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Missed opportunity for tuberculosis screening among patients presenting at two health facilities in Manafwa district, Uganda

TITUS WAMULIMA[1-3], JOHN PETER MASETTE MASABA[1], DAVID MUSOKE[4], DAVID MUKUNYA[1] and JOSEPH KB MATOVU[1,4]

[1]Busitema University Faculty of Health Sciences, Mbale; [2]Bubulo HCIV, Manafwa District; [3]Butiru HCIII, Manafwa District; [4]Makerere University School of Public Health, Kampala, Uganda

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Abstract. Missed opportunities for Tuberculosis (TB) screening are key drivers of continued tuberculosis transmission. To determine the proportion of and factors associated with missing TB screening amongst patients who attended Bubulo and Butiru health facilities in the Manafwa district to inform future TB prevention and control efforts in Uganda. This was a facility-based, cross-sectional study with quantitative methods of data collection. 125 patients (≥18 years) with at least one symptom suggestive of TB were systematically selected and interviewed at the exit. Data analysis was done by Stata version 15, using a cluster-based logistic regression model. Of the 125 patients enrolled at both sites, 39% (n=49) were aged between 30 and 49 years; 75.2% (n=94) were females; 44% (n=55) were married while 66.4% (n=83) had a primary level of education. Of the patients enrolled in the study, 68% (n=85) had a missed opportunity for TB screening. Having a; post-primary education level (Adjusted Odds Ratio [AOR]=5.9; 95% Confidence Interval [95% CI]=1.3, 27.1) and attending Bubulo HCIV (AOR=0.01; 95% CI: 0.01, 0.2) were significantly associated with having a missed opportunity for TB screening. Our findings show that slightly more than two-thirds of the patients who presented to the study health facilities with symptoms suggestive of TB missed the opportunity to be screened for TB. Study findings suggest a need for interventions to increase TB screening, particularly among better-educated TB patients.

Introduction

Tuberculosis (TB) is a chronic infectious disease that has affected over 10 million people globally (1). In spite of this, the number of people with undiagnosed and untreated TB has continued to grow, resulting in an increased number of TB deaths and more community transmission of infection, and an increased number of people developing TB (2). Missed TB screening opportunities are the key drivers of continued TB transmission in the community (3). Unfortunately, four million patients with symptoms suggestive of TB are not screened for TB annually (4). In Africa, 40% of tuberculosis cases are missed annually (5). Missed opportunities for TB emanate from a host of including the low operational capacity of laboratory networks in most low-and middle-income countries (6,7), weak TB screening strategies (8,9), and low involvement of all healthcare workers in TB case finding (6).

Uganda is among the 30 tuberculosis-burdened countries in the world and TB continues to be a serious major public health concern (5). In 2015, the TB mortality rate, excluding HIV, was 5.5 deaths per 100,000 Population. This mortality rate is based on the WHO estimates because Uganda as a country does not have a well-established vital registration system (10). In Uganda's first national population-based TB disease prevalence survey of 2014-2015, the prevalence of TB was 253/100,000 population and the incidence of 201/100,000 population. In the same financial year (FY) the country registered 52,458 (65 percent) out of an expected 80,000 TB cases. The Uganda National Tuberculosis and leprosy control program set a goal to reduce the incidence of TB by 5% in 2014 to less than 1 per million populations by 2019/20 (11).

Despite improvements in TB case-finding efforts, Uganda misses over 40,000 (45-50%) of the incident TB cases annually (10). One of the key drivers of continued TB transmission is delayed TB diagnosis (12), leading to increased morbidity and mortality (13). Therefore, the urgent need for early TB screening, diagnosis, and treatment is critical in the control of TB (14). For instance, findings from the above-mentioned population-based TB survey, show that a third of patients diagnosed with TB during the survey didn't seek care (15). Even then, only 16% of those who sought care due to TB symptoms were investigated for TB and half of those diagnosed with TB were symptomatic (16,17). Such delays in TB screening and diagnosis are attributed to the failure of healthcare workers

Correspondence to: Titus Wamulima, Faculty of Health Sciences, Busitema University, P.O. Box 1460, Mbale, Uganda
E-mail: titus.wamulima@gmail.com

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to recognize symptomatic TB patients and as well failure to follow the TB screening guidelines (18). Considering that over 40,000 TB cases are missed every year (11), these findings present challenges for (NTLP) to achieve the strategic actions outlined in Uganda's Revised 2020/2021-2024/2025 National TB and Leprosy Strategic Plan (10). Uganda, like any other TB high-burden countries, relies majorly on passive case finding for TB. However, it has been noted that a good number of patients with TB-related symptoms go un-screened for TB in healthcare facilities (19). This has resulted in delays in TB diagnosis (20) and treatment initiation (21-23), thereby contributing to continued transmission of TB in the communities hence complicating the control and prevention of TB in the country (24).

Despite all the interventions made in building health facility capacity to improve TB screening and diagnosis, including functional availability of Gene-Xpert machines, and sputum smear microscopy (25); many suspected TB patients continue to go through the health system unscreened (26). Our study adds to the existing literature by assessing the proportion of and factors associated with missing TB screening in two health facilities in rural Uganda.

Materials and methods

Ethical considerations. Ethical approval was obtained from Mbale Regional Referral Hospital Research Ethics Committee (MRRH-REC) with a REC number MRRH-REC OUT 0762020. Information about the study and informed consent forms were written in English and translated into the local language best understood by the patients. Participants were given all the required information about the study and consent before enrolment into the study. Confidentiality and anonymity were assured and maintained throughout the study.

Study site. The study was conducted at the Out-Patient Departments (OPDs) of Bubulo HCIV and Butiru HCIII in Manafwa district, Eastern Uganda. Manafwa district is bordered by Mbale district in the North, Tororo district in the South, Bududa and Namisindwa districts in the East, and Mbale and Tororo in the West. It has a population of 215,935 people (18), with an estimated TB burden of 59/100,000, based on Uganda's National TB prevalence survey 2014-2015 (11). The district has eleven health facilities, seven of which (Bubulo HCIV, Bugobero HCIV, Butriru HCIII, Lwanjusi HCIII, Butiru Chrisco HCIII, Bukewa HCIII, and Bukimanayi HCIII) are designated as TB treatment sites. In general, TB screening in the district is very low across the seven TB treatment health facilities (11). Bubulo HCIV and Butiru HCIII were purposively chosen, because they had low TB screening coverage according to the district TB performance review report of October-December 2019 (Manafwa district TB performance report 2019, unpublished data). Besides, the two study sites had the biggest catchment population among HCIVs and HCIIIs in the district and serve mostly rural, poor populations that usually have challenges in accessing health care due to high travel costs.

Study design. This was a facility-based, cross-sectional study that employed quantitative methods of data collection.

Study population. The study population was patients (≥18 years) registered in the OPD register, who reported at least one symptom suggestive of TB following the administration of TB symptoms screening tool based on the Uganda Tuberculosis and Leprosy Control guidelines (26). All adult patients (≥18 years) who presented with signs and symptoms suggestive of TB and declined to provide informed consent were excluded from participation in the study.

Sample size determination. Sample size calculation was based on results obtained from Claassen *et al* 2015 (27), who reported that 92% of patients who presented to healthcare facilities with TB symptoms in South Africa were not screened for TB. We used this prevalence because; there was no published study on missed opportunities for TB screening in health facilities in the Ugandan context at that time. Based on this information, assuming the level of confidence at 95% and z-score value of 1.96, the proportion of patients screened for TB at 8%, the proportion of patients not screened for TB at 92%, and the desired margin of sampling error to be tolerated at 5%, we estimated the sample size 113 patients with symptoms suggestive of TB. The final sample size was 125 after accounting for a 10% non-response rate.

Sampling procedures. Since we had two study sites, proportion-to-size sampling was used to adjust and determine the sample size for each study facility. In each study facility, the sum of all the registered TB patients was calculated from the health unit TB registers between 1st January 2020 to 18th September 2020. The total number of registered TB patients for each study facility was summed up and the final sample size for each study facility was the proportion of the registered TB patients multiplied by the study sample size. The final adjusted sample size for Bubulo HCIV and Butiru HCIII was 79 and 46 respectively.

After realizing the sample size for each study facility, we visited each study facility and checked through the HMIS109 register. We selected patients aged ≥18 years from the HMIS109 register using a sampling interval of five for each study facility. Selected patients were approached as they exited the health facility and were, given brief information about the study. Interested participants were invited to participate in the study. We screened for study eligibility by asking patients about the presence of symptoms suggestive of TB using the TB symptom screening form adopted from Uganda's National TB and Leprosy Management guideline (26). We considered a patient to be eligible for the study if they presented with at least one symptom suggestive of TB without evidence of TB screening from both the unit TB presumptive register and the patient's books. All those that were eligible were administered a written informed consent prior to the interview.

Data collection procedures and methods. Data were collected between the 12th and 16th of October 2020 at Bubulo HCIV and between the 19th and 22nd of October 2020 at Butiru HCIII. Data were collected by two research assistants, working closely with the principal researcher, after obtaining administrative clearance from each health facility. Data were collected on patients' social demographics, awareness of TB symptoms, and presence of TB symptoms using a structured

Table I. Independent variables.

Conceptual definition	Operational definition	Scale of measurement
Age	Age of participants at the last birthday categorized as 18-29, 30-49, 50 and above	Scale: Discrete numerical data
Gender	Sex of participant as reported, categorized as: male, female	Nominal: male; female
Marital status	Marital status as reported by participants, categorized as: single, currently married, cohabiting, widowed/divorced	Nominal: married; not married
Employment status	Employment status as reported by participants, categorized as: unemployed, employed	Nominal: employed; not employed
Education level	Education level of participants as reported, categorized as: primary, post-primary	Ordinal: none; certificate; diploma; degree; masters
Number of family members in the household	Number of household family members as reported by participants, categorized as: 1-5, 6 and above	Scale: discrete numerical data
Cost of one-way journey to the health facility	Amount spent on one-way journey (in Uganda shillings) by participant to the health facility, categorized as: 500-2,000, above 2,000	Scale: discrete numerical data

questionnaire configured on Kobo Collect-enabled mobile phones. Interviews were conducted in the form of exit interviews after the patient had received the services for which they had come to the facility. Data collection took 30 min and at the end of each interview, the interviewer sent the finalized questionnaire to the main server for storage.

Measurement of variables. The primary outcome was the proportion of patients who missed the opportunity to screen for TB despite presenting with TB-related symptoms. On the same day before the interview, we cross-checked both unit TB presumptive register and the patient's books for evidence of TB screening. We confirmed a missed opportunity to screen for TB for all patients who had no evidence of documentation of TB screening in both the unit TB presumptive register and the patient's books. All patients who had missed TB screening were further asked about their socio-demographics, awareness of TB symptoms, and presence of TB symptoms. We confirmed TB symptoms among patients by comparing the score on the TB symptom screening form with the ordinary symptoms related to TB. We used the TB presumptive register and the TB symptom screening form as our reference tools since they are recommended by Uganda National TB and Leprosy Program for TB screening (26). The secondary outcomes as, defined are summarized in Table I below.

Statistical analysis. Data analysis was conducted using Stata version 15. Site specific data on the socio-demographic characteristics of the patients were computed separately and summarized in one table in the form of frequencies and percentages. We computed the number and proportion of patients who missed TB screening separately for each study facility and tabulated the overall distribution of patients who missed TB screening by their socio-demographic characteristics. Background factors potentially associated with missing TB screening were assessed using cluster-based logistic regression. An odds ratio with a 95% confidence interval (CI) was used as the measure of association. The choice of the best model was based on the model with the lowest Akaike's Information Criteria (AIC) and Bayesian Information Criteria (BIC) (AIC=60.68, BIC=63.50). All factors that were independently associated with missing TB screening at the bivariate level and were considered to be plausibly associated with the primary outcome were entered into the final multivariate logistic regression. All the factors with a P-value <0.05 in the final model were considered to be significantly associated with missing TB screening.

Results

Patients' socio-demographic characteristics. Table II shows the socio-demographic characteristics of the 125 patients enrolled in the study. One-third of the patients (39%, n=49) were aged between 30 and 49 years; a majority (75.2%, n=94) of the patients were females while nearly half of the patients (44%, n=55) were married. More than half (66.4%, n=83) of patients had the primary level of education; with the highest proportion (83.2%, n=104) of patients being unemployed. More than half of patients (55.2%, n=66) had one to five members living in their households, and a big proportion of patients (76%, n=95) spent between 500 between 2,000 Ugandan shillings (approximately US$ 0.14 and 0.55 based on 2023 exchange rates) to reach the study sites. Of the patients interviewed, the highest proportion (96.8%, n=121) reported TB-related symptoms to the health workers while slightly more than half (52%, n=65) reported non-TB symptoms as the main reason for the visit to the study sites.

Missed opportunity for TB screening. Table III shows the proportion of patients who missed TB screening stratified by facility type and background characteristics. Overall,

Table II. Socio-demographic characteristics of patients enrolled into the study.

Characteristic	Category	Health facility: Bubulo HCIV N=79 (%)	Health facility: Butiru HCIII N=46 (%)	Total N=125 (%)
Sex	Male	22 (27.85)	9 (19.57)	31 (24.80)
	Female	57 (72.15)	37 (80.43)	94 (75.20)
Age	18-29	18 (22.78)	17 (36.96)	35 (28.00)
	30-49	29 (36.71)	20 (43.48)	49 (39.20)
	50 and above	32 (40.51)	9 (19.57)	41 (32.80)
Marital status	Single	15 (18.99)	5 (10.87)	20 (16.00)
	Currently married	35 (44.30)	20 (43.48)	55 (44.00)
	Cohabiting	10 (12.66)	13 (28.26)	23 (18.4)
	Widowed/divorced	19 (24.05)	8 (17.39)	27 (21.60)
Employment status	Unemployed	65 (82.28)	39 (84.78)	104 (83.20)
	Employed	14 (17.72)	7 (15.22)	21 (16.80)
Education level	Primary	50 (63.29)	33 (71.74)	83 (66.40)
	Post-primary	29 (36.71)	13 (28.26)	42 (33.60)
Household size	1-5	42 (53.16)	27 (58.71)	69 (55.20)
	6 and above	37 (46.84)	19 (41.30)	56 (44.80)
Cost of one-way journey to the health facility (UGX)	500-2,000	57 (72.15)	38 (82.61)	95 (76.00)
	Above 2,000	22 (27.85)	8 (17.39)	30 (24.00)
Main reason for the visit	Non-TB symptoms	56 (70.89)	9 (19.57)	65 (52.00)
	TB symptoms	23 (29.11)	37 (80.43)	60 (48.00)

(68%, n=85) of patients missed the opportunity to screen for TB at both health facilities; higher at Bubulo HCIV (89.4%, n=76) than at Butiru HCIII (10.5%, n=9). Slightly more than three-quarters of the patients (76.5%, n=65) who missed TB screening were females and most of them were from Bubulo HCIV. Slightly more than a quarter of the patients aged 30 to 49 years (38.82%, n=33) missed the opportunity to screen for TB more than patients in the other age groups. Nearly half (42.1%, n=36) of the patients who were currently married, 60% (n=51) of those with post-primary education and 77.65% (n=66) of those who spent between UGX 500-2,000 (approximately US$ 0.014-0.55, based on 2023 exchange rates) as transport to reach the study facilities were found to have missed the opportunity to screen for TB than their counterparts.

The majority of the patients (76.5%, n=65) who waited for two hours or less before being attended to by the health worker missed TB screening compared to those who waited for more than two hours. Almost all the patients (95.3%, n=81) who self-reported TB-related symptoms to the health worker missed TB screening and the majority of these patients were from Bubulo HCIV. A higher proportion (67.1%, n=57) who attended health facilities due to non-TB symptoms missed TB screening than those who attended the health facilities due to TB related-symptoms (32.9%, n=28). Almost all patients from Bubulo HCIV missed the opportunity to be screened for TB but the proportion of those who missed TB screening at Butiru HCIII varied across the background characteristics.

Factors associated with missing TB screening at Bubulo HCIV and Butiru HCIII in Manafwa district. Table IV shows the factors associated with missing TB screening at the bivariate level. Being female; aged 50 years and above; being married and cohabiting; having a post-primary educational level, and attending Bubulo HCIV were significantly more likely to miss TB screening. Patients whose main reason for visiting the health facility was because they had TB-related symptoms; those who waited for at least 3 h before attending, were significantly more likely to miss TB screening.

Table V shows the factors associated with missing TB screening among patients at the two study sites. Patients who had a post-primary education level were 5.9 times more likely to miss TB screening than those who had the utmost primary education level (Adjusted Odds Ratio [AOR]=5.9; 95% Confidence Interval [95% CI]=1.3, 27.1). Patients who attended Bubulo HCIV were also 0.02 times more likely to miss TB screening than those attending Butiru HCIII (AOR= 0.02; 95% CI: 0.01, 0.2).

Discussion

Our findings show that slightly more than two-thirds of the patients who presented to the study health facilities with symptoms suggestive of TB missed the opportunity to be screened for TB. Our study showed that the factors associated with missing TB screening were, patients who had a post-primary level of education and those who attended

Table III. Proportion of patients who missed the opportunity to be screened for TB, stratified by facility type and background characteristics.

		Name of health facility				
Characteristic	Category	Total	Bubulo HCIV (N, %)	Total	ButiruHCIII (N, %)	Total (N, %)
Overall	Missed TB screening	79	76 (89.41)	46	9 (10.61)	85 (68.00)
Sex	Male	22	20 (91.00)	9	0 (0.00)	20 (23.53)
	Female	57	56 (98.25)	37	9 (24.32)	65 (76.50)
Age-group	18-29	18	18 (23.68)	17	3 (33.33)	21 (24.71)
	30-49	29	28 (36.84)	20	5 (55.56)	33 (38.82)
	50 and above	32	30 (93.80)	9	1 (11.11)	31 (36.51)
Marital status	Single	15	14 (93.33)	5	2 (40.00)	16 (18.80)
	Currently married	35	33 (94.31)	20	3 (15.00)	36 (42.10)
	Cohabiting	10	10 (100.00)	13	1 (7.70)	11 (13.00)
	Widowed/divorced	19	19 (100.00)	8	3 (37.50)	22 (25.90)
Employment status	Unemployed	65	62 (95.40)	39	8 (20.51)	70 (82.40)
	Employed	14	14 (100.00)	7	1 (14.31)	15 (17.70)
Education level	Primary	50	47 (61.84)	33	4 (44.44)	51 (60.00)
	Post-primary	29	29 (38.16)	13	5 (55.56)	34 (40.00)
Household size	1-5	42	40 (52.63)	10	3 (30.00)	43 (50.61)
	6 and above	37	36 (47.37)	17	6 (35.300)	42 (49.41)
Cost of one-way journey	500-2,000	57	57 (75.00)	38	9 (23.71)	66 (77.65)
to the health facility (UGX)	Above 2,000	22	19 (25.00)	8	0 (0.00)	19 (22.35)
Waiting time (in hours)	1-2	66	63 (82.90)	14	2 (22.20)	65 (76.50)
before being attended to	>2	13	13 (17.10)	32	7 (77.80)	20 (23.50)
Self-reported TB-related	No	4	4 (100.00)	0	0 (0.00)	4 (4.70)
symptoms	Yes	75	72 (96.00)	46	9 (19.61)	81 (95.30)
Main reason for the visit	Non-TB symptoms	56	55 (98.21)	9	2 (22.22)	57 (67.11)
	TB symptoms	23	21 (91.30)	37	7 (18.92)	28 (32.94)

Bubulo HCIV. Our finding that more than two-thirds of patients missed TB screening is similar to the findings from a study conducted in South Africa; where 62.9-78.5% of patients attending the clinic for TB-related symptoms missed TB screening (28). The proportion of patients who missed TB screening in our study is much higher than the national average for Uganda (45-50%) (18), probably due to the failure of healthcare workers at the two study sites to recognize symptomatic TB patients or failure to implement the recommended Uganda TB symptom screening algorithm (18).

Another study conducted in Uganda; reported that 75% of patients who presented with TB-related symptoms to healthcare facilities missed TB screening, and only 15% screened for TB (23). However, the study didn't establish the cause of such delays, although it was assumed that poor knowledge of TB symptoms among healthcare workers, could have resulted in low suspicion index for TB (14). The magnitude of these missed opportunities presents critical gaps in the clinical suspicion of TB; greatly contributing to an increased incidence of TB in families, and communities and negatively hindering TB prevention and control efforts in the district and Uganda in general.

Although findings from our study showed patients who had attained post-primary education level, were more likely to miss TB screening than those who had attained the utmost primary education level. Findings from several previous studies have shown no correlation between education level and TB screening in several settings (16,29). Similarly, findings from another study conducted in Uganda did not show any correlation between education level and the factors that affected TB screening in health facilities (19). However, in another study from Pakistan, it was found that patients who had higher education levels, had a greater level of awareness regarding tuberculosis warning signs, symptoms, and its risk factor (30). Good TB awareness among patients is associated with a high likelihood of being screened for TB (29,31), despite this fact; stigma, fear, and cultural beliefs can hinder TB screening in health facilities even among people with good education level (32).

Much as we did not collect data on why patients who had post-primary education level missed TB screening, it would also seem reasonable to suggest that these patients could have been busy or working patients who did not prefer to wait for long and could not bear long waiting

Table IV. Factors associated with missing TB screening at bivariate level.

Variable	Total N=125 (%)	Screening status: Screened n=40 (%)	Screening status: Not screened n=85 (%)	COR (95% CI)	P-value
Gender of the respondent					0.632
Male	31 (24.8)	11 (27.5)	20 (23.5)	1	
Female	94 (75.2)	29 (72.5)	65 (76.5)	1.2 (0.5, 2.9)	0.632
Age category					0.345
18-29 years	35 (28.0)	14 (35.0)	21 (24.7)	1	
30-49 years	49 (39.2)	16 (40.0)	33 (38.8)	1.4 (0.6, 3.4)	0.489
50 and above years	41 (32.8)	10 (25.0)	31 (36.5)	2.1 (0.8, 5.5)	0.148
Marital status of the respondent					0.057
Single	20 (16.0)	4 (10.0)	16 (18.8)	1	
Married	78 (62.4)	31 (77.5)	47 (55)	0.4 (0.1, 1.2)	0.109
Divorced/Widowed	27 (21.6)	5 (12.5)	22 (25.9)	1.1 (0.2, 4.8)	0.898
Employment status of the respondent					0.712
Employed	21 (16.8)	6 (15.0)	15 (17.6)	1	
Unemployed	104 (83.2)	34 (85.0)	70 (82.4)	0.8 (0.3, 2.3)	0.712
Education level					0.027
Primary	83 (66.4)	32 (80.0)	51 (60.0)	1	
Post Primary	42 (33.6)	8 (20.0)	34 (40.0)	2.7 (1.1, 6.5)	**0.030**
Household size					0.510
1-5	63 (50.4)	20 (50.0)	43 (50.6)	1	
>5	62 (49.6)	20 (50.0)	42 (49.4)	2.2 (0.5, 2.1)	0.951
Cost of one-way journey to the health facility (UGX)					0.530
500-2,000	95 (76.0)	29 (72.5)	66 (77.6)	1	
Above 2,000	30 (24.0)	11 (27.5)	19 (22.4)	0.8 (0.3, 1.8)	0.530
Aware about TB symptoms	64 (51.2)	39 (97.5)	25 (29.4)	0.01 (0.001, 0.08)	**0.001**
Waiting time (in hours) before being attended to					0.001
1-2	80 (64.0)	15 (37.5)	65 (76.5)	1	
>2	45 (36.0)	25 (62.5)	20 (23.5)	0.2 (0.1, 0.4)	**0.001**
Main reason for the visit					0.001
Non-TB symptoms	65 (52.0)	8 (20.0)	57 (67.1)	1	
TB symptoms	60 (48.0)	32 (80.0)	28 (32.9)	0.1 (0.1, 0.3)	**0.001**
Name of the facility					0.001
Bubulo HC IV	79 (63.2)	3 (7.5)	76 (89.4)	1	
Butiru HC III	46 (36.8)	37 (92.5)	9 (10.6)	0.01 (0.002, 0.04)	**0.001**

*P<0.05, **P<0.01, ***P<0.0001, (CI; Confidence Interval).

time evidenced in these health facilities during the study. Prior studies have also shown that many patients who turned up at health facilities for TB contact investigation left without investigation due to long wait times at health facilities, this led to many missed opportunities for TB screening (33,34).

Our findings show that patients who presented at Bubulo HCIV were more likely to miss TB screening than those who presented at Butiru HCIII. This is surprising considering that Bubulo HCIV is a higher-level facility that offers a comprehensive package of services including TB management, out-patient, and in-patient, maternal, and child health services, and is more equipped to offer all these services. Thus, the difference in the missed opportunities for TB screening between the two study facilities cannot be clearly articulated. Perhaps, Bubulo HCIV being a high-volume facility experiences a high patient load amidst low staffing levels which increases the time that patients have to wait to

Table V. Factors associated with missing TB screening at multivariate level.

Variable	COR (95% CI)	P-value	AOR (95% CI)	P-value
Education level				
Primary	1		1	
Post-Primary	2.7 (1.1, 6.5)	**0.030**	5.9 (1.3, 27.1)	**0.023**
Aware about TB symptoms	0.01 (0.001, 0.08)	**0.001**	0.1 (0.01, 1.5)	0.100
Waiting time (in hours) before being attended to				
1-2	1		1	
>2	0.2 (0.1, 0.4)	**0.001**	2.5 (0.4, 16.7)	0.335
Main reason for the visit				
Non-TB symptoms	1		1	
TB symptoms	0.1 (0.1, 0.3)	**0.001**	0.3 (0.1, 1.5)	0.156
Name of the facility				
Bubulo HC IV	1		1	
Butiru HC III	0.01 (0.002, 0.04)	**0.001**	0.02 (0.01, 0.2)	**0.001**

*P<0.05, **P<0.01, ***P<0.0001, (CI; Confidence Interval).

receive health care, including TB services. Patients, who can wait for a long before being attended to, are more likely to leave the health facility without being screened for TB (18). Much as our findings showed that patient waiting time did not have an impact on missing TB screening, evidence from other studies suggests that long patient waiting can significantly impact access to and uptake of health care services (11,19). Further research, preferably with a quantitative lens, is warranted to fully understand why TB screening at a health center IV level was worse than that at a lower-level facility (health center III) in this district.

Study limitations and strengths. The findings in our study should be interpreted with caution due to the relatively small sample size (N=125) used, this affected the study's reliability and we could not yield sound TB screening statistical comparisons between the two facilities. We realized recall bias during the exit interview; since some questions involved asking patients what had been asked by the health worker. This was minimized by confirming TB screening status from the facility's TB presumptive register and patients' books. This is the first study of its kind in Manafwa district and Uganda as a whole; the data presented will have a significant contribution towards strengthening TB screening programs at the health facilities in the district and the country in general.

Conclusion

Our finding shows that slightly more than two-thirds of the patients who presented to the study health facilities with symptoms suggestive of TB missed the opportunity to be screened for TB. The factors associated with missing TB screening were, patients who had a post-primary level of education and those who attended Bubulo HCIV. This study suggests the need to strengthen routine health education on TB and reduce patient waiting time to improve TB screening in health facilities.

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Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

Authors' contributions

Conceived and designed the study: WT, JPMM, DM, DM, and JKBM. Data collection: WT. Data analysis: WT. Manuscript preparation and editing: WT, JPMM, DM, DM, and JKBM. Manuscript review: WT, JPMM, DM, DM, and JKBM. All authors agree with the manuscript's results and conclusions. All authors read and approved the final manuscript for submission.

Competing interests

All the authors have declared that no competing interests exist.

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