. Providers felt that some patients initiate but fail to complete treatment

because daily travel to a DOTS clinic at a regional hospital is prohibitively inconvenient and expensive. A number of respondents also noted that food insecurity reduces patient adherence. Lastly, providers noted that there is no system in place to track down defaulters.

Pharmacists raised concerns regarding medication inventory, describing shortages of first-line tuberculosis medications in the previous year across all five sites. Many noted regularly receiving medications delivered near or past expiration. Pediatric doses for most anti-TB medications were not on the national procurement list at the time of the study. As such, respondents complained that children are treated with adult pills cut into pieces, leading to inconsistent dosing in children. Additionally, almost all tuberculosis medications available in government hospitals are combination pills. Thus physicians have limited recourse if a combined medication causes side effects; respondents noted particular concern regarding second line treatment in the setting of drug-induced hepatitis.

Infection Control

Basic infection control was a major challenge in all study facilities from an administrative, engineering and equipment standpoint. Administrative controls to limit the risk of patient-to-patient tuberculosis transmission were reported as incomplete or absent across sites with limited waste control and incomplete ventilation and isolation practices.

Two of the five study hospitals had separate inpatient units for patients with active tuberculosis, while one hospital had recently closed its tuberculosis ward. At the time of the study, three of five sites housed sputum positive tuberculosis patients alongside other inpatients, many severely immunocompromised with HIV/AIDS. (Table 5, Quote 1)

None of the study hospitals isolate patients during initial evaluation. As a result, patients suspected of having tuberculosis are routinely asked to produce sputum samples while in close proximity to other patients and staff in crowded general medicine wards.

Nurses were very well versed in basic cough hygiene practices, and many DOTS clinics had well ventilated waiting areas. However, ventilation remained a key challenge in many areas, both because of inappropriate building infrastructure and because patients and family members frequently prefer to keep windows closed, believing that drafts cause illness. (Table 5, Quote 2) Respondents also emphasized that infection control was hampered by resource constraints and building engineering. (Table 5, Quote 3)

The risk of tuberculosis and MDRTB transmission from patients to healthcare workers was a major preoccupation. Subjects at each site knew staff members who had contracted tuberculosis in the last year, including physicians, medical students, nurses, sanitation workers, and lab technicians. One hospital’s head nurse was on leave with tuberculosis infection during the study visit. To providers, tuberculosis infection represents morbidity, missed wages, and health care costs while MDRTB infection remains a fatal diagnosis for most. (Table 5, Quote 4)

Though particulate masks are not recommended in Ethiopia’s national guidelines, numerous respondents indicated an interest in wearing protective masks when working with patients with active pulmonary tuberculosis or suspected MDRTB. Last, while all five hospitals

offered voluntary HIV testing, no respondents could identify a confidential mechanism by which HIV positive colleagues might minimize tuberculosis exposure.

Health Workforce Challenges

Open-ended questions regarding challenges in treating and preventing tuberculosis frequently led to a discussion of health-workforce challenges. Providers at each hospital were aware of the toll taken by constant physician turnover on quality of care. Five different medical directors had led one hospital over the prior year. Respondents noted that efforts to improve tuberculosis programs are hampered by frequent turnover.

Multi Drug Resistant Tuberculosis

All respondents were aware of the emergence of MDRTB in Ethiopia. At the time of the study, only one pilot program in the country offered treatment for MDRTB and that program had 20 patients on second line therapy. Despite this, respondents consistently reported that they “referred” MDRTB suspects for culture and second line treatment in Addis Ababa. Patients thus referred for MDRTB evaluation and treatment face prohibitively expensive travel and an extremely long waitlist for culture and care, in addition to a multi-day journey on a crowded bus.

The inability to diagnose and treat such patients was a source of great frustration to nurses and physicians. (Table 6, Quote 1)

In the absence of sputum cultures and second line therapies, respondents reported that they repeated first line therapy in patients who had already failed. Providers were aware that inappropriate treatment did not reduce the risk of horizontal transmission of MDRTB. (Table 6, Quote 2)

Providers repeatedly reported that quality of patient care is adversely affected when patients are suspected of having MDR-TB. (Table 6, Quote 3)

Isoniazid Preventive Therapy

Physician respondents expressed mixed views regarding isoniazid preventive therapy (IPT). Though many respondents supported the immediate roll-out of IPT in their facilities, others were concerned IPT might create resistance to isoniazid if administered in error to “missed” active cases. A number of respondents suggested that diagnostics should first be improved and then IPT should be made available. Supply chain concerns were also raised, contributing to ambivalence among respondents regarding IPT’s inclusion in national guidelines.

DISCUSSION

Ethiopia has a long and distinguished record of caring for patients with tuberculosis dating back to the 1960’s. Despite this, current systems are overwhelmed by the large reservoir of active tuberculosis infections, the emergence of MDR-TB and the synergy between the HIV epidemic and tuberculosis infection and transmission. The MOH was, at the time of this study, leading a broad-based effort to transform tuberculosis prevention, treatment and management strategies and has recently published new guidelines for TB/HIV collaborative

activities, the prevention of transmission of tuberculosis in health care facilities and for the clinical management of drug resistant tuberculosis.[7,9,10]

Study participants were largely aware of this history and well informed regarding the many successes of the current system, including an exceptionally high smear positive treatment success rate. Respondents were consistently knowledgeable regarding tuberculosis prevention, diagnostics and treatment. Despite this, interviews revealed many ongoing practical challenges including patients' late presentation, ongoing difficulties with diagnostics and both administrative and resource related challenges to infection control and treatment. Health care workers shared deep concern regarding the growing perceived prevalence of MDRTB and were acutely aware of their own vulnerability as first line providers in the absence of appropriate diagnostics and medications. Scarce resources, both physical and human, complicate these challenges and these scarcities are compounded by the escalation of the tuberculosis epidemic in the HIV/AIDS era.

Study respondents suggested many strategies for improvement at the local level; this impulse toward local innovation could potentially be harnessed to capitalize on the current strengths of the MOH tuberculosis strategy moving forward. These qualitative findings suggest many opportunities for future innovation and research. The challenges identified may be representative of obstacles to tuberculosis prevention and treatment in other public sector hospitals in Ethiopia and, to some degree, public facilities elsewhere in sub-Saharan Africa.

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Table 1

Ethiopia Tuberculosis Case Detection by Region: 2009/10*

		New Sputum Smear Positive (SS+) TB Cases			All Forms of New TB Cases		
Region	**Population**	**Annual Estimate of SS+ TB Cases per Region****	**Actual Annual Number of SS+ TB Cases Detected per Region**	**SS+ Case Detection Rate (%)**	**Annual Estimate of All New TB Cases per Region****	**Actual Annual Number of New TB Cases Detected per Region**	**Total TB Case Detection Rate (%)**
Tigray	**4,646,197**	**7,573**	**2,112**	**28**	**17,563**	**10,812**	**62**
Afar	**1,506,288**	**2,455**	**761**	**31**	**5,694**	**2,561**	**45**
Amhara	**18,106,982**	**29,514**	**7,732**	**26**	**68,444**	**33,728**	**49**
Oromiya	**29,590,441**	**48,232**	**18,965**	**39**	**111,852**	**53,980**	**48**
Somali	**4,794,481**	**7,815**	**1,439**	**18**	**18,123**	**4,543**	**25**
Benshangul	**733,053**	**1,195**	**568**	**48**	**2771**	**1,502**	**54**
SNNPR	**16,389,550**	**26,715**	**10,534**	**39**	**61,952**	**23,100**	**37**
Gambella	**346,236**	**564**	**359**	**64**	**1,309**	**914**	**70**
Hareri ***	**198,020**	**323**	**710**	**220**	**749**	**2,212**	**296**
Addis Ababa	**2,914,406**	**4,750**	**2,961**	**62**	**11,016**	**14,376**	**130**
Dire Dawa	**369,187**	**602**	**493**	**82**	**1,396**	**1,780**	**128**
National	**79,594,841**	**129,740**	**46,634**	**36**	**300,868**	**149,508**	**50**

"Tuberculosis Prevention and Control Program: Special Issue for World TB Day 24th March 2011." Agrarian Health Promotion and Diseases Prevention Directorate and the Ethiopian Ministry of Health: Annual Bulletin Vol. 3, No. 3; Addis Ababa, Ethiopia, March 24, 2011:19-21.

* These data are from the Ethiopian calendar year EC 2002 which spans 2009 and 2010

** Estimates are based on the 2009 WHO country report for Ethiopia that estimated a tuberculosis prevalence rate of 163 sputum smear positive cases per 100,000 population, and a prevalence rate of 378 cases of all forms of TB per 100,000

*** People from neighboring regions (Somali and Oromia) are getting TB treatment in Harai region

Table 2

Representative quotes regarding TB case identification.

Quote 1	"In the rural areas…they do not seek medical attention fast enough. They seek medical attention when they get time after doing their farm activities. By the [time of presentation], their complaint is a year back, long long history….being a source of infection for other patients." -General Practitioner
Quote 2	"There is no assigned person who traces these patients, these defaulters…we ask patients who live nearby." –DOTS Nurse

Table 3

Representative quotes regarding TB diagnostics.

Quote 1	“In five months here, I have sent 50 sputum, but only two were positive. We would expect a much higher percentage.” -General practitioner
Quote 2	“They [farmers] like to be diagnosed with tuberculosis, so they say tuberculosis for everything, for tooth problem, for some bone problem.” – Specialist physician

Table 4

Ethiopian Treatment Outcomes for Sputum Smear Positive (SS+) Pulmonary Tuberculosis 2009/10*

Region	Total Number of SS+ Patients Started on TB Treatment by Region	Total Number of SS+ Patients Cured by Region	Regional Cure Rate for Patients with SS+ TB (%)	Number of Additional SS+ Patients Who Completed Treatment by Region	Total Number of SS+ Patients Who Completed TB Therapy	SS+ Patient Treatment Success Rate (%)
Tigray	**1,953**	**1,534**	**79**	**146**	**1,680**	**86**
Afar	**1,471**	**439**	**30**	**915**	**1,354**	**92**
Amhara	**7,347**	**5,086**	**69**	**1,146**	**6,232**	**85**
Oromiya	**17,567**	**12,138**	**69**	**2,879**	**15,017**	**85**
Somali	**1,495**	**1,106**	**74**	**51**	**1,157**	**77**
Benshangul	**458**	**333**	**73**	**57**	**390**	**85**
SNNPR	**10,429**	**6,223**	**60**	**2,578**	**8,801**	**84**
Gambella	**297**	**154**	**52**	**125**	**279**	**94**
Hareri	**267**	**137**	**51**	**49**	**186**	**70**
Addis Ababa	**3,029**	**1,802**	**59**	**373**	**2,175**	**72**
Dire Dawa	**494**	**312**	**63**	**97**	**409**	**83**
National	**44,807**	**29,264**	**65**	**8,416**	**37,680**	**84**

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*These data are from the Ethiopian calendar year EC 2002 which spans 2009 and 2010

Table 5

Representative quotes regarding TB infection control.

Quote 1	"Because of the shortage of places … we can only separate them in compartments informally and people are at risk. There will be smear positive tuberculosis patients and others smear negative, and they will sleep together [in the same room]. It is overcrowded and so there is often infection spread." – General practitioner
Quote 2	"Most attendants [family members] are battling with us to close the windows and doors. They think there is a problem with the wind [drafts]." -Nurse
Quote 3	"There is a resource problem, even soap, water, hand rubs--such things are problem here. There is no fan in the room…the hospital is not suitable for infection prevention. There is no cross and through ventilation. This is a barrier for working actively [on infection control]." -Hospital Medical Director
Quote 4	"We see a lot of medical students [with tuberculosis], we see interns also…last year, two medical students, one had been started on anti-TB, she developed drug induced hepatitis and she finally died. And we do have a classmate who has discontinued his medical education and he was forced to stop his medical education [because of MDRTB infection.]" – General Practitioner

Table 6

Representative quotes regarding MDRTB.

Quote 1	"There must be cultures. We don't have cultures even for sputum. If patients become resistant to drugs, we send to Addis if he has money. If he does not, he dies here."-DOTS Nurse
Quote 2	"It is very risky. One recent patient had a round of category 1, and 2 rounds of category 2 treatments (the addition of streptomycin to RIPE). And the patient is still sputum positive. It is frustrating that healthcare workers may just refill his meds quickly for fear of getting TB." –General practitioner
Quote 3	"I am scared of getting TB, I have 2-3 smear positive patients right now. It is especially scary to have MDR-TB on the ward. You are always in fear examining them, and you may not visit them as much." –Intern