

# A Five Year Incidence Trend Analysis of Tuberculosis (TB) and HIV/AIDS Co-Infection at Bo Government Hospital, Southern Sierra Leone

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**Citation:** Babawo LS, Sellu EJ, George A, Kaikai D (2020) A Five Year Incidence Trend Analysis of Tuberculosis (TB) and HIV/AIDS Co-Infection at Bo Government Hospital, Southern Sierra Leone. *J Public Health Dis Prev* 3: 102

## Abstract

**Introduction:** The incidence of TB is increasing in Africa. Sierra Leone is one of Sub-Saharan countries severely affected by the dual burden of TB/HIV co-infection, however very few studies have reported on the prevalence or incidence of TB/HIV co-infection. HIV and TB infections can suppress the natural immunity of an individual, thus reducing lifespan if no prompt intervention is ensued. Global TB Report estimates 10 (9.0-11.1) million new (incident) TB cases worldwide in 2018 and People living with HIV accounted for 9% of the total.

**Objective:** The study was conducted to determine the incidence of TB/HIV co-infection within a five year period in Sierra Leone.

**Methodology:** Data were collected for all presumptive cases tested of TB at the laboratory and treatment center during the period of the research. Statistical Package for Social Science (SPSS) program Version 24, 2016 (SPSS, Chicago IL) was used for the Descriptive statistical analysis and then presented into Tables and Figures where P values < 0.05 were considered statistically significant.

**Result:** The overall presumptive case of TB was highest among clients aged 25 -34 years accounting for 21.3 % (n= 1418). The disease was 59.6% (3640/6108) among males compared to 40.4% (2468/6108) in females. The difference was found to be statistically significant (P = 0.0180)

**Conclusion:** The overall presumptive case of TB was highest among clients aged 25 -34 years accounting for 21.3 % (n= 1418). The disease was 59.6% (3640/6108) among males compared to 40.4% (2468/6108) in females. The difference was found to be statistically significant (P = 0.0180)

**Keywords:** Tuberculosis (TB); Incidence; Human Immunodeficiency Virus (HIV); Immunity; Co-Infection

## Introduction

TB and HIV infections have been largely independent of each other despite efforts to fight their overlapping epidemiology [1,2]. Sierra Leone is one of Sub-Saharan countries in which the dual burden of tuberculosis (TB) and human immunodeficiency virus (HIV) co-infection has severely hit a major global health challenge of the 21<sup>st</sup> century [3,4]. The country has a high tuberculosis (TB) burden with a prevalence of 441 cases per 100,000 populations [5,6]. According to UNAIDS (UJPOHA) 2016, the prevalence of HIV is approximately 1.7% of the general population accounting for 67,000 Sierra Leoneans living with the disease [4,7].

The association between tuberculosis (TB) and human immunodeficiency virus (HIV) infection has contributed to high morbidity and mortality worldwide [8], however very few studies have reported on the prevalence of TB/HIV co-infection. The World Health Organization (WHO) confirms that Africa region was hardest hit where about 74% of the estimated 1.2 million TB patients co-infected with HIV occurred in 2014 [9,10]. In 2016, global TB/HIV Co-infection statistics revealed that deaths from HIV and TB co-infection, TB alone, and HIV alone is 374,000, 1,300,000 and 826,000, respectively [11]. In 2018, there was an estimated 10 (9.0-11.1) million new (incident) TB cases worldwide, of which 5.7 million were men, 3.2 million were women and 1.1 million were children. People living with HIV accounted for 9% of the total (GLOBAL TB REPORT). According to the report, TB was one of the top 10 causes of death worldwide in 2018. It is also the leading killer of people with HIV and a major cause of deaths related to antimicrobial resistance [12,13].

As part of efforts to stop people living with HIV from becoming ill and dying from TB, at the 2016 United Nations High-Level Meeting on Ending AIDS, United Nations Member States committed to reducing TB deaths among people living with HIV by 75% by 2020 [14] The incidence of TB is increasing in Africa, therefore control of TB infection was implemented to reduce the impact of TB among people living with HIV [15] but there is no remarkable achievement especially in Sub Saharan Africa region which is an area of high TB/HIV related morbidity and mortality in the world. Therefore, it requires multi-sectorial approach to control TB / HIV co-infection [16,17].

HIV and TB infections can suppress the natural immunity of an individual, thus reducing lifespan if no prompt intervention is ensued. TB is the most important opportunistic disease that increases the progression of acquired immune deficiency syndrome (AIDS) and the number one killer in HIV-positive individuals. The relationship between both TB & HIV/AIDS is inducing high magnitude of drug-resistant TB, which in turn has a potential negative impact on efforts to end TB. It is reported that one-third of people co-infected with TB and HIV often are not aware of their HIV status, and are therefore less likely to be cured. There is an obvious need to conduct a nationwide study to establish the national prevalence of this dual infection. This study is sought to determine the Incidence Trend Analysis of Tuberculosis (TB) and HIV/AIDS Co-Infection in Sierra Leone [18].

## Objective

The study was conducted to determine the incidence trend of TB/HIV co infection within a five year period in Sierra Leone.

### Specific Objective

- To determine the prevalence of TB and HIV infections
- To identify the factors associated with the disease

## Methodology

### Laboratory Methods and Data Collection

Data were collected for 20971 presumptive cases tested of TB at the laboratory and treatment centre within five (5) years period. A sputum smear and culture method was used to diagnose subjects with clinical manifestation of TB and/or HIV infections. The usually available acid fast bacteria (AFB) modified Ziehl Neelsen (ZN stain) was used for staining to identify the presence of the mycobacterium. The presumptive TB clients had undergone screening with adequate records of their medical history prior to diagnosis [19,20].

### Statistical Analysis

Statistical Package for Social Science (SPSS) program Version 24, 2016 (SPSS, Chicago IL) was used for the Descriptive statistical analysis and then presented into tables and figures where P values < 0.05 were considered statistically significant. Before analysis, data were entered and stored into Microsoft Excel 2013 spread sheet and double checked to minimize data entry errors. General characteristics of the population were described by mean, standard deviations and percentages [21,22].

## Results

### Study Variable among General Population

The overall presumptive case of TB was highest among clients aged 25-34 years accounting for 21.3 % (n= 1418). The disease was 59.6% (3640/6108) among males compared to 40.4% (2468/6108) in females. The difference was found to be statistically significant (P = 0.0180) (Table 1).

Risk Factor	Frequency (n)	Percent (%)	p -value
<b>Sex</b>			
Male	3640	59.6	0.018
Female	2468	40.4	
<b>Age (years)</b>			
0-4	223	3.4	0.0013
14-May	336	5.1	
15-24	1149	17.3	
25-34	1418	21.3	
35-44	1311	19.7	
45-54	996	15	
55-64	675	10.1	
65 above	545	8.2	

Table 1: Showing the Demographic Variables of the General Population

### TB/HIV Positivity Relating to Age and Gender

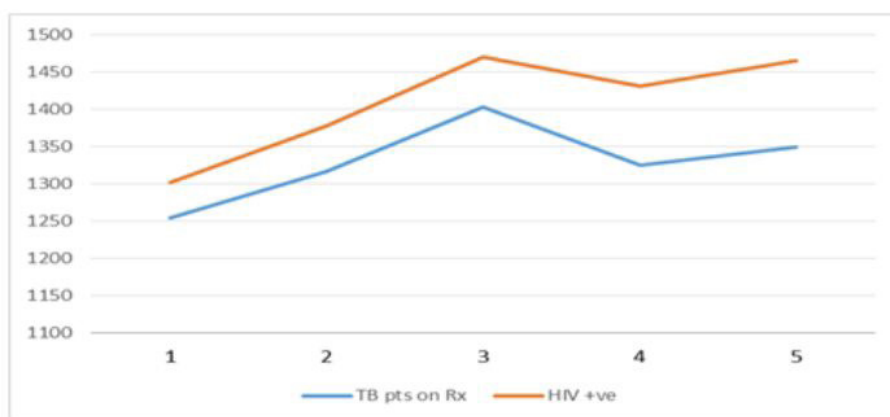
Tuberculosis infection increased with age, 5.1% in 5-11 year age group to 21.3% in 25-35 year age group. The difference was found to be statistically significant (P = 0.0013) (Table 1). The research showed maximum prevalence of TB at 67.9% (94/3025) in male cases aged 45-54 years and at 57.0 % in female females aged 0-4 years. We could not establish any significant association between age and gender in relation to TB Infection (data statistically insignificant) (Table 2).

Age (years)	Male		Female	
	n	%	n	%
0-4	96	43	127	57
14-May	155	46.1	181	53.9
15-24	673	58.6	476	41.4
25-34	828	58.4	590	41.6
35-44	795	60.6	516	39.4
45-54	676	67.9	320	32.1
55-64	417	61.8	258	38.2
≥ 65	310	56.9	235	43.1

Table 2: Showing the TB & HIV co-infection relating to Age and Gender

### TB and HIV Co-Infection Incidence Trend

Within the five years, 6647 patients were infected with TB with 400 co-infected with HIV. TB and HIV Co-Infection were higher in 2019 at 8.7 % and lowest in 2015 at 3.8 (Table 3).



Year (s)	TB client on Rx	HIV +ve	%
2015	1254	48	3.8
2016	1316	62	4.7
2017	1403	67	4.8
2018	1325	106	8
2019	1349	117	8.7
Total	6647	400	6

Table 3: Showing TB & HIV co-infection trend from 2015 to 2019

### Statistics on the Forms of TB Infection

year	Presumptive	P +ve TB	%	P -ve TB	%	E.P TB	%	HIV +ve
2015	3924	896	22.8	306	7.8	52	1.3	48
2016	3994	901	22.6	347	8.7	68	1.7	62
2017	3946	971	24.6	357	9	75	1.9	67
2018	4687	931	19.9	335	7.1	59	1.3	106
2019	4420	926	21	312	7.1	111	2.5	117
total	20971	4625	22.1	1657	7.9	365	1.7	400

Table 4: Showing Data on the Forms of TB Infections

From the 20971 presumptive cases recorded within the five year period, a total of 4625 (22.1%) clients were tested acid fast bacteria (AFB) positive, 1657 (7.9%) were tested acid fast bacteria (AFB) negative with clinical manifestation of the TB, 365 (1.7) were diagnosed extra pulmonary tuberculosis (Table 4).

## Discussion

The research revealed that it is time for TB and HIV programmes to work together to reach the 2020 target and set the world firmly on track to ending TB and AIDS by 2030. We recorded 20971 presumptive cases within the five year period from which a total of 4625 (22.1%) clients were tested acid fast bacteria (AFB) positive, 1657 (7.9%) were tested acid fast bacteria (AFB) negative with clinical manifestation of the TB, 365 (1.7) were diagnosed extra pulmonary tuberculosis. The most vulnerable and marginalized group of individuals are still out of reach of HIV and TB services and in around 40 countries. We also realised that Tuberculosis infection increased with age, 5.1% in 5-11 year age group to 21.3% in 25-34 year age group. The difference was found to be statistically significant ( $P = 0.0013$ ) (Table 1). The disease was 59.6% (3640/6108) among males compared to 40.4% (2468/6108) in females. The difference was found to be statistically significant ( $P = 0.0180$ ) [23-26].

The research showed maximum prevalence of TB at 67.9% (94/3025) in male cases aged 45-54 years and at 57.0 % in female females aged 0-4 years. The number of people living with TB and HIV co-infection is increasing resulting to high mortality rate. The increasing incidence of TB and HIV co-infection in Sierra Leone indicates that most countries particularly in Africa are not on track and too many people living with HIV are still dying from TB, which is preventable and curable. Within the five year period, we recorded 6647 patients were infected with TB with 400 co-infected with HIV. TB and HIV Co-Infections were higher in 2019 at 8.7 % and lowest in 2015 at 3.8. This is unacceptable. The epidemics of TB and HIV are closely interlinked. Yet, too often, TB and HIV activities are not coordinated, a missed opportunity that is costing lives.

A major cause for concern is the rise in TB deaths among people living with HIV in some regions and countries. Between 2010 and 2017 the number of TB deaths among people living with HIV increased by 22% In Eastern Europe and central Asia, and in Latin America by 7%. WHO also estimated that TB deaths among people living with HIV rose between 2010 and 2017 in at about 40 countries showing the urgent need to scale up integrated HIV and TB services in those countries. Sierra Leone and other developing countries need to fully integrate TB and HIV services and use focused community-based approaches to surveillance, diagnose and treat the missing cases in order to accelerate progress in reducing TB deaths among people living with HIV and reach the 2020 target.

There should be need for laboratory screening of all persons living with HIV or TB and all those with TB should be also tested for HIV. TB and HIV co-infection prevention efforts need scaling up, particularly among the vulnerable higher risk group of individuals. There is also an urgent need to improve on the quality of TB and HIV co-infection diagnosis, and those diagnosed with TB and HIV to have immediate access to treatment and support to adhere to their treatment regimens.

## Conclusion

The prevalence of TB/HIV co-infection was 6.0%, and co-infection was more common among age group of 25-34 years that are sexually and behaviorally active.

## Acknowledgement

We are thankful to the TB laboratory coordinator at the Bo Government for sample collection and provision of data. We also acknowledge all other contributors towards this research.

## References

1. Addo KK, Ampofo WK, Owusu R., Bonsu C, Nartey N, et al. (2018) First Nationwide Survey of the Prevalence of TB/HIV Co-Infection in Ghana. *J Tuberculosis Res* 6: 135-47.
2. Gao F, Bailes E, Robertson DL, Chen Y, Rodenburg CM, et al. (1999) Origin of HIV-1 in the chimpanzee pan troglodytes troglodytes. *Nature* 397: 436-41.
3. Sierra Leone Health and Demographic Survey (2013) Statistics Sierra Leone.
4. UNAIDS (2016) Country Sierra Leone.
5. Hamilton DO, Vas Nunes J, Grobusch MP (2019) Improving the diagnostics of tuberculosis and drug resistance with Xpert MTB/RIF in a district general hospital in Sierra Leone: a quality improvement project. *BMJ Open Qual* 8:e000478.
6. Gamanga AH, Owiti P, Bhat P, Harries AD, Kargbo Labour I, et al. (2017) The ebola outbreak: effects on HIV reporting, testing and care in Bonthe district, rural Sierra Leone. *Public Health Act* 7: S10-15.
7. Ansumana R, Dariano DF, Jacobsen KH, Leski TA, Taitt CR, et al. (2017) Prevalence of markers of HIV infection among febrile adults and children in Bo, Sierra Leone, 2012-2013. *BMC Res Notes* 10: 565.
8. World Health Organization (2015) Global Tuberculosis Report, Geneva, Switzerland.
9. Tesfaye B, Alebel A, Gebrie A, Zegeye A, Tesema C, et al. (2018) The twin epidemics: Prevalence of TB/HIV co-infection and its associated factors in Ethiopia; A systematic review and meta-analysis. *PLoS ONE* 13: e0203986.
10. Selwyn PA, Hartel D, Lewis VA, Schoenbaum EE, Vermund SH, et al. (1989) A Prospective Study of the Risk of Tuberculosis among Intravenous Drug Users with Human Immunodeficiency Virus Infection. *New Engl J Med* 320: 545-50.
11. Dalbo M, Tamiso A (2016) Incidence and Predictors of Tuberculosis among HIV/AIDS Infected Patients: A Five-Year Retrospective Follow-Up Study. *Adv Infect Dis* 06: 70-81.

12. Gao F, Yue L, Robertson DL, Hill SC, Hui H, et al. (1994) Genetic diversity of human immunodeficiency virus type 2: evidence for distinct sequence subtypes with differences in virus biology. *J Virol* 68: 7433-47.
13. Kamath RSV, Pattanshetty S, Hegde M, Chandrasekaran V (2013) HIV-TB coinfection: clinico-epidemiological determinants at an antiretroviral therapy center in southern India. *Lung India* 30:302-6.
14. Mekonnen D, Derbie A, Desalegn E (2015) TB/HIV co-infections and associated factors among patients on directly observed treatment short course in North-eastern Ethiopia: a 4 years retrospective study. *BMC Research Notes* 8: 666.
15. Mbopi Keou FX, Robinson NJ, Mayaud P, Belec L, Brown DW (2003) Herpes simplex virus type 2 and heterosexual spread of human immunodeficiency virus infection in developing countries: Hypotheses and research priorities. *Clin Microbiol Infect* 9: 161-71.
16. The World Health Organization (2016) Global AIDS.
17. National HIV/AIDS Secretariat (2015) Sierra Leone National AIDS Response Progress Report.
18. World Health Organisation (2018) Estimated WHO TB mortality statistics for HIV positive people 2016 by age & region.
19. Centers for Disease Control and Prevention (2017) National Center for HIV/AIDS, STD, and TB Prevention Division of HIV/AIDS Prevention.
20. Tadesse S, Tadesse T (2013) HIV co-infection among tuberculosis patients in Dabat, northwest Ethiopia. *J Infect Dis Immun* 5: 29-32.
21. Osei E, Der J, Owusu R, Kofie P, Axame WK (2017) The burden of HIV on Tuberculosis patients in the Volta region of Ghana from 2012 to 2015: implication for Tuberculosis control. *BMC Infect Dis* 17: 504.
22. Tarekegne D, Jemal M, Atanaw T, Ebabu A, Endris M, et al. (2016) Prevalence of human immunodeficiency virus infection in a cohort of tuberculosis patients at Metema Hospital, Northwest Ethiopia: a 3 years retrospective study. *BMC Res Notes* 9: 192.
23. Fekadu S, Teshome W, Alemu G (2015) Prevalence and determinants of Tuberculosis among HIV infected patients in south Ethiopia. *J Infect Developing Countries* 9: 898-904.
24. Swaminathan S, Narendran G (2008) HIV and tuberculosis in India. *J Biosci* 33: 527.
25. Anglada Martinez H, Riu Viladoms G, Martin Conde M, Rovira Illamola M, Sotoca Momblona JM, et al. (2015) Does mHealth increase adherence to medication? Results of a systematic review. *Int J Clin Pract* 69: 9-32.
26. Lester RT, Ritvo P, Mills EJ, Kariri A, Karanja S, et al. (2010) Effects of a mobile phone short message service on antiretroviral treatment adherence in Kenya (WelTel Kenya1): a randomised trial. *Lancet* 376: 1838-45.