Prevalence, Knowledge, and Occupational Risk Factors for Tuberculosis among Health Workers in Siaya County Hospitals, Kenya

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Abstract

BACKGROUND

TB is a known occupational hazard for healthcare workers (HCWs), especially in countries with high TB burdens. It is estimated that HCWs have a 2- to 3-fold increased risk of developing TB compared with the general population. This study sought to determine the burden of TB among healthcare workers in hospitals in Siaya County and establish their knowledge of TB, and the associated occupational risk factors.

METHODOLOGY

This analytical cross-sectional study investigated the burden, knowledge and occupational risk factors for TB among HCWs in Siaya County, using a sample of 275 participants. Sputum samples were collected for TB testing using GeneXpert. Self-administered structured questionnaires and observation checklists were used to collect data from the HCWs. Chi-square test of association and logistic regression were conducted to test for the presence and/or strength of association between participant characteristics, HCW knowledge of TB, and TB prevalence (α =0.05).

RESULTS

Among the 275 respondents, 18 (6.5%) reported a TB diagnosis within the past five years. Diagnostic tests used included Gene Xpert (69.2%), chest X-ray (19.3%), and smear microscopy (3.8%). Only 68 (24.7%) had received TB training, and 71 (25.8%) strongly disagreed that TB-related manuals were available at their health facilities. Health facilities that provided health talks and prioritized coughers for treatment were significantly associated with lower TB occurrence among health workers ($\chi2 = 11.125$, p = 0.012). However, factors such as consistent N95 mask supply ($\chi2 = 7.505$, p = 0.069), mask usage ($\chi2 = 6.335$, p = 0.135), designated sputum collection areas ($\chi2 = 6.714$, p = 0.116), functional IPC measures ($\chi2 = 7.796$, p = 0.067), scheduled health talks ($\chi2 = 8.353$, p = 0.052), and adequate lighting and ventilation ($\chi2 = 6.065$, p = 0.144) were not significantly associated with TB incidence among health workers.

CONCLUSION

The unavailability of certain infection prevention and control (IPC) interventions is associated with the occupational risk of TB among healthcare workers. The Ministry of Health should enhance the dissemination of relevant TB manuals to update health care staff on IPC and availing N95 masks to all healthcare workers.

Keywords: TB, Healthcare Worker, Occupational Risk, Infection Prevention Control, Siaya, Kenya

Introduction

An estimated global total of 10.6 million people fell ill with TB in 2022, equivalent to 133 incident cases per 100,000 population. Among all incident TB cases, 6.3% were among people living with HIV. Most TB cases in 2022 were in the WHO regions of South-East Asia (46%), Africa (23%) and the Western Pacific (18%), with smaller shares in the Eastern Mediterranean (8.1%), the Americas (3.1%) and Europe at 2.2%. In, 2021 Kenya was one of the high TB burden countries that achieved WHO's End TB Strategy milestone for 2020 with a 32% reduction in TB incidence compared to 2015 (1).

Estimated new TB cases in Africa hit over 2,720,000 in 2018, of whom about 740,000 (27%) died from related morbidities (2, 3). Although healthcare workers are at an increased risk of TB infection, the prevalence of TB among them in this high-burden TB setting is not known. Similarly, knowledge and occupational risk factors, are not fully understood (1).

Tuberculosis is a major occupational hazard among healthcare workers, not just in Kenya but globally due to consistent and routine exposure (4). This is especially true among the nurses and laboratory workers among the profession cadre who are regarded as high-risk groups for both latent tuberculosis infection (LTBI) as well as active TB (5), with the lowest risk noted among the administrative staff healthcare workers' latent tuberculosis infection (LTBI) as well as active TB (6-8).

Healthcare workers have a 2-3-fold more significant risk of active tuberculosis than the general population (9). Transmission of tuberculosis is a risk in healthcare and other congregate settings where many people share the same space for extended periods (8, 10, 11).

Healthcare workers are susceptible to latent tuberculosis infection, LTBI (12, 13), especially in high-burden tuberculosis countries, although most of the HCWs acquire *Mycobacterium tuberculosis* but do not progress to the active disease, leading to LTBI (14).

This study sought to determine the burden of TB among healthcare workers in hospitals in Siaya County and establish their knowledge of TB, and the associated occupational risk factors.

Methodology
Study design, area and population

This was an analytical cross-sectional study conducted in Siaya County, which lies within the greater western region of Kenya. In the devolved Siaya government, there are 6 Sub-counties.

In Siaya County, similar to the rest of Kenya, the doctor-patient ratio was 1:6505 and 1:1250 for nurses (15). The total population was 993,183 with a health care provider population of 3019. Out of these 664 were in the ten public hospitals in Siaya County, with a TB case notification rate of 314/100,000 population, compared to the National at 133/100,000 population (1).

The study included both technical and non-technical health care staff, aged ≥18 years who had worked in Siaya County health facilities for more six months and consented to participate in the study. Staff with long-term conditions affecting the chest e.g. congestive cardiac failure, those with confirmed bipolar disorder and were on treatment, or those who declined to participate were excluded from participation.

Sample size determination

The sample size was calculated using Yamane (16) formula as follows:

$$n = \frac{N}{1+N(e)^2}$$

Where: n = Sample size

N = Population size = 664

e = Margin of error (0.05; CI=95%)

$$n = \frac{664}{1 + (664 \times 0.05^2)}$$

n = 249.62

= 250

Adjusting by 10% for non-response, therefore: n = 275

Sampling technique

This study was conducted in ten public sub-county hospitals which were spread across the county. The hospitals were purposively selected due to the stability of staff retention compared to private hospitals where staff turnover was high. Healthcare workers in each facility were selected by simple random sampling, after stratification by cadre. In this study, only staff on duty were interviewed

Data collection

Self-administered mixed questionnaires were issued to eligible staff who consented to participate. Observation checklists were used in reporting. The same participants were issued with filled TB sputum request forms and falcon tubes for sputum samples.

The participants signed informed consent forms and closed-ended questionnaires issued to them self administration. This study used several questions organized in a 5-point Likert Scale to test the participant's level of knowledge regarding tuberculosis. Participants were also issued with filled coded request forms and coded falcon tubes for sputum collection which were sent to Gene Xpert sites and results were picked back for analysis.

Data analysis and presentation

Data was analyzed using SPSS version 23. Descriptive statistics were used to summarize the participant characteristics and TB prevalence. Chi-square test of association and logistic regression were conducted to test for the presence and/or strength of association between participant characteristics, HCW knowledge of TB, and TB prevalence (α =0.05). The results were presented in the form of coefficients, ratios and percentages, and illustrated using tables, charts and graphs.

Ethical considerations

The study was approved by the Board of Postgraduate Studies, JOOUST. Authority to carry out research from JOOTRH Ethical Research Committee (IERC/JOOTRH/530/21) and NACOSTI permit obtained. Permission to collect data from the study area was obtained from the Ministry of Health, Siaya County. All participants signed and informed consent forms before data was collected from them. Participant privacy and the confidentiality of the collected data was observed.

Results

Characteristics of the respondents

A total of 275 (female = 155; 56.4%) health workers were enrolled. The average age of the respondents was 35.3 (SD = 9.3) years, while the majority were 103 (37.5%) aged between 30-39 years. All (100.0%)study participants were Christians. Up to 154 (56.0%) were married and 56 (23.6%) of them resided in Alego Usonga Sub County.

Table 1:
Sampled Health Care Workers in the 10 Public Hospitals

Sub County	Level 4 Public Hospitals	Staff population	Sample
Alego Usonga	1. Siaya CRH	124	44
	2. Rwambwa SCH	61	22
Bondo	3. Bondo SCH	123	44
	4. Usigu SCH	54	19
	5. Uyawi SCH	44	16
Gem	6. Yala SCH	98	34
Rarieda	7. Madiany SCH	77	27
Ugenya	8. Ukwala SCH	76	27
Ugunja	9. Ambira SCH	102	36
	10. Sigomre SCH	41	15

More than half (159; 57.8%) of the respondents attained college (diploma) education. Over two-thirds (196; 71.3%) of the health workers were technical staff. The median number of years the health workers had worked in a healthcare setting was 5 (IQR = 7) years. Slightly over half (141; 51.3%) of the participants had worked in a healthcare setting for at most five years (Table 2).

Prevalence of tuberculosis

Of the 275 respondents, 18 (6.5%) reported having been diagnosed with TB in the preceeding five years. Therefore, the period prevalence of TB among health workers in Siaya County from 2017 to 2022 was 6.5% (95% CI 3.6%-9.4%). Up to 194 (70.6%) of the health workers reported never having a cough of any duration, weight loss, night sweats or chest pain at the time of the study. All HCWs who produced sputum during the study tested negative for TB. Thus, the point prevalence of TB among health workers was 0.0% (Figure 1).

Table 2:
Demographic characteristics of respondents

Characteristics		n (%)
Gender	Female	155 (56.4)
	Male	120 (43.6)
	Maternal age (years), mean (±SD)	35.3±9.3
	< 30	87 (31.6)
	30-39	103 (37.5)
	40-49	59 (21.5)
	50-59	24 (8.7)
	60-69	2 (0.7)
Religion	Christianity	275 (100.0)
Marital status	Single	67 (24.4)
	Widow	23 (8.4)
	Separated/Divorced	5 (1.8)
	Married, staying together	26 (9.5)
	Married, not staying together	154 (56.0)
Residence (Sub-county)	Ugunja	38 (16.0)
	Ugenya	50 (21.1)
	Alego Usonga	56 (23.6)
	Bondo	43 (18.1)
	Gem	28 (11.8)
	Rarieda	21 (8.9)
	No data	1 (0.4)
Education	Primary	9 (3.3)
	Secondary	47 (17.1)
	College (diploma)	159 (57.8)
	University (undergraduate degree)	47 (17.1)
	University (postgraduate degree)	13 (4.7)
Staff type	Non-technical	75 (27.3)
	Technical	196 (71.3)
	No data	4 (1.4)
	Duration of service in health care setting (years), median (IQR)	5 (7)
	≤ 5 years	141 (51.3)
	> 5 years	121 (44.0)
	No data	13 (4.7)

Knowledge level of healthcare workers on TB

The results indicated that only 68 (24.7%) had been trained on TB in the past two years. On whether the participants had been encouraged to interact during the TB training, 65 (23.6%) strongly disagreed and another 65 (23.6%) strongly agreed. On whether TB training content was organized and easy to understand 65 (23.6%) of the study participants strongly disagreed. The highest proportion (83; 30.2%) of health workers strongly agreed that the TB trainers were qualified and well prepared. About a quarter (66; 24.0%) of the health workers strongly disagreed that good quality TB teaching aid materials were provided during TB training. Regarding the adequacy and comfort of the lecture rooms used for TB training, 63 (22.9%) of the health workers strongly agreed. About one-quarter (71; 25.8%) of the respondents strongly disagreed that TB-related manuals were provided for reference back at their respective health facilities after undergoing TB training. Only 55 (20.0%) of the health workers strongly disagreed that TB training was helpful to them in patient management and TB infection prevention and control at the workplace (Table 3).

Occupational risk factors for TB infection among health workers

In this study, the occupational risk factors related to TB infection were compared between healthcare workers who ever tested positive for TB and those who never tested positive for TB in the last five years. Table 4 shows the distribution of TB prevalence among health workers in the last five years against occupational risk factors. Occupational risk factors prevention such as the constant supply of N95 masks ($\chi^2 = 7.505$, $p = 0.069$), putting on N95 masks ($\chi^2 = 6.335$, $p = 0.135$), provision of designated cough corner/sputum sample collection place ($\chi^2 = 6.714$, $p = 0.116$), availability of functional IPC ($\chi^2 = 7.796$, $p = 0.067$), availability of TB health talk schedule ($\chi^2 = 8.353$, $p = 0.052$) and availability of adequate lighting and cross ventilation in all waiting bays and clinical rooms ($\chi^2 = 6.065$, $p = 0.144$) were not significantly associated with TB prevalence among health worker (Table 4).
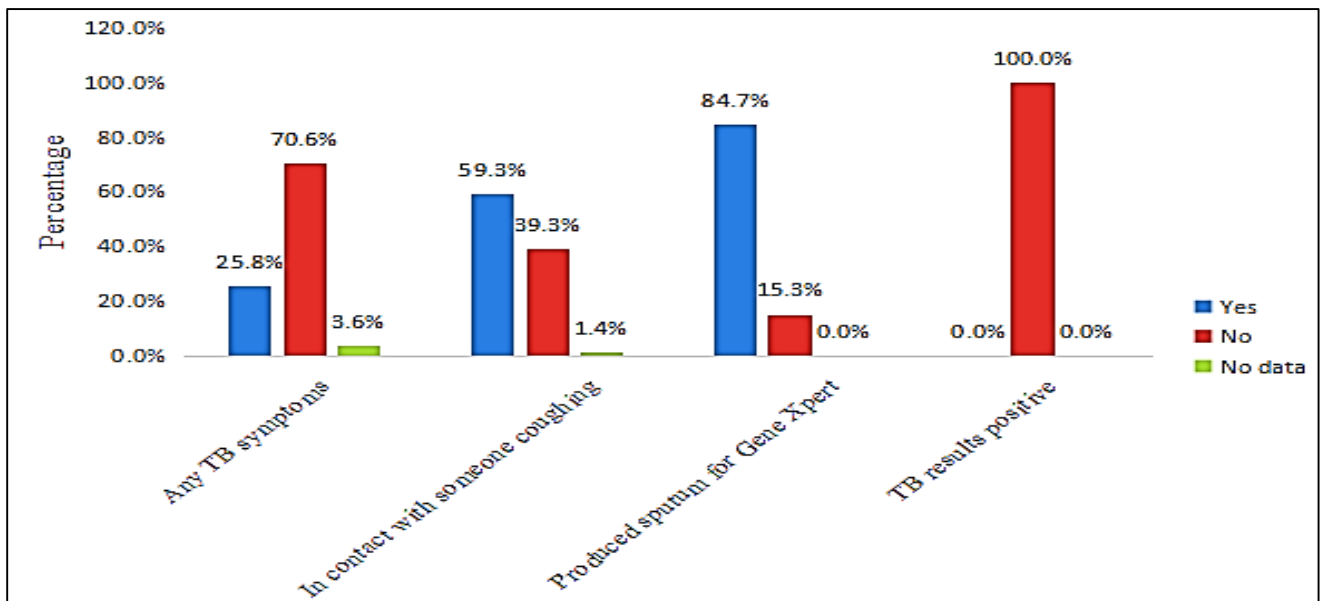

Figure 1:
TB Active Case Finding among Health Workers

Table 3:
Knowledge of Healthcare Workers on TB

Knowledge factors		n (%)
	Attended at least a TB capacity-building session	275 (100%)
Degree of satisfaction with capacity building	Strongly disagree	87 (31.6)
	Disagree	33 (12.0)
	Neutral	34 (12.4)
	Agree	42 (15.3)
	Strongly agree	68 (24.7)
	No response	11 (4.0)
Interactive TB training	Strongly disagree	65 (23.6)
	Disagree	23 (8.4)
	Neutral	33 (12.0)
	Agree	52 (18.9)
	Strongly agree	65 (23.6)
	No data	37 (13.5)
Well-organized and easily understood training content	Strongly disagree	65 (23.6)
	Disagree	18 (6.5)
	Neutral	32 (11.6)
	Agree	48 (17.5)
	Strongly agree	72 (26.2)
	No data	40 (14.5)
Qualified and well-prepared TB trainers	Strongly disagree	62 (22.5)
	Disagree	26 (9.5)
	Neutral	23 (8.4)
	Agree	41 (14.9)
	Strongly agree	83 (30.2)
	No data	40 (14.5)
Good quality teaching aid materials provided	Strongly disagree	66 (24.0)
	Disagree	27 (9.8)
	Neutral	32 (11.6)
	Agree	58 (21.1)
	Strongly agree	42 (15.3)
	No data	50 (18.2)
Adequate and comfortable lecture room	Strongly disagree	59 (21.5)
	Disagree	22 (8.0)
	Neutral	29 (10.5)
	Agree	52 (18.9)
	Strongly agree	63 (22.9)
	No data	50 (18.2)
Provision of TB-related manuals	Strongly disagree	71 (25.8)
	Disagree	27 (9.8)
	Neutral	34 (12.4)
	Agree	46 (16.7)
	Strongly agree	44 (16.0)
	No data	53 (19.3)
TB training in patient management and TB IPC at the workplace	Strongly disagree	55 (20.0)
	Disagree	23 (8.4)
	Neutral	24 (8.7)
	Agree	47 (17.1)
	Strongly agree	73 (26.5)
	No data	53 (19.3)

Table 4:

Occupational Risk Factors Associated with TB among Health Workers

Variables	All N=275 n (%)	Ever diagnosed with TB		χ²	*p*-value
		No (257) n (%)	Yes (18) n (%)		
TB health talks and segregation of coughing patients				11.125	0.012
Strongly disagree	22 (8.3)	21(8.5)	1 (6.3)		
Disagree	18 (6.8)	15 (6.0)	3 (18.8)		
Neutral	34 (12.9)	34 (13.7)	0 (0.0)		
Agree	94 (35.6)	84 (33.9)	10 (62.5)		
Strongly agree	96 (36.4)	94 (37.9)	2 (12.5)		
No data	11	-	-		
Constant supply of N95 masks				7.505	0.069
Strongly disagree	128 (49.0)	117 (48.8)	11 (68.8)		
Disagree	33 (12.6)	33 (13.5)	0 (0.0)		
Neutral	19 (7.3)	17 (6.9)	2 (12.5)		
Agree	38 (14.6)	35 (14.3)	3 (18.8)		
Strongly agree	43 (16.5)	43 (17.6)	0 (0.0)		
No data	14	-	-		
Putting on N95 masks				6.335	0.135
Strongly disagree	106 (41.9)	97 (40.9)	9 (56.3)		
Disagree	32 (12.6)	32 (13.5)	0 (0.0)		
Neutral	37 (14.6)	34 (14.3)	3 (18.8)		
Agree	25 (9.9)	22 (9.3)	3 (18.8)		
Strongly agree	53 (20.9)	52 (21.9)	1 (6.3)		
No data	22	-	-		
Designated cough corner/sputum sample collection place provided				6.714	0.116
Strongly disagree	31 (11.9)	28 (11.4)	3 (18.8)		
Disagree	30 (11.5)	28 (11.4)	2 (12.5)		
Neutral	39 (14.9)	38 (15.5)	1 (6.3)		
Agree	58 (22.2)	51 (20.8)	7 (43.8)		
Strongly agree	103 (39.5)	100 (40.8)	3 (18.8)		
No data	14	-	-		
Functional IPC present				7.796	0.067
Strongly disagree	20 (7.8)	19 (7.9)	1 (6.3)		
Disagree	30 (11.7)	29 (12.0)	1 (6.3)		
Neutral	67 (26.1)	63 (26.1)	4 (25.0)		
Agree	69 (26.8)	60 (24.9)	9 (56.2)		
Strongly agree	71 (27.6)	70 (29.0)	1 (6.3)		
No data	18	-	-		
TB health talk schedule present				8.353	0.052
Strongly disagree	26 (10.3)	23 (9.7)	3 (20.0)		
Disagree	19 (7.5)	19 (8.0)	0 (0.0)		
Neutral	58 (23.0)	53 (22.4)	5 (33.3)		
Agree	65 (25.8)	59 (24.9)	6 (40.0)		
Strongly agree	84 (33.3)	83 (35.0)	1 (6.7)		
No data	23	-	-		
Adequate lighting and cross ventilation present				6.065	0.144
Strongly disagree	11 (4.2)	10 (4.1)	1 (6.3)		
Disagree	16 (6.2)	14 (5.7)	2 (12.5)		
Neutral	41 (15.8)	36 (14.8)	5 (31.3)		
Agree	79 (30.4)	75 (30.7)	4 (25.0)		
Strongly agree	113 (43.5)	109 (44.7)	4 (25.0)		
No data	15	-	-		

Although none of the potential occupational risk factors significantly predicted TB infection among HCWs, HCWs who strongly agreed on health talks and segregation of coughers were less likely to get TB (COR = 0.45; 95% CI 0.04-5.16), while those who were neutral were more likely to get TB infection (COR = 1.25; 95% CI 0.26-6.14).

Table 5:
Occupational Risk Factors Influencing TB Occurrence among Health Workers

Predictors	Ever diagnosed with TB		Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	p-value
	No n (%)	Yes n (%)			
TB health talks and segregation of coughing patients					
Strongly disagree	21(8.5)	1 (6.3)	Reference		
Disagree	15 (6.0)	3 (18.8)	4.20 (0.40-44.40)	2.79 (0.06-141.58)	0.609
Neutral	34 (13.7)	0 (0.0)	N/A		
Agree	84 (33.9)	10 (62.5)	2.50 (0.30-20.63)	11.32 (0.41-312.35)	0.152
Strongly agree	94 (37.9)	2 (12.5)	0.45 (0.04-5.16)	0.88 (0.03-23.95)	0.939
Constant supply of N95 masks					
Strongly disagree	117 (48.8)	11 (68.8)	Reference		
Disagree	33 (13.5)	0 (0.0)	N/A		
Neutral	17 (6.9)	2 (12.5)	1.25 (0.26-6.14)	2.12 (0.06-70.49)	0.674
Agree	35 (14.3)	3 (18.8)	0.91 (0.24-3.45)	2.14 (0.05-90.61)	0.691
Strongly agree	43 (17.6)	0 (0.0)	N/A		
Putting on N95 masks					
Strongly disagree	97 (40.9)	9 (56.3)	Reference		
Disagree	32 (13.5)	0 (0.0)	N/A		
Neutral	34 (14.3)	3 (18.8)	0.95 (0.24-3.72)	0.61 (0.03-11.94)	0.745
Agree	22 (9.3)	3 (18.8)	1.47 (0.37-5.88)	0.66 (0.02-28.31)	0.828
Strongly agree	52 (21.9)	1 (6.3)	0.21 (0.03-1.68)	0.09 (0.01-3.66)	0.199
Designated cough corner/sputum sample collection place provided					
Strongly disagree	28 (11.4)	3 (18.8)	Reference		
Disagree	28 (11.4)	2 (12.5)	0.67 (0.10-4.30)	0.51 (0.01-48.17)	0.769
Neutral	38 (15.5)	1 (6.3)	0.25 (0.02-2.49)	0.17 (0.01-17.34)	0.452
Agree	51 (20.8)	7 (43.8)	1.28 (0.31-5.35)	12.17 (0.28-531.64)	0.195
Strongly agree	100 (40.8)	3 (18.8)	0.28 (0.05-1.46)	3.98 (0.13-122.72)	0.430
Functional IPC					
Strongly disagree	19 (7.9)	1 (6.3)	Reference		
Disagree	29 (12.0)	1 (6.3)	0.66 (0.04-11.12)	7.17 (0.05-1125.96)	0.445
Neutral	63 (26.1)	4 (25.0)	1.21 (0.13-11.45)	0.95 (0.01-78.54)	0.981
Agree	60 (24.9)	9 (56.2)	2.85 (0.34-23.97)	0.66 (0.01-57.42)	0.856
Strongly agree	70 (29.0)	1 (6.3)	0.27 (0.02-4.54)	0.34 (0.01-73.86)	0.693
TB health talk schedule present					
Strongly disagree	23 (9.7)	3 (20.0)	Reference		
Disagree	19 (8.0)	0 (0.0)	N/A		
Neutral	53 (22.4)	5 (33.3)	0.72 (0.16-3.28)	3.28 (0.05-238.12)	0.587
Agree	59 (24.9)	6 (40.0)	0.78 (0.18-3.38)	6.56 (0.11-383.56)	0.365
Strongly agree	83 (35.0)	1 (6.7)	0.09 (0.01-0.93)	0.40 (0.01-54.29)	0.715
Adequate lighting and cross ventilation present					
Strongly disagree	10 (4.1)	1 (6.3)	Reference		
Disagree	14 (5.7)	2 (12.5)	1.43 (0.11-18.00)	4.06 (0.01-1201.19)	0.629
Neutral	36 (14.8)	5 (31.3)	1.39 (1.15-13.29)	1.13 (0.01-139.05)	0.962
Agree	75 (30.7)	4 (25.0)	0.53 (0.05-5.26)	0.02 (0.00-2.01)	0.097
Strongly agree	109 (44.7)	4 (25.0)	0.37 (0.04-3.61)	0.52 (0.01-39.95)	0.766

Regarding staff who put on N95 masks reviewing patients; those who strongly agreed had lower odds of TB infection (COR = 0.95; 95% CI 0.24-3.72, COR = 0.21; 95% CI 0.03-1.68), respectively, while those who agreed with the statement had increased odds of TB infection than the health workers who strongly disagreed with the statement (COR = 1.47; 95% CI 0.37-5.88). About functional IPC committees, the odds of TB infection among health workers were lower among those who were neutral (AOR = 0.95; 95% CI 0.01-78.54), agreed (AOR = 0.66; 95% CI 0.01-57.42) or strongly agreed (AOR = 0.34; 95% CI 0.01-73.86) and higher among those who disagreed (AOR = 7.17; 95% CI 0.05-1125.96) that health facilities had functional IPC compared to the health workers who strongly disagreed when all other factors were constant. On TB health talk in health facilities, it remained less likely to get TB infection than those who strongly disagreed. Those who were neutral (AOR = 1.13; 95% CI 0.01-139.05) that health facilities had adequate lighting and cross ventilation in all waiting bays and clinic rooms increased their odds of TB infection (Table 5).

Discussion
Demographic characteristics of participants

In Siaya County, 6.5% of health workers were diagnosed with tuberculosis (TB) between 2017 and 2022, suggesting that TB prevalence among healthcare workers in the county was relatively high compared to a previous study done in Makindu and Kiamb, where only 16 (2.96%) HCW were diagnosed with TB out of 541. Since only staff on duty were interviewed and investigated during the study, there may be a likelihood of more staff having a history of previous TB disease and probably those who had active TB Disease were on sick off. The average age of 35.3 years indicates that most healthcare workers in Siaya County are young. The level of education of the healthcare workers in Siaya is evident that more than half of the respondents have college diploma education with only 47 of the participants having undergraduate education. Over half of the healthcare workers had worked in healthcare settings for at most five years. This shows that most of the healthcare staff in Siaya are experienced in offering services. Experience in the healthcare sector by healthcare practitioners is critical because it gives healthcare professionals confidence. (17, 18). Studies have confirmed that healthcare workers appear to be at an increased risk of TB compared to the general population (7, 12, 19-21).

Regarding participants' training on TB in the past 2 years, the majority of the participants interviewed, 87 (31.6%) strongly disagreed, meaning that most HCWs in Siaya do not have updated information regarding tuberculosis as a disease and are not up-to-date on the latest advances in the field of TB. The WHO (1) asserts that TB is a serious and potentially life-threatening infectious disease that requires specialized knowledge and skills to manage effectively. Research by Vigenschow, Edoa (22) found that interactive training on tuberculosis was significantly associated with high knowledge scores among healthcare workers. Alotaibi, Yassin (23) emphasized the need for regular training for HCWs using the case of Riyadh, Saudi Arabia. According to Shrestha, Bhattarai (24), uncomfortable or poorly equipped consultation rooms could negatively impact the overall well-being of healthcare workers.

Occupational risk factors for TB infection among healthcare workers

The results here suggest that after controlling for potential confounding factors such as occupational risk factors such as age, gender, and TB knowledge, healthcare workers who agreed or strongly agreed with the following statements had a lower risk of TB infection: health facilities conduct health talks and segregate patients with cough, HCWs put on N95 masks when reviewing patients with cough or known TB patients, health facilities have

functional infection prevention and control measures, and Health facilities have TB health talk schedules. However, those who disagreed or were neutral with these statements had a higher risk of TB infection.

Conclusion

The low healthcare workers' knowledge of tuberculosis may imply significant shortcomings in the current training programs for TB among healthcare workers. This study found none of the proximal risk factors significantly predicting TB infection status among HCWs in SIaya County. In part, this could be because of the relatively low prevalence of TB in the study population.

Recommendations

Ministry of Health (National and Siaya County) and hospital administration should facilitate frequent TB screening to identify each healthcare worker with TB, and all put on early treatment. It should provide sustained dissemination of knowledge about tuberculosis to all healthcare workers in the county. In addition, healthcare workers should be provided with TB-related manuals and other necessary materials for reference. All health facilities in Siaya County should prioritize the implementation of infection prevention and control (IPC) measures in all health facilities to prevent health workers from acquiring tuberculosis while on duty.

Recommendations for Future Studies

Future studies should delve into the reasons for the knowledge gap on TB among healthcare workers in Siaya County. Additionally, a case study design may be more tractable in unpacking any associations between occupational risk factors and TB infection.

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