

# Assessing The Rate of HIV Infection Among Age Groups of Tuberculosis Patients in Ghana

(A Cross-sectional study)

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**Abstract:** Despite the numerous interventions to alter the course of the HIV/AIDS epidemic in Ghana, challenges still remain, especially in HIV/TB co-infection. It is spread by certain types of human behaviors which are influenced by age groups and societal norms. The aim of the study was conducted to assess the prevalence/rate of HIV infection among age groups of TB patients attending the Chest Clinic at the Korle Bu Teaching Hospital in Ghana.

**Methodology:** The study employed a cross-sectional study design utilizing retrospective secondary data. A redcap tool was used to collect the data from entries made of patients' daily clinical attendance at the Korle Bu Chest Clinic from January 2020 to September 2020. The data was edited, coded, transcribed, cleaned, and analyzed using Microsoft Excel tool 2019 and SPSS version.25.0 and the results were presented in descriptive statistics such as frequencies, percentages, tables, and figures.

**Findings:** The total of clients was five hundred and five (505). The mean age of the respondents was 42.9 ( $\pm 15.9$ ). The majority, 40% of the patients are in the 41-60 age group followed by the 39.9% (21-40) age group. 61.7% (465) of the patients were males. There was no recorded HIV infection among the ages 61 years and above group even though HIV infections were recorded in the lower age groups. The highest HIV contraction of 10.0% (15) occurred in the 41-60 years age group followed by 9.5% (13) in the youthful age (21-40 years) group.

**Conclusion:** The prevalence/rate of HIV among TB patients was 7.5% among (41-60 years).

**Keywords:** Prevalence, Tuberculosis, Human Immunodeficiency Virus, Age groups.

## Introduction

The Centers for Disease Control and Prevention defined Tuberculosis as a disease caused by a bacterium referred to as Mycobacterium tuberculosis (MTB), this definition is consistent with that of the World Health Organization which also claims it is an infectious disease that is caused by the bacillus Mycobacterium tuberculosis (MTB) [1]. The Centers for Disease Control and Prevention establishes that aside from the bacteria attacking the lungs it can attack any part of the body that is any organ or tissue, for instance, the kidney, brain, spine, etc. They assert that when not treated properly TB can be very fatal [2].

The disease mainly or stereotypically affects the lungs though other sites can affect them. Lung sites affected by the disease are referred to as pulmonary TB, but the other sites affected are referred to as extra-pulmonary TB. The disease is infectious and spread from one to the other through the droplets of an infected person when they sneeze or cough and individuals nearby after breathing in these bacteria become infected, however, the mode of spread is not by shaking, sharing food or drink, kissing or any form of physical contact. The infected person has a high probability of spreading it to people around him for instance family members who stay with him/her [2]. The Mayo Clinic also defines Tuberculosis (TB) as an infectious disease that affects the lungs. The causative agent is the bacteria, which spreads from person to person through tiny droplets released into the air through their coughs and sneezes. [3]. In congruence, the

WHO also mentioned Tuberculosis is caused by bacteria that affect the lungs. One gets infected by inhaling a small amount of these droplets from an infected person. Tuberculosis is curable and preventable [4].

### Methods

The study employed a cross-sectional study design utilizing retrospective secondary data. A redcap tool was used to collect the data from entries made of patients' daily clinical attendance at the Korle Bu Chest Clinic from January 2020 to September 2020. The data was then prepared by going through editing, coding, transcribing the stored data, and cleaning. The data were analyzed using Microsoft Excel tool and SPSS version.21 and presented in descriptive statistics such as frequencies, percentages, tables, and figures.

### Study Area

The study was conducted using secondary data from the Chest Diseases unit of the Korle Bu Teaching Hospital.

### Study Population

In research, the whole population that is under consideration is referred to as the "target population" while the selected sample from the population is referred to as the "study population" [5]. The population targeted in this study were all HIV Patients who attended the Chest clinic in the period January 2020 to September 2020 regardless of their age.

### Sampling Size and Technique

The study utilized all entries made into the Chest unit's HIV record. The sample was taken from January 2020 to September 2020. This secondary database is generated by the Korle Bu Chest unit as a result of daily documentation of patient attendance.

### Inclusion Criteria

1. Record of all clients in the TB records book, of the Chest Clinic Korle-Bu
2. Period of review: January 2020 to September 2020.
3. All Gender at all ages

### Exclusion Criteria

1. All cases recorded after September 2020
2. All cases recorded before January 2020

*Data Collection:* Secondary Data collection was carried out from September 2020 to October 2020. Potential participants chosen from the daily clinic attendance were approached by the PI. Informed written consent was obtained prior to data collection.

*Statistical Analysis:* The secondary data was typed and uploaded into SPSS version 21, cleaned for errors, and analyzed. The results were presented as means and standard deviations for continuous variables and analyzed with Student's T-test to assess the difference in means between groups. Categorical variables were presented as nominal variables and percentages.

### Ethical consideration:

Ethical approval was sought from the hospital authorities

### Results

The total of clients was five hundred and five (505). Males were 62.30% while females were 37.70% as shown in figure 1. The mean age of the respondents was 42.9 ( $\pm 15.9$ ). The majority, 40% of the patients are in the 41-60 age group followed by the 39.9% (21-40) age group. 61.7% (465) of the patients were males. There was no recorded HIV infection among the ages 61 years and above group even though HIV infections were recorded in the lower age groups. The highest HIV contraction of 10.0% (15) occurred in the 41-60 years age group followed by 9.5% (13) in the youthful age (21-40 years) group.

### HIV Infection among the ages

The ages of TB patients were grouped into four categories as shown in the table below thus younger generation was 1-20 years, the youthful ages 21-40 years, the old adults aged 41-60 years and lastly the old aged 61 years and above. The majority of the patients were concentrated within 21-40 years 137(37.9) and 41-60 years 150(41.5). There was no HIV infection among the 61 years and above group, but there was HIV infection among the others. The highest HIV contraction 10.0% (15) was among the old adults 41-60 years age group. The second

highest HIV contraction 9.5% (13) was among the youthful age group thus 21-40year as shown in table 1 below.

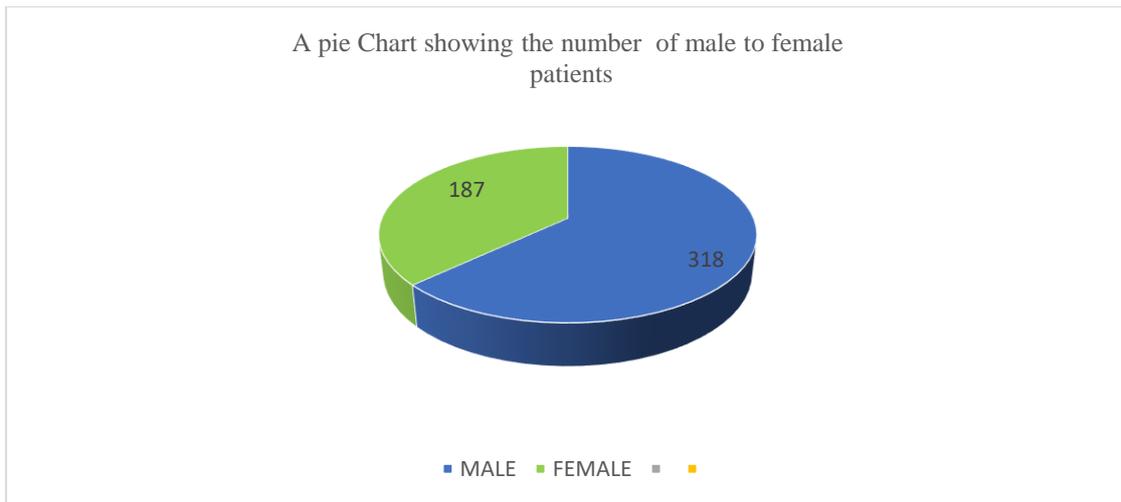


Figure 1. Patients' demographics

**Gender, Patient Type and HIV**

The majority (62.30%) of the patients were males while 37.70% were females. The tuberculosis patients (75.80%) were more than the non-tuberculosis patients (24.20%). The HIV patients were 12.90% while non-HIV patients were 87.10% as shown in figure 2 below

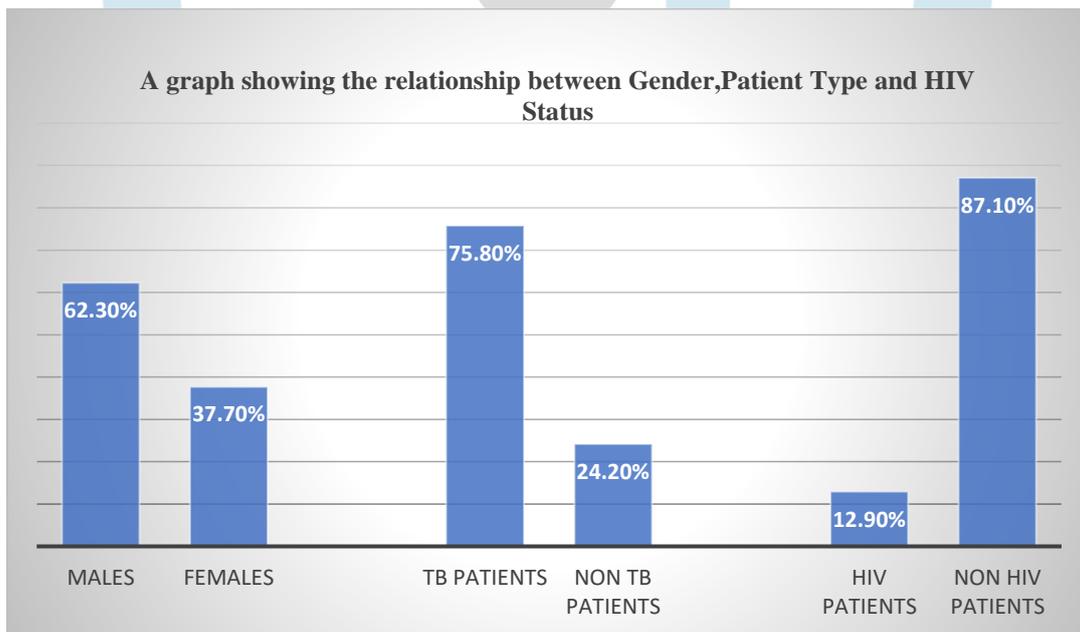


Figure2. Relationship between gender, patient type and HIV

**Table 1: HIV Infection among ages**

Age groups	FINAL TEST				
	Non-Reactive	Reactive	Indeterminate	Total	
1-20yrs	17 (89.5)	2 (10.5)	0 (0.0)	19	
21-40yrs	123 (89.8)	13 (9.5)	1 (0.7)	137	
41-60yrs	134 (89.3)	15 (10.0)	1 (0.7)	150	
61 above	55 (100.0)	0 (0.0)	0 (0.0)	55	
Total	329 (91.1)	30 (8.3)	2 (0.6)	361	

The highest rate of HIV infection peaked at age 42 and in the 41-60years age group even through the majority of the patients were concentrated within 21-40years 137(37.9) and 41-60years 150(41.5) as depicted in figure 3 below.

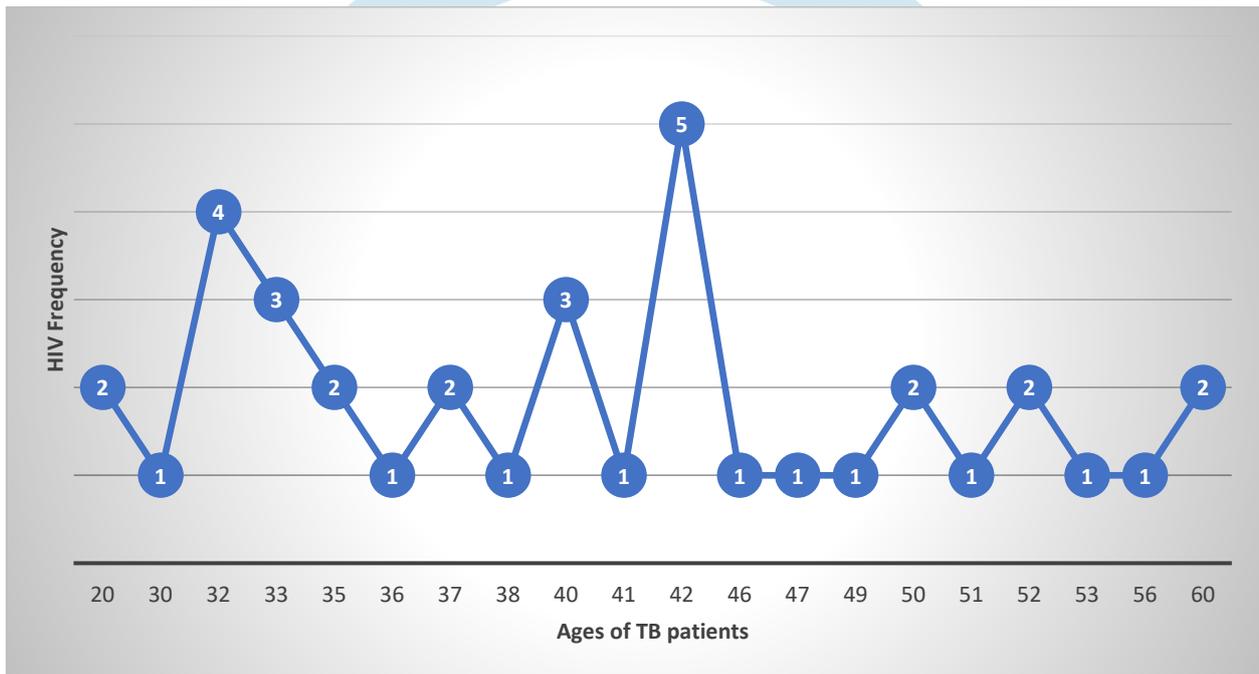


Figure 3. HIV reactive among Ages (TB patients)

Sex and patient type was seen as factors that contributed significantly to the rate of reaction of the disease as shown in table 2 below.

Table 2. Factors contributing to the rate of HIV among TB patients

Variables	HIV NON-REACTIVE	HIV REACTIVE	Wald (df)	P Value	OR (95% CL)
Sex					
Male	287	31	5.9(1)	0.01*	0.5 (0.3-0.8)
Female	153	34			
Patient Type					
TB Patient	341	42	3.9(1)	0.04*	1.7 (1.0-2.9)
Non-TB patient	99	23			

OR =Odds Ratio, CL= Confidence Interval df= Degrees of freedom, “\*” = Significant Pvalue

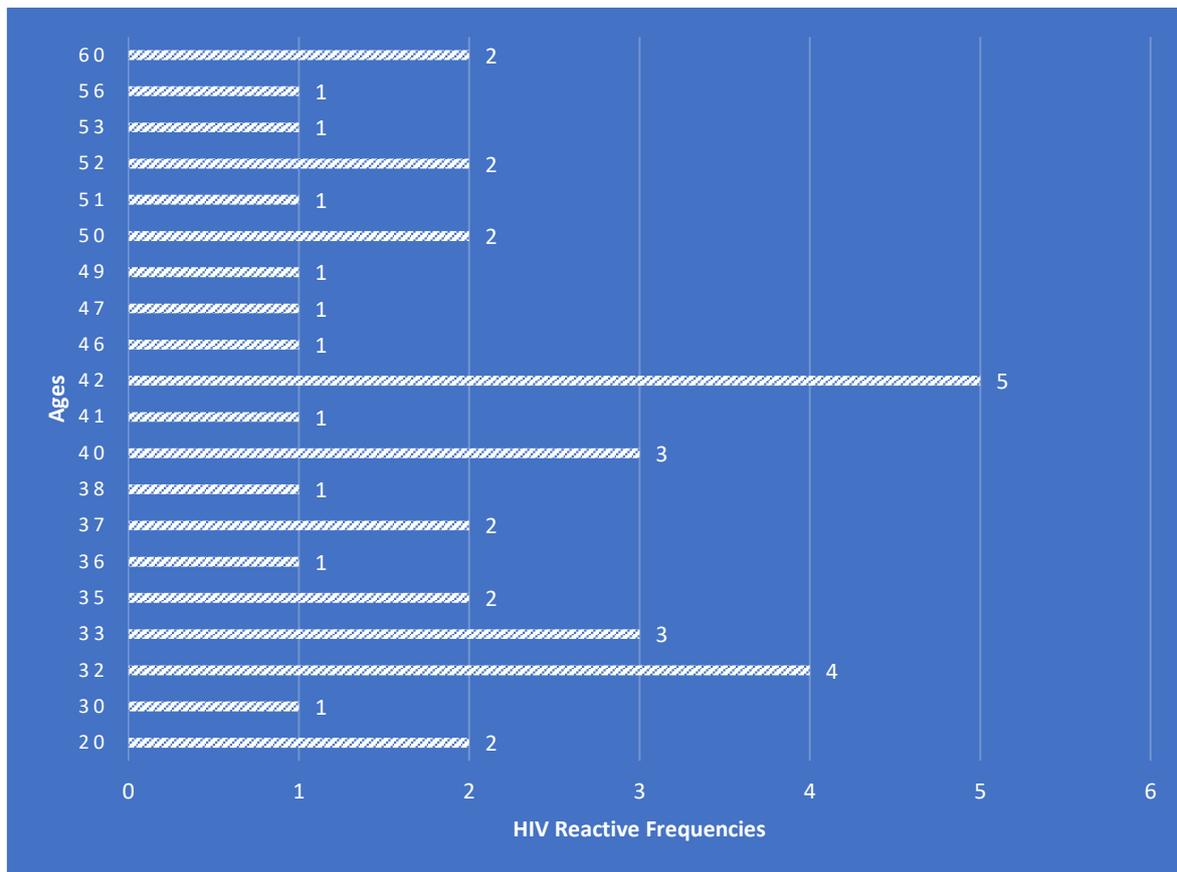


Figure 4. Relationship between Ages of patients and HIV status

## Discussion

The human immunodeficiency virus (HIV) pandemic presents a massive challenge to the control of tuberculosis (TB) at all levels. This unprecedented scale of the epidemic of HIV-related Tuberculosis demands concerted and urgent action. Among all the age groups the overall HIV infection recorded was 8.3%. lower than the overall prevalence of HIV infection among TB patients was high (19.4%) in the Health Facility of East Wollega Zone in Ethiopia [6]. The finding is also consistent with the WHO claim women in this reproductive age group are also at greater risk of becoming co-infected [7] and was relatively lower compared to another study conducted in southern Ethiopia which claimed that out of a total of 1308 TB patients enrolled, 226 (18%) were HIV positive [8]. The findings that HIV infection was highest among adults between 21-60 years in this study were similar to another finding of a study conducted in Zambia. The findings were that respondents between the ages of 35–44 years were found to have the highest prevalence of TB/HIV and it was a statistically significant finding (50%;  $p = 0.0001$ ) compared to other age groups [9].

### Susceptibility to Tuberculosis and HIV Among sex

This study utilized a one-year retrospective secondary data of patients who walked in for service or were referred from other treatment centers within Korle Bu Teaching Hospital. The majority of the patients were males who had more TB infections than females constituting 62.97% and the females were 37.03%. The greater proportion of HIV patients were females (52.3%) while that of the males was 47.7%. The differential analysis in means of sex who reported as TB patients were shown that females had a higher mean (0.12) as compared to Males with a mean (0.06). The t-test statistics showed that the mean was statistically significant as seen in table 2 above however in other studies the findings were the reverse where males were more susceptible to Tuberculosis than females for instance in a study done to study tuberculosis case notification and treatment outcomes in Ghana from 2013 to 2017 indicated that majority (62.5%) of the tuberculosis patients were males as compared to females [10]. This was also consistent with another which claimed Infectious diseases infrequently affect gender thus females and males equally [11] and tuberculosis is no exception [10] and it was found that male to female ratio of 2012 worldwide tuberculosis notification was the ratio of 1.9:1. The study findings of a female having a higher mean of tuberculosis can still hold because the World Health Organization report of tuberculosis thus from 1990-2020 claims that the degree of sex susceptibility to Tb varies by geographical location and by year [12]. Guerra-Silvera and Abad-French (2013) explained that sex bias to infectious disease may depend on the behavioral characteristics where the behavioral hypothesis relates primarily to sex-specific exposure to infection, while the physiological hypothesis posits that biological differences between the sexes render one more susceptible to

a given disease. [11]. Behavioral characteristics can highly influence the male-to-female ratio, a study explain that smoking is a higher risk factor of been susceptible to TB and it explains that in a correlative analysis of cigarette smoking, sex, and tuberculosis stipulates that smoking may influence up to one-third of the gender bias observed in this set of their study [13]. Other studies stress that it is possible for the male-to-female ratio to be lower than female to male ratio thus TB is higher in females than males, thus a study claimed that females at younger ages have up to 34% likelihood of being susceptible or at risk of progression to TB disease than in males. They claimed the ratio is attributed to a reduced immunity connected with the stresses of pregnancy [14].

#### HIV testing and counseling

all the patients who came to test their status irrespective of their TB status or other chest-related conditions were offered pre-counseling as well as post-testing education irrespective of the outcome of their HIV test results. The recommended practice by the World Health Organization is that patients should be given pre-counseling prior to testing in all settings, regardless of the approach. According to the WHO, all adults, couples/partners, and adolescents should be cared for [15]. It is advised that patients whose results turn out to be negative HIV or indeterminate should also be counseled however, counseling resources should not be entirely diverted from those that actually need it especially, those whose test results turnout HIV-positive [16]. It is recommended that all non-reactive HIV patients (HIV-negative) should be retested or rule out the acute infection that may be too early to detect and it is advised that it is needed for those who report recent exposure to any risks [16]. Others also recommend that all unconducive results or indeterminate results should return within two weeks for additional HIV testing to confirm their HIV statuses.

#### Prevalence of HIV among TB patients

Analysis of the results gave a periodic prevalence of HIV infection among TB patients was 13.05% as shown in Table 2. Even though all the patients attending the clinic were not TB patients, however, the majority were TB patients with a number of them being “other chest-related conditions”, and “Partners of TB patients” as shown in table 2. Despite the WHO indication that Ghana is one of the high TB/HIV-burdened countries, the rates were low as compared with a study conducted in Ghana by the World Health Organization (WHO) which found a prevalence of 22.5% of TB patients are co-infected with HIV [17]. A recent study conducted by Osei et al in the Volta Region from 2013 to 2017 revealed a higher prevalence which stood from 30.1% to 33.3% and this prevalence remained the same throughout these years [10].

#### Limitations of Study

Some data variables were excluded due to a lack of clarity.

**Conclusion:** The highest HIV infection among tuberculosis patients occurred at age 42 which falls in the 41-60years age group.

**Recommendations:** There is a need to conduct further studies in this area given the resources with a bigger sample across the country.

**Conflict of Interest:** The authors have declared that no competing interests exist.

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