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PREVALENCE AND KNOWLEDGE OF PULMONARY TUBERCLOSIS AMONG PRISON INMATES AT MALUKHU GOVERNMENT PRISON, MBALE CITY, EASTERN, UGANDA. A CROSS-SECTIONAL STUDY.

Wilson Wakora, Ivan Awach Ogwal*
St Francis School of Health Sciences

Abstract

Background

Globally, about 1.7 billion individuals globally harbor Tuberculosis infection and approximately (5-10) % may progress with TB in their lifetime, responsible for 1.3 million deaths worldwide.

Objectives

The purpose of the study was to determine the prevalence and knowledge of pulmonary tuberculosis among prison inmates at Malukhu government prison, Mbale City, Eastern Uganda.

Methods

A descriptive cross-sectional study that utilized quantitative methods of data collection with a duration of 21 days. 100 respondents were selected using a purposive sampling method. A structured questionnaire was used to collect data and involved closed-ended questions. The data collected was analyzed using Microsoft Excel 2013 and arranged in the form of pie charts, tables, and graphs.

Results

The prevalence of pulmonary tuberculosis among respondents was 10%. The knowledge of respondents about Tuberclosis was adequate, where the highest source of information about Tuberclosis was from health workers (70%), 75%of the respondents knew that tuberculosis is gotten from cigarette smoking, 95% is spread through sneezing and coughing for more than two weeks is a common sign (70%). The practices of respondents in the context of the study were 80%, were not cigarette smokers and 20% were cigarette smokers.

Conclusion

The knowledge and practices of respondents towards tuberculosis were adequate with prevalence being high among respondents aged 50-59 years (3%).

Recommendations

The government of Uganda through the /*Ministry of Health should continue with massive sensitization of Tuberculosis disease, spread, prevention, and treatment—furthermore, enforcement of TB screening in prisons. There is a need for prison Wardens to inform the prisoners to avoid practices like cigarette smoking to reduce the effects of tuberculosis.

Keywords; *Pulmonary Tuberculosis, Prison Inmates, Malukhu Government Prison, Mbale City.*
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Corresponding author: *Wilson Wakora*
St Francis School of Health Sciences

Background of the study.

Tuberculosis (TB) is a communicable disease caused by the Bacillus Mycobacterium tuberculosis which spreads through respiratory droplets. The disease manifests signs and symptoms like coughing for three or more weeks, chest pain, pain while breathing, coughing blood, weight loss, fatigue, night sweats, chills, and loss of appetite.

Globally, about 1.7 billion individuals harbor Tuberculosis infection and approximately (5-10) % May progress with TB disease in their lifetime are responsible for 1.3 million deaths worldwide, and the deaths are related to poor management related to several factors (Kazibwe *et al.*, 2022).

Uganda as a country is ranked 16th on the list of the 22 most tuberculosis-burdened countries in the world prisons being the most affected places. It has an estimated tuberculosis prevalence of 651/100000 but this might be under-estimated as national notification data is often incomplete due to inadequate reporting and recording.

Tuberculosis is an airborne infection, and overcrowding in prisons creates a prime condition for its spread, more so the lifestyle, such as cigarette smoking which is very common in prisons may increase the chances of developing pulmonary tuberculosis among inmates.

In Sub-Saharan Africa, prisoners were at high risk of pulmonary tuberculosis disease due to overcrowding and poor ventilation. Consequently, tuberculosis was one of the leading causes of morbidity and mortality in prisons. According to the study carried out in Sub-Saharan Africa, it indicates that about 37 studies comprising 72844 prison inmates were involved in the study, the prevalence

was 7.74%. Subgroup analysis shows that the Democratic Republic of Congo will have the highest prevalence of about 19.7% followed by Zambia at 11.68%, then Ethiopia at 9.22%.

According to the study carried out in Malawi, of 1652 registered Tuberculosis cases 15.4% were prison inmates (all males),72% none prisoners (58% male) and the median age of the cases was 35 years. Therefore Tuberculosis remains the main global health problem.

In Uganda tuberculosis prevalence countrywide, is about 623 per 100000 prisoners (WHO, 2019) compared to the 174 per 100000 people in the whole country. This figure was blamed due to overcrowding in the prisons and the inaccessibility of treatment.

Luzira prison for example was supposed to accommodate about 1000 inmatesbut the numbers go up to 3,500 prisoners. Therefore, there are fears that the high rate of tuberculosis in prisons was coupled with poor health care which contributes to the problem of multi-drug resistance tuberculosis strains.

This study hence seeks to investigate the prevalence and knowledge of pulmonary tuberculosis among prison inmates at the Malukhu government prison.

METHODOLOGY

Study design

The study employed a cross-sectional study design for determining the prevalence of pulmonary tuberculosis among prison inmates at Malukhu government prison, Mbale City, Eastern Uganda. It was for enabling dependent and independent variables to be assessed at the same time and there was to be no follow-up of the study participants.

Study area

The study was conducted from June 2023 to November 2023.in Malukhu government prison, which is found in the industrial division in Mbale City located in the eastern region of Uganda. Mbale City is bordered by Tororo to the South, Manafwa District to the southeast, Sironko District to the northeast, Kumi District to the northwest, and Butaleja District to the southwest. Mbale city covers a geographical area of 2435 hectares.

Study population

The study consisted of prison inmates at Malukhu government prison, Mbale City, Eastern Uganda

Sample size determination

The Kish and Leslie formula (1965) is employed to determine the sample size below

Where

$$n = \frac{Z^2PQ}{I^2}$$

n was the sample size Z was the standard normal deviation corresponding to the confidence Interval i.e., 1.96I was Errors allowed (desired level of precision at a percentage of 7%) =0.07

P was prevalence attributed to a recent similar research study=15% which is 0.15 in decimal.

Q was exclusion value in the study= (1- p) = (1-0.15) Hence,

$$n = \frac{1.9^2 \times 0.15 \times (1 - 0.15)}{0.07^2}$$

$$=99.82 \approx 100$$

Sampling technique.

The study participants were selected using a purposive sampling method where respondents with specific characteristics were selected according to the signs and symptoms shown. This was done till the required number of respondents was reached in 21 days.

Data collection method.

A structured interview questionnaire method of data collection was used and involved two or more people exchanging information through a series of questions and answers. The questions were designed to elicit information from interview participants on the study topic and where the interviewee doesn't understand the interviewer translated into the local language.

Data collection tools

The questionnaire consisted of closed-ended questions written in simple English language and filled.

The questionnaire was written and pre-tested to adjust for any ambiguity or errors and corrections were made. A laboratory request form, sample logs, and study register, in addition to Zn reagents, glass slides, heart source, sterile sputum containers, cotton wool, applicator sticks, and stationaries (books, pens, pencils, rim of papers) were used.

Data collection procedures

An introductory letter from the school to the prison administration of Malukhu government prison, the hospital administrator of Mbale Regional Referral Hospital, laboratory manager of Mbale Regional Referral Hospital laboratory for authorization after which a consent letter was presented to the participants. One laboratory assistant from Malukhu Prison Health Center III was identified and trained as a research assistant and helped in filling out questionnaires. The questionnaires were provided to the clients to obtain their credentials as needed by the study for convenience, all questionnaires were filled in my presence to obtain reliable information needed for the study, and guidance was provided if necessary.

The final data concerning the prevalence of pulmonary tuberculosis was obtained after laboratory diagnosis of sputum samples collected, using the Zn technique about details obtained from questionnaires.

Study variables Independent variable
Knowledge of pulmonary tuberculosis among prison inmates at Malukhu government prison.
Practices leading to pulmonary tuberculosis among prison inmates.

Dependent variable
Prevalence of pulmonary tuberculosis in prison inmates.

Quality control
Pre-testing of data collection tools was done before actual data collection by conducting a pilot study.

Validity
This was done by checking how well the results correspond to established theories and other measures of the same concept by setting questions according to research objectives.

Reliability
This was done by checking the consistency of the results across time, across different observers, and across parts of the test itself hence the method of data collection yielded related results from those achieved during the pre-testing stage.

Data analysis and presentation.
The questionnaires were collected from the respondents after filling in their views and counted to ensure that all will be returned and checked for completion. Data was grouped, tallied, and processed so that information was obtained from raw data that was comprehensive. The results for all objectives were examined, categorized, and presented in summarized separate graphs, frequency tables, figures, percentages, and information was analyzed using Microsoft Excel, 2013 using a computer.

Inclusion criteria.
The prison inmates at Malukhu government prison presented signs and symptoms of pulmonary tuberculosis and were willing to consent during the time of the study.

Exclusion criteria.
All the prison inmates who didn't present any signs and symptoms of pulmonary tuberculosis.

Ethical consideration
An introductory letter will be sought from St. Francis School of Health Sciences Mukono and will be presented to a prison warden of Malukhu government prison for permission to carry out the study.
Consent will be sought from all participants who will participate in this study and all matters arising from the discussion will be kept confidential.

RESULTS

Table 1: Shows socio-demographic factors.

Variable	Category	Frequency (f)	Percentage (%)
Age	20 - 29	10	10
	30 - 39	35	35
	40 – 49	30	30
	50 – 59	15	15
	60 above	10	10
	Total	100	100
Gender	Male	70	70
	Female	30	30
	Total	100	100
Education level	Primary	44	44
	Secondary	38	38
	Tertiary	6	6
	None	12	12
	Total	100	100

The results from Table 1 show that the majority of respondents (35)35% were aged 30-39 years,(30)30% of the respondents were aged 40-49 years, (15)15% of respondents were aged 50-59 years, (10)10% were aged 20-29 years, then the (10)10% of respondents were aged 60 years and above.

Regarding the Genda, the Majority of respondents (70)70% were males, and a minority of therespondents (30)30% were females.
Regarding the level of education, the majority of respondents (44)44% were primary leavers,(38)38% of the respondents were secondary leavers, (12)12% of respondents had never gone to school and the minority (6)6% of the respondents had reached tertiary institutions

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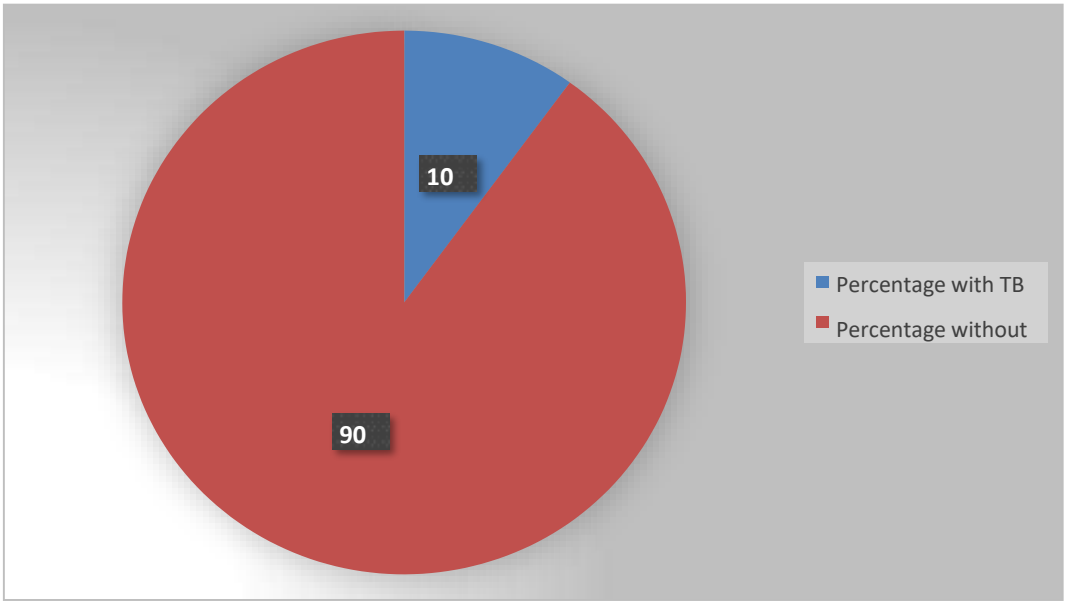
Prevalence of pulmonary tuberculosis among prison inmates at Malukhu government prison.

The pie chart shows the prevalence of pulmonary tuberculosis among prison inmates at Malukhu government prison.

Figure 1: Pie chart showing PTB Prevalence among prison Inmates



From Figure 1, of the 100 study participants who were involved, sampled, and those whose smears were examined for AFBs, 10/100 participants had acid-fast bacilli (positive cases) and 90/100 participants were negative for pulmonary tuberculosis hence giving a prevalence of 10%.

Knowledge of pulmonary tuberculosis among prison inmates at Malukhu government prison.

Table 2, shows respondents' knowledge of pulmonary tuberculosis.

Variable		Frequency (f)	Percentage (%)
Whether the respondents have Have you ever heard about TB	Yes	100	100
	No	00	00
Total		100	100
Knowledge of lifestyle that leads to pulmonary tuberculosis			
Cigarette smoking		75	75
Having a family member who has ever suffered from TB		10	10
All the above		15	15
Total		100	100
Knowledge of signs and Symptoms of TB			
Coughing for more than 2 weeks		70	70
Night sweats		2	2
Coughing blood		20	20
All above		8	8
Total		100	100

The findings of the study in Table 2 reveal that all the respondents had ever heard aboutpulmonary tuberculosis. Results in Table 2 indicate that the majority, 75 (75%) of respondents knew cigarette smoking ashes leading lifestyle that led to pulmonary tuberculosis while the minority 25(25%) did not know cigarette smoking as the lifestyle that led to pulmonary tuberculosis. The minority 10(10%) knew having a family member who had ever

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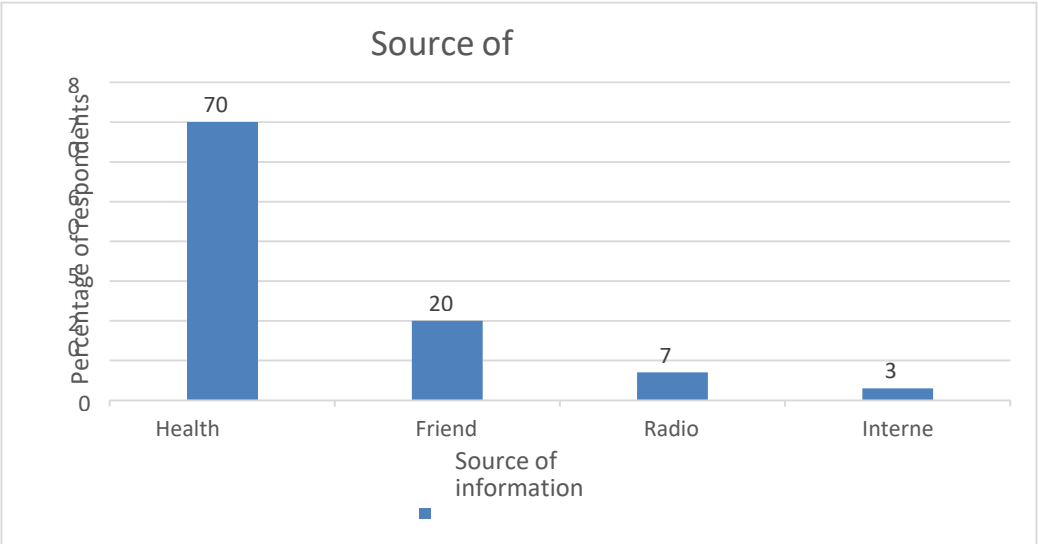
suffered from TB was a lifestyle that led to pulmonary tuberculosis while the majority 90(90%) did not know that having a family member who had ever suffered from TB was a lifestyle that leads to TB. 15% of the respondents knew cigarette smoking and having a family that had ever suffered from pulmonary tuberculosis as a lifestyle that leads to pulmonary tuberculosis while the majority 85(85%) didn't know both cigarette smoking and having a family member as the lifestyles that lead to pulmonary tuberculosis.

The results from the table also show that 70% of respondents know coughing for more thantwo weeks as a sign and symptom of pulmonary tuberculosis. 20% of respondents know coughing blood, 8% of the respondents know night sweats, coughing for more than two weeks, coughing blood as signs of pulmonary tuberculosis, and then the minority about 2% know only night sweats as a sign of pulmonary tuberculosis.

Figure 2, Shows respondents' source of information on pulmonary tuberculosis.



Results from Figure 2 shows that the majority of respondents 70% got information from health workers, 20% from family and friends, 7% got information from radios, and 3% from the internet.

Figure 3: Shows how pulmonary tuberculosis spreads

Figure 3 shows that the majority 95% of respondents knew that pulmonary tuberculosis is spread through sneezing and coughing while a minority of respondents 5% knew that pulmonary tuberculosis is spread through respiratory droplets.

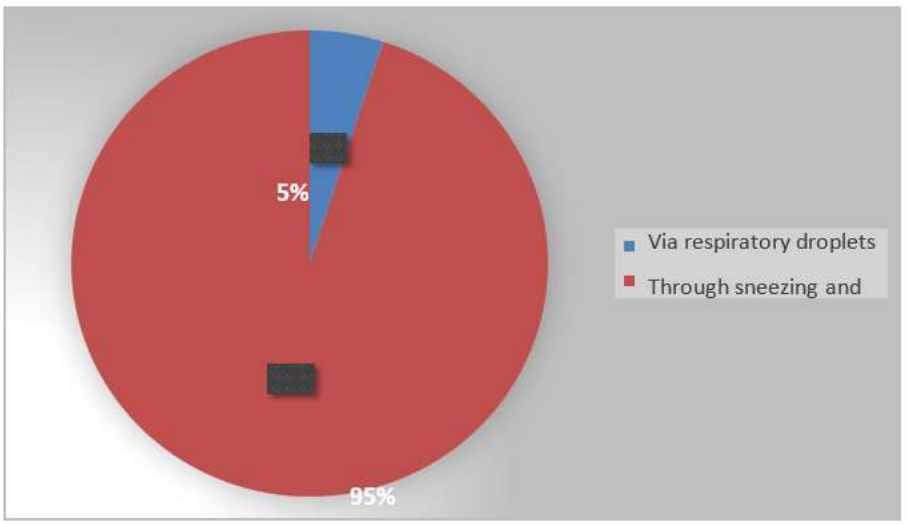


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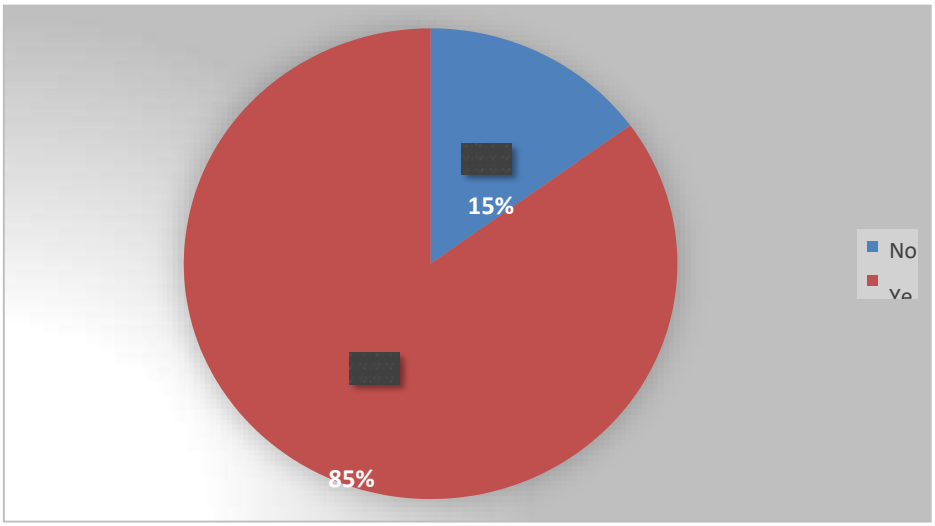
Figure 4: Shows whether the respondents know that pulmonary tuberculosis can be treated.



Results from Figure 4 show that the majority of respondents about 85% know thatpulmonary tuberculosis can be treated while a minority 15% know that it cannot be treated.

Figure 5: Shows whether respondents were cigarette smokers

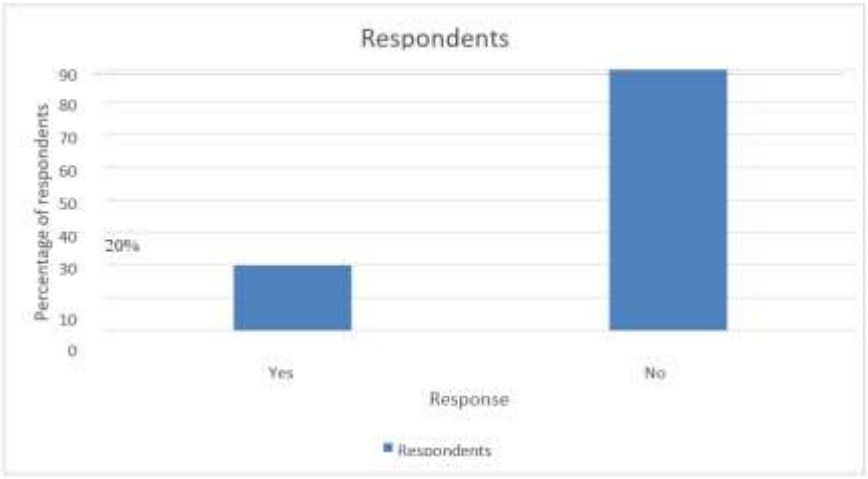


Figure 5 results reveal that the majority of respondents about 80% were not cigarettesmokers while a minority of respondents 20% were cigarette smokers.

Table 3; shows whether the respondents had ever been screened for pulmonary tuberculosis.

Variable	Frequency (f)	Percentage (%)	Positives for TB
Yes	72	72	7
No	28	28	3
Total	100	100	10

Results in Table 3 show that the majority of respondents 72% had ever been screened for pulmonary tuberculosis with a TB prevalence of 7(7%) while the minority 28% had never screened for pulmonary tuberculosis with a tuberculosis prevalence of 3(3%).

Discussion

Prevalence of pulmonary tuberculosis among prison inmates

About Table 2 and Figure 1, the study findings indicated the following. The prevalence of pulmonary tuberculosis among prison inmates at Malukhu government prison was found 10%. This indicates that out of 100 participants who participated, 10(10%) were found with acid-fast bacilli in their sputum smears. This could be attributed to the conditions at which the prisoners stay for example overcrowding in their prison wards which eases the transmission of pulmonary tuberculosis and also other prison inmates having other diseases like HIV/AIDS which makes them immunocompromised. This high prevalence is also attributed to the fact that these study participants were involved in alcoholism and cigarette smoking. The findings of the study were higher than that of a study.

The knowledge of pulmonary tuberculosis in prison inmates

The findings of the study revealed that all the respondents (100%) had ever heard about tuberculosis whereas the majority 70% of the respondents got information from health workers.This is because of massive education about tuberculosis and its prevention at prisons this is the same study by (Haque, A. T. M.,2018) in a Malaysia prison that revealed that100% of the respondents had heard about Tuberculosis of which the majority 54% of them gotthe information from the Doctors.

The study findings obtained in the study show that majority 95% of the respondents knewthat tuberculosis is spread through sneezing and coughing which is higher than that of the

a study carried out (DS Abebe, *et al.*,2018) which revealed that 75% of the respondents described sneezing as a mode of transmission of TB.

Practices leading to Pulmonary tuberculosis among prison inmates

The study findings showed that the majority of respondents, 80% were not cigarette smokers because they knew the dangers of cigarette smoking towards TB. This is slightly lower than the study by Victor G *et al,* (2021) in central and South American prisons which revealed that 93.7% of therespondents were not cigarette smokers.

In addition, the findings of the study also showed that the majority of respondents 72% had never screened for pulmonary tuberculosis which is slight.

Conclusion

The prevalence of pulmonary tuberculosis was high among prison inmates 10% at Malukhu government prison, Mbale city, Eastern Uganda.

The knowledge of respondents about pulmonary tuberculosis was adequate where the sourceof information about pulmonary tuberculosis was health workers (70%), (20%) friends,(7%) from radios, and a minority (3%) from the internet. 75% of the respondents knew that tuberculosis is gotten from cigarette smoking, where the disease is spread through coughing and sneezing (95%) and the common sign and symptom is coughing for more than two weeks (70%).

The practices of the respondents in the context of the study were, that 80% were not cigarettesmokers, and 72% had never been screened for tuberculosis.

Limitation of study

Some participants were not willing to give all the information that they had regarding thestudy.

Limitations from funds most especially for research requirements such as printing, buying slides, photocopying, buying stains, buying pens, and notebooks were also encountered.

Recommendations

- To the Ministry of Health. The government of Uganda through the Ministry of Healthshould continue with massive sensitization of TB disease, spread, prevention, and treatment—furthermore, enforcement of TB screening of those prison inmates.
- To the prison Wardens; There is a need to inform prison inmates to avoid practices like cigarette smoking which will enable them to reduce on increased prevalence of pulmonary tuberculosis in prisons.

Acknowledgment

I am thankful to the almighty God for giving me the strength, knowledge, ability, and opportunityto undertake this study and complete it satisfactorily.

Secondly, I would like to extend my gratitude to my family members for having supportedme. Without their encouragement, love, and support none of this would have been possible.

I am also thankful to the Prisons Officer in charge, staff, and hospital director for their guidanceduring this whole process of research.

I am also grateful to my supervisor for his mentorship and continuous guidance throughout the various stages of this research. His suggestions and comments were genuine and based onthe research guidelines.

Abbreviations

AFBS: Acid Fast Bacilli.
H/W: Health workers.
MoH: Ministry of Health.
ZN: Ziehl-Nielsen.
WHO: World Health Organization.
TB: Tuberculosis.
WWW: World Wide Web.
PTB: Pulmonary Tuberculosis.
HIV: Human Immunodeficiency Virus.
AIDS: Acquired Immunodeficiency Syndrome.

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Conflict of interest
No conflict of interest.

Authors Biography
Wilson Wakora is a Medical Laboratory Technology student at St Francis School of Health Sciences.
Ivan Awach Ogwal, supervisor, St Francis School of Health Sciences

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