Delay in Diagnosis of Pulmonary Tuberculosis is associated with Increased Risk of Transmission in Somali Region, Ethiopia

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Presentation Outline

- Introduction
- Objective
- Methods
- Results and discussion
- Conclusion and recommendations

Introduction

- TB remains the leading killer of infectious diseases.
  - 10 million cases and 1.3 million deaths in 2017.
- Ethiopia ranked 11th among the 22 HBCs & 4th in Africa
  - 172, 000 new cases in 2017.
- The disease is more prevalent in pastoral communities
  - 316/100,000 Vs. 277/100,000
- To end the global epidemics by 2030, the End-TB strategy sets early diagnosis and treatment of cases as pillar
  - The NTP of Ethiopia implements *passive case finding strategy*: *(detection of self-presented symptomatic cases)*

(WHO, 2018, Kebede 2014)

Case detection level in Somali region?

- It was 34% in 2015 despite the 70% target
- Didn't excel 60% in 2019
- Why so?
  - Patients might delay without seeking healthcare
  - The HCPs might fail to identify presented cases
- Fail to timely treat PTB extends contagious period & leaves destructive damages to lung ⟹ **pulmonary cavitation**
- The cavities
  - Release higher MTB load in aerosols
  - Slow smear conversion upon treatment initiation
  - Result in Rx failure, drug resistance & permanent lung damages

Aim of the study

- To determine the extent of delay in diagnosis of PTB
- To evaluate the effect of diagnosis delay on infectiousness of PTB patients (Cavitation and smear positivity)
- To determine threshold delays that optimize cavitation and smear positivity
  - **Diagnosis delay**: is the time duration from onset of pulmonary symptoms to date of diagnosis

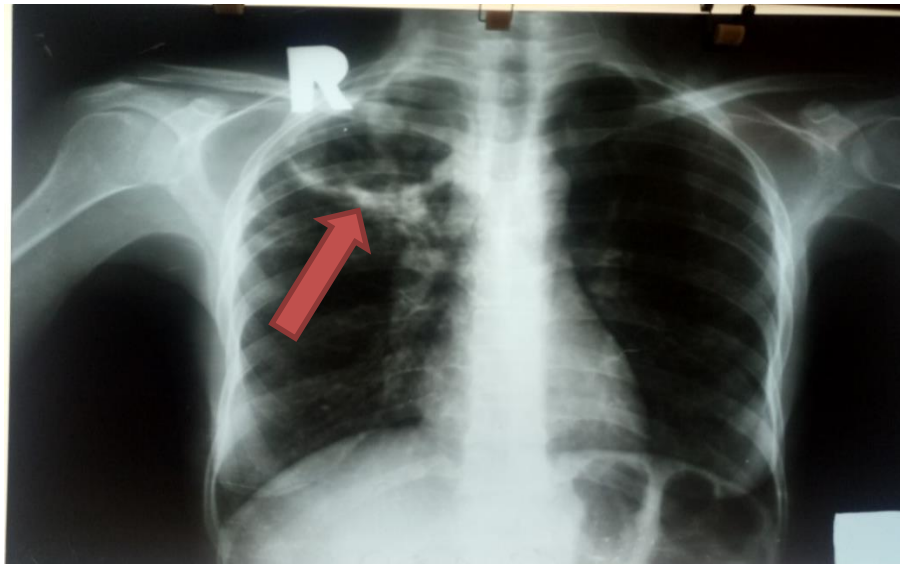
Methods

Study design and setting: facility-based cross-sectional study

- 4 hospitals (Kharamara, Degehabour, Kebridaher and Gode)
- 1 health center (Abilelie)

- **Population and sampling**
  - 434 newly diagnosed PTB patients aged ≥15 years between December 2017 and October 2018
  - People in this age category :
    - Manifest similar pathological features
    - Same diagnosis approaches are followed
    - Acquire competent immunity that is key in cavitation
    - Cover 80% of TB cases & account for ~100% of transmissions

Data collection



Statistical analysis

- Double entered and validated using EpiData v. 3.1
- Analyzed using Stata v. 14
- Log-binomial regression models
  - To reveal the association of delay and other factors associated with cavitation and smear positivity
- ROC curve:
  - To determine the discriminative ability of delay to predict cavitation and smear positivity
  - Threshold delay that optimize cavitation & smear positivity

Results and Discussion

- Median diagnosis delay = 49 days (IQR= 33-70),
  - Rang
  - 5 pts
- Cavitation:
  - 45. s, diameter = 2.8
  - 82.5% [76.1% - 87.8%] among smear positive
- Smear positivity:
  - 42.0% [37.3 46.9%] & 75.3% among cavitary
  - Comparable to other reports in Ethiopia

- Matches with the max. assumption of 50% that happens if pts do not receive Rx during the entire course of the disease
- Surpassed 34.0% and 21% in other areas

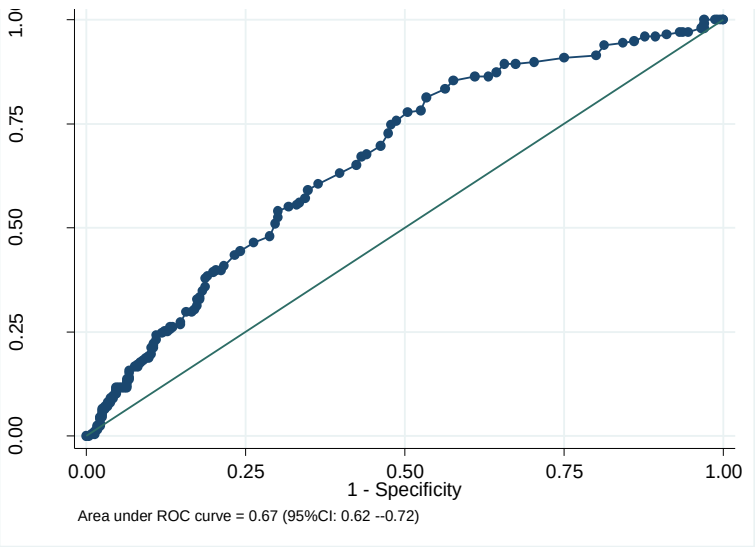
- Almost twice to related reports of 49.9% in China and 38.3% in Brazil

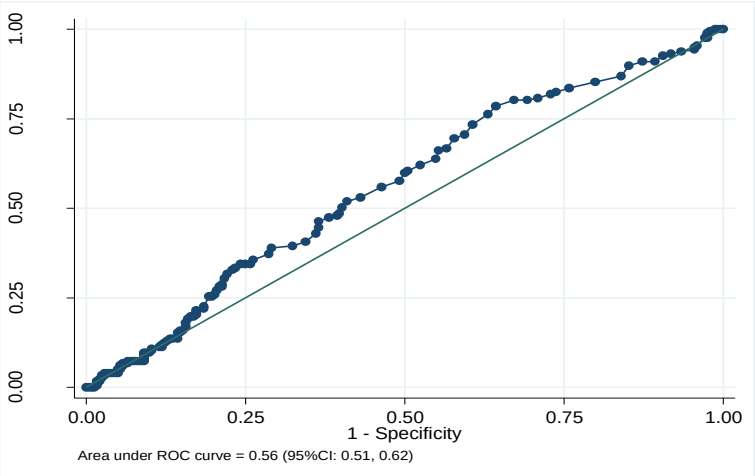
Effect of Delay on cavitation & SP+

- The risk of cavitation:
  - Continually increased in patients delayed >30 days
  - 90% of cavitary cases delayed >30 days
  - Well pred
  - Threshold delay = 43 days

< The median 49 days
= 60% delayed >43 days

- Smear positivity
  - Increased in pts delayed >49 days
  - Poorly predicted (AUC = 0.56)





What do the high delays imply?

- Early diagnosis and Rx is not ensured
  - Many patients did not seek timely care
  - The health system fails to suspect and investigate TB cases timely
  - Possibly many cases remained undiagnosed in the community
  - Both patient and health systems contributed principally
- Patients suffer longer without medical care
- Prolonged contagious period

What does the strong association of delay with cavitation and smear positivity imply?

- High delays:
  - Lead to devastated disease (cavitation): 22.2% at ≤30 days; but >51.7% for patients delayed >30 days: ↑dose-response Rxnship
  - Elevate patient infectiousness (cavitation and smear positivity)
- Cavitation is:
  - The source for disease transmission
  - Slows RX response (↑contagious)
  - Rx failure and relapse,
  - Emergence of drug resistance
  - Disease dissemination and
  - Permanent lung impairments

Extended RX and new drugs are suggested

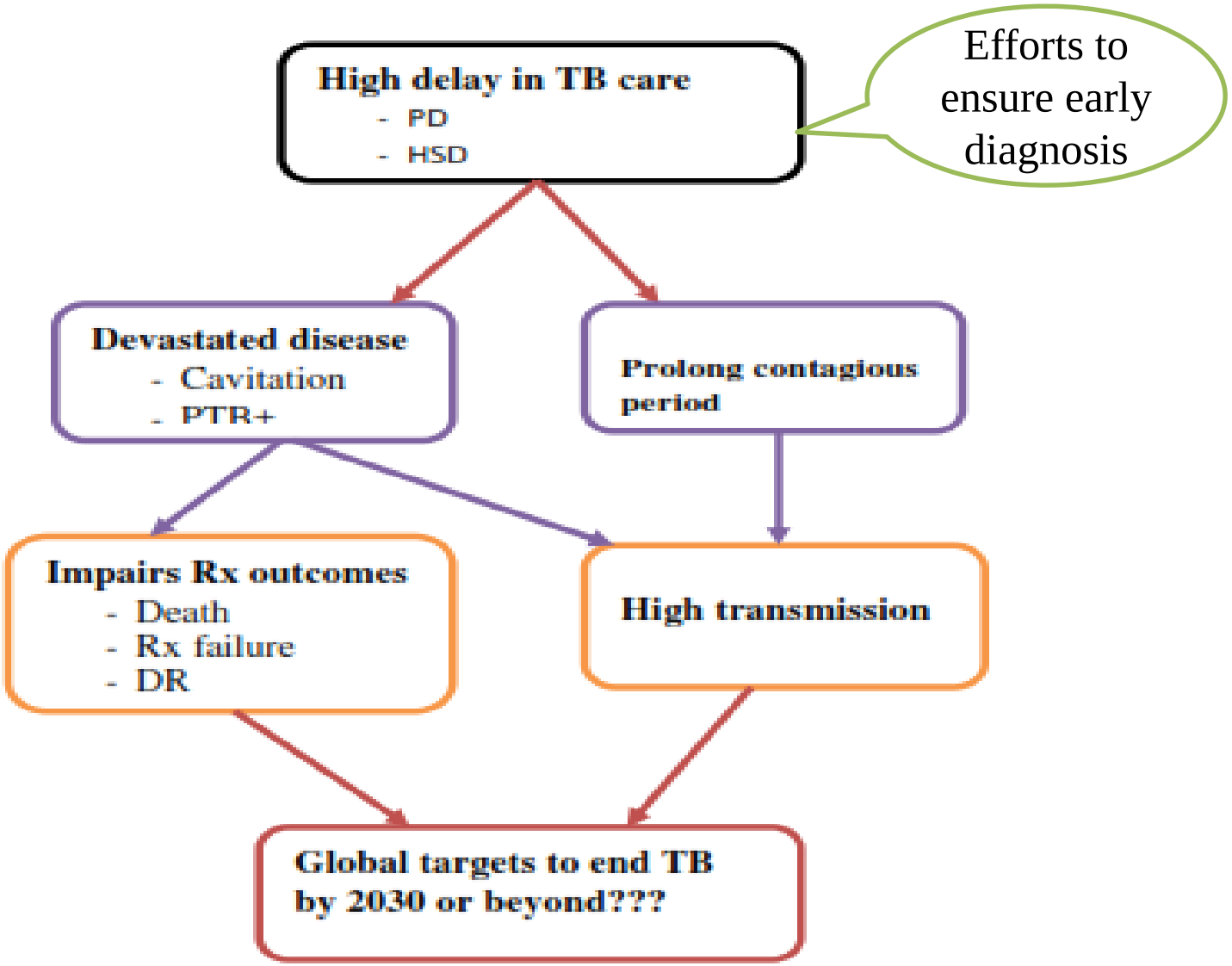
Other factors associated with cavitation and SP+

- Cavitation:
  - Age ≤35 years (APR = 1.3)
  - Chronic co-morbidity (APR =1.8)
  - MUAC ≤23 cm (APR =1.8)
- Smear positivity:
  - Age ≤35 years (APR =1.4)
  - BMI <18.5 Kg/M^2 (APR =1.3)
  - MUAC ≤23 cm (APR =1.5)

Potential transmission from Infectious patients?

- Nearly half live in traditional hut
- >3/4th shared sleeping rooms with family members (6.6±2.8).
- > 3/4th spit sputum everywhere

Conclusion


High delay in TB care
- PD
- HSD
Efforts to ensure early diagnosis
Devastated disease
- Cavitation
- PTR+
Prolong contagious period
Impairs Rx outcomes
- Death
- Rx failure
- DR
High transmission
Global targets to end TB by 2030 or beyond???

Recommendation

- Expansion of TB services
  - Engaging clan/religious leaders to identify and link presumptive cases
  - Mobile/outreach screening in pastoral villages
- Distribution of highly sensitive diagnostic tools
- Special attention to cavitary TB cases:
  - Contact screening of all HH contacts
  - Treatment outcome evaluation: radiological evaluation

Thanks for attention!!!