IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 8 Ver. II (August. 2016), PP 80-89
www.iosrjournals.org

Tuberculosis Treatment Outcomes of Patients Co-Infected With Tuberculosis And HIV At Jaramogi Oginga Odinga Teaching And Referral Hospital (JOOTRH), Kenya.

R. K. A. Sang[1], O. B. Otieno[2].
[1]*Egerton University (Faculty of Health Sciences)*
[1]*Jaramogi Oginga Odinga Teaching and Referral Hospital (Medical Services)*

Background:*Human Immunodeficiency Virus (HIV) infection and Tuberculosis (TB) increase the rate of disease progression of each other, thereby reducing the survival time of the patients. TB disease is considered a preventable, detectable and curable disease that requires wider public- private partnerships. Causes of mortality include late TB and/or HIV diagnosis, late HAART initiation, overlapping drug toxicities or co-morbidities, drug-drug interactions between rifamycin and antiretroviral drugs, and immune reconstitution syndrome of TB after ART initiation etc. The Kenya National TB cohort analysis showed poorer treatment outcomes to be higher among patients with unknown or undocumented HIV status followed by HIV positive TB patients. Nyanza province contributes TB(20%) and HIV (30%) burden of the national burden, with co-infection rate of 70% of TB patients against 53% national rate. Early diagnosis, treatment initiation and monitoring leads to improved survival.*

Methods: *This was a retrospective study aimed at evaluating socio-demographic characteristics of 350 TB/HIV co-infected patients (adults and children) enrolled in JOOTRH and documented treatment outcomes, risk factors associated with mortality and lost to follow up between January 2012 and July 3013 who were followed up 8 months after completion of treatment.*

Conclusion:*Early ART initiation in the intensive phase of TB treatment, use of Cotrimoxazole, being WHO stage I & II and CD4> 350cells/mm^3 were associated with reduced deaths or loss to follow up while being male gender, initiating or delaying treatment after 2 months of TB treatment, WHO stage III and IV and CD4 < 350cells/mm^3 were significantly associated with high mortality.*

Abbreviations and Acronyms

AIDS	Acquired Immuno Deficiency Syndrome
CCC	Comprehensive HIV Care Clinic
CD4	Cluster for Differentiation 4
CDC	Centers for Disease Control and Prevention
CNR	Case Notification Rate
CQI	Continuous Quality Improvements
DLTLD	Division of Leprosy TB and Lung Diseases
DOTS	Direct Observed Therapy- Short course
DQA/C	Data Quality Assurance/Control
EMR	Electronic Medical Register
ERC	Ethical Review Committee
HAART	Highly Active Anti-Retroviral Therapy
HIV	Human Immune Deficiency Virus
JOOTRH	Jaramogi Oginga Odinga Teaching and Referral Hospital
KEMRI	Kenya Medical Research Institute
MDG	Millennium Development Goals
OI	Opportunistic Infections
PLHIV SYNDEMIC	People Living with HIV A **syndemic** is the aggregation of two or more diseases in a population in which there is some level of positive biological interaction that exacerbates the negative health effects of any or all of the diseases.
TB	Tuberculosis
VMMC	Voluntary Male Medical Circumcision
WHO	World Health Organization

[1] Egerton University (Faculty of Health Sciences)
[2] Jaramogi Oginga Odinga Teaching and Referral Hospital (Medical Services)

I. Background Information

1.1 Introduction And Background Of The Study

According to the World Health Organization (WHO., 2012) report, 8.7 million people (530,000 children) had TB disease of whom 1.1 million (13%) were HIV-positive with Africa accounting for 79% of TB burden while 1.4 million patients died in the same period. Human Immunodeficiency Virus (HIV) infection and Tuberculosis (TB) synergistically interact to increase the rate of mobidity and mortality among dual infected persons thus reducing the survival time of patients. Tuberculosis (TB) is a serious airborne infectious disease caused by *M. tuberculosis*. It is primarily a lung infection but can affect any part of the body(extra pulmonary). TB is vaccine-preventable by BCG immunisation, yet still has a very high worldwide prevalence concentrated especially in resource-poor settings, and developing countries.Africa and Asian continents are home to 22 high TB burden countries contributing 80% of global TB burden of which Kenya is ranked 15th position(WHO 2012)**.**

Adoption and adaptation of the Global Stop TB Strategy guideline for TB/HIV collaborative activities at national level accelerated treatmentresponse. The guideline highlights 13 collaborative activities summarized as 5 Isi.e. Intensified case finding for TB, Isoniazid Prophylactic Treatment (IPT) among exposed TB negative patients, TB Infection control both at home, workplace and hospitals, Integration of HIV/TB services and immediate HAART Initiation among TB/HIV co infected patients. Based on global TB reports, since introduction of the 5Is, this has drastically reduced mortality and TB cases especially in high TB and HIV burden countries while increasing TB treatment success rates.

According to (Manosuthi, W., Chottanapand, S., Thongyen, S., Chaovavanich, A., and Sungkanuparph, S., 2006),causes of mortality include late TB and/or HIV diagnosis, late HAART initiation, overlapping drug toxicities or co-morbidities, drug-drug interactions between rifamycin and antiretroviral drugs, and immune reconstitution syndrome of TB after ART initiation etc. Its worth noting that initiation of ART during TB treatment rather than after completion of TB treatment leads to improved survival, and that patients with very low CD4 counts (<50 cells/mm^3) should be started on ART within 2-4 weeks after initiation of TB treatment. The 2013 WHO guideline currently recommends initiation of HAART to all TB co-infected patients in the intensive phase irrespective of WHO or CD4 status.

Kenya's 2011 Division of Leprosy, TB and Lung Disease (DLTLD) report showed that there was a tenfold increase in TB case notification from 11,625 in 1990, to 116,723 cases in 2007 and 103,981 in 2011. The Case Notification Rates (CNR) increased from 53/100,000 population for all forms of TB and 32/100,000 population for sputum smear-positive PTB cases in 1990 to 264/100,000 population and 94/100,000 population respectively in 2011. The TB/HIV co-infection rates were 39% nationally with Nyanza reporting 60-70% co-infection rates.(DLTLD, 2011), (DLTLD, 2011). Despite good identification of co infected patients, the national TB cohort analysis indicated that poorer treatment outcomes were significantly higher among patients with unknown or undocumented HIV status followed by HIV positive TB patients.

Nyanza province especially northern region bears the brunt of TB/HIV epidemic in Kenya contributing 20% and 30% of national TB and HIV disease burden respectively (2012 NASCOP and DLTLD reports). Different socio- demographic and economic factors are believed to contribute to increased HIV burden e.g. non circumcising men, wife inheritance and fishing related practices among the Luo culture (tribe affected most) fuels HIV and thus TB burden(MOT 2008). Currently on-going interventions e.g. voluntary Male Medical Circumcision (VMMC), combination of preventive interventions and decentralization of ART services are targeted towards reducing the incidences. Jaramogi Oginga Odinga Teaching Referral Hospital (JOOTRH)is the largest public referral hospital in Nyanza province. Between January 2012 to July 2013 over 593 (99%) of TB patients who were seen knew their HIV status (sum of Known Positive and Newly tested positive) and 350 patients were diagnosed as co-infected of whom 87% were marked to be initiated on ART.Prior to integration in 2010, TB and HIV services were offered in different departments leading to patients' loss in between referrals, communication gaps between departments affecting effective TB and HIV management. Due to above challenges and inline with national TB/HIV collaborative efforts, clients completing TB treatment were then linked back to the HIV clinic to continue ART follow up. According to Hermans, S.M., Castelnuovo, B., Katabira C., Mbidde, P., Lange, J.M., Hoepelman, A.I., Coutinho, A., and Manabe, Y.C., 2012)in a Ugandan study integration of TB and HIV services led to improved TB treatment outcomes and earlier, prioritized ART initiation. This study validates impact of integration, service uptake and treatment outcomes at JOOTRH. The findings will be used to sensitize health care providers, program managers and policy makers on modifiable factors that would otherwise affect quality of services and patient level treatment outcomes.

1.2 Problem statement

The human immunodeficiency virus (HIV) pandemic presents a significant challenge to global tuberculosis (TB) control and the general public health. To date, TB is a leading preventable cause of death among people living with HIV. According 2012 WHO policy on TB/HIV collaborative activities, over 56 million people have been successfully treated since 1995 and an estimated 22 million lives saved through use of DOTS and the stop TB strategy. Despite improvements, poor outcomes among TB/HIV co infected patients continue to be reported especially in developing countries with high HIV burden. In Kenya, despite over 90% HTC uptake and decentralization of TB/HIV services, linkage to ART treatment and late HAART initiation and lost to follow up still remains key challenges.

1.3 Justification of the study

Despite current body of knowledge on uptake and outcomes of TB and HIV services at different time points, there are no designed programmatic longitudinal data in use at national level to assess progress. There are no systematic data collections and use at all levels that facilities an in-depth causal analysis of program data. Understanding causes of poor treatment outcomes among TB/HIV co-infected clients offers an opportunity to critically review efficiency and effectiveness of TB and HIV programs in line with National TB and HIV collaborative activities and guidelines.JOOTRH being one among the facilities that initiated integrated services for TB co-infected patients, conducting this study in a mature program will offer detailed programmatic successes and challenges in relations to current health systems, access and uptake of services, compliance to Ministry of Health guidelines and standards. Advanced review of data beyond that which is routinely reported nationally is critical to inform objective gap analysis of distal determinants of poor outcomes which are relevant to improving quality health programming at JOOTRH and review of policy guidelines.

1.4 Study Objectives

1.4.1 Broad Objective

To determineTb Treatment Outcomes of Patients co-infected with Tuberculosis and HIV at Jaramogi Oginga Odinga Teaching and Referral Hospital.

1.4.2 Specific Objectives

- **i.** To describe socio-demographic and clinical characteristics of TB/HIV co-infected patients in TB clinic at JOOTRH between January 2012 and July 2013
- **ii.** To determine TB and HIV service uptake among TB/HIV co-infected patients enrolled in JOOTRH between January 2012 and July 2013
- **iii.** To establish TB treatment outcomes among TB/HIV co-infected patients at the end of TB treatment period enrolled in JOOTRH between January 2012 and July 2013
- **iv.** To determine factors associated with mortality and lost to follow up among TB/HIV co-infected patients enrolled in JOOTRH between January 2012 and July 2013

1.5 Research Questions

1. What are the socio demographic and clinical charateristics of TB/HIV co-infected patients attending JOOTRH integrated clinic?
2. What is the uptake of services of TB/HIV co-infected patients attending JOOTRH integrated clinic?
3. What are the TB treatment outcomes among TB/HIV co-infected patients enrolled in the integrated clinic in JOOTRH?
4. What are the factors associated with mortality and lost to follow up among TB/HIV co-infected patients enrolled in JOOTRH between January 2012 and July 2013?

1.6 Hypothesis

TB/HIV co-infected patients identified, enrolled and promptly initiated on HAART have better TB treatment outcomes.

1.7 Literature Review

Human Immuno- deficiency Virus (HIV) is a significant viral infection associated with immune suppression, surge of Opportunistic Infections (OI) and end stage Acquired Immune Deficiency Syndrome (AIDS). Tuberculosis (TB), caused by mycobacterium tuberculosis is the leading opportunistic infection and a major cause of morbidity and mortality among HIV infected patients. People with latent tuberculosis infection are at higher risk of progression to active disease if immune status is compromised due to malnutrition, immune suppression and immature immune status due to extremes of age (young children and elderly). To date, HIV is the most important risk factor for developing active TB with a lifetime risk of between 10% to 20% among persons infected with TB only and for those co-infected with TB and HIV, the annual risk exceeds 10% (Manosuthi, W., Chottanapand, S., Thongyen, S., Chaovavanich, A., and Sungkanuparph, S., 2006).

The TB and HIV syndemic affects all aspects of each disease pathogenesis, epidemiological profile, clinical presentation, treatment and prevention especially in resource poor settings which are faced with limited modern TB diagnostic technologies. The highest tuberculosis (TB) incidences occur in sub-Saharan Africa, where the epidemic is fuelled by poverty, war, poor health systems and, in particular, the HIV epidemic. In adults, clinical presentation of TB in early HIV infection resembles that observed in immune-competent persons while in late HIV infection, TB is often atypical in presentation, frequently causing extra pulmonary disease. In children unlike adults, TB is acquired from infected older persons in the family due to immature immune system that is unable to mount a strong immune response resulting into primary TB infection with severe complications. HIV-positive children with TB are at risk of delayed or miss diagnosis due to overlapping clinical and radiographic features with other lung diseases. Acute pneumonias and chronic lung diseases such as lymphocytic interstitial pneumonitis are difficult to distinguish from TB(Marais, B.J., Graham, S.M., Cotton, M.F., Beyers, N.,, 2007). TB manifestations are more severe in HIV-positive children and progression to death is more rapid than in HIV-negative children. The response to standard short-course therapy in HIV-positive children is not as good as in HIV-negative children due to lower cure rates and higher mortality. TB hastens the progression of HIV disease by increasing viral replication and reducing CD4 counts further. The BCG vaccination is effective against severe forms of the disease, such as TB meningitis in children, but it is not as effective against all forms of TB. BCG offered in advanced HIV disease state could lead to disseminated Mycobacterium bovis disease in the presence of immunosuppression; however this has been reduced by use of HAART.

TB is a preventable, detectable and curable disease that requires wider public- private partnerships and response in other MDGs e.g. MDG 1(poverty eradication, MDG 2(basic education),andMDG 8(global partnerships)(UNDP, 2000).

Despite a strong overlap of activities and relationship between TB and HIV services, there is duplication of services and underutilization of staff. Apart from the referral of patients between TB and HIV services, they function independently of each other devoid of exchange of information between providers hence one patient with dual infection is seen in different treatment locations with separate patient folders. This model of practice leads to missed opportunities for Cotrimoxazole prophylaxis. In 2004, WHO formulated a strategic framework for TB/HIV collaborative activities that focuses on the **"five Is":** **I**ntensified case finding, **I**soniazid preventive therapy, **I**nfection control, **I**ntegration of TB and HIV services and immediate **I**nitiation of HAART among co-infected patients as a platform to increasing access for TB and HIV diagnosis, optimised resources, and treatment outcomes for both diseases (WHO., 2012). Integration models are based on level of facility staffing, infrastructure and population being served. Three models used include fully integrated "one stop" model where all TB and HIV services are provided under one roof as either TB services in HIV clinic or vice-versa, partial integration where services are offered in two separate rooms but in the same building while co-location refers to TB an HIV services offered in two different departments. According to Topp, S.M., Chipukuma, J.M., Chiko, M.M., Matongo,E., Moore, C.B. and Reid, S.E., 2012), key benefit of integration at the service delivery level is the capacity to strengthen organizational culture and staff relationships and in turn facilitate more collaborative and motivated service delivery in resource constrained settings. It was however noted that integration did not solve overarching deficiencies in human resources and infrastructure thus demonstrating limitations associated with the model.

Rapid scale-up and use of antiretroviral treatment programmes in resource poor settings, driven by international and national advocacy and policy directives with huge external donor aid and technical assistance, offers opportunity for millions of HIV-infected Africans, among whom tuberculosis is the major cause of serious illness and death (Harries, A.D. *et al.*, 2002). Evolution in TB diagnostic technologies and lab networking strategies has dramatically increased case notification of TB. Roll out of fully integrated TB/HIV service delivery models in high prevalence settings is shown to reduce deaths, and increase cure and treatment completion rates (Broek, J.V., Mfinanga, S., Moshiro, C., O'Brien, R., Mugomela, A., Lefi, M.,, 1998, NIH., 2009, Gebremariam, M.K., Bjune, G.A., and Frich, J.C., 2010). Increased sensitivity to TB screening among HIV positive adults and children is critical for early response(Cain, P.K., McCarthy, D.K., Heilig, M.C., Monkongdee, P., Tasaneeyapan, T., Kanara, N., Kimerling, M.E., Chheng, P., Thai, S., Sar, B., Phanuphak, P., Teeratakulpisarn, N., Phanuphak, N., Dung, N.H., Quy, H.t., Thai,L.H., Varma,J.K.,, 2010).

Kenya and global data shows a decline in TB case notification rates and improved treatment success rates over the last few years. This is partly contributed to increased access to TB diagnostic facilities, INH prophylaxis especially for under five children, decentralised HAART and Intensified case findings among enrolled HIV infected clients, TB screening of families of index patients, and improved nutrition. Other hypothesised causes include improved housing ventilation and BCG vaccination that reduces severe forms of TB.

II. Research Methodology

2.1 Study area

The study was conducted in the integrated TB/HIV clinic at the Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH), Kisumu in western Kenya. JOOTRH is a public referral hospital that provides medical services including ambulatory TB and HIV care services. The facility has over 7,000 active HIV patients on follow up in the Comprehensive Care Clinic (CCC) and annually offers treatment to over 500 TB patients. Due to high TB and HIV disease burden, an integrated TB/HIV clinic was established within the chest clinic to reduce nosocomial infection in the HIV clinic, expedite ART uptake and improve retention.

2.2 Study design

This was a retrospective study focusing on routinely collected clinical data of TB/HIV co-infected patients, both adults and children enrolled and followed up at the TB/HIV integrated clinic inJOOTRH.

2.3 Study population

The study population included all adults and children identified as TB/HIV co-infected, registered and treated at JOOTRH in the integrated TB clinic between January 2012 to June 2013 and followed up for a minimum of 8 months. Analysis was conducted on 350 TB co-infected adults and children. The identification process of co-infected adults and children in the hospital was as described below of whom all were enrolled in the integrated TB clinic during the treatment period.

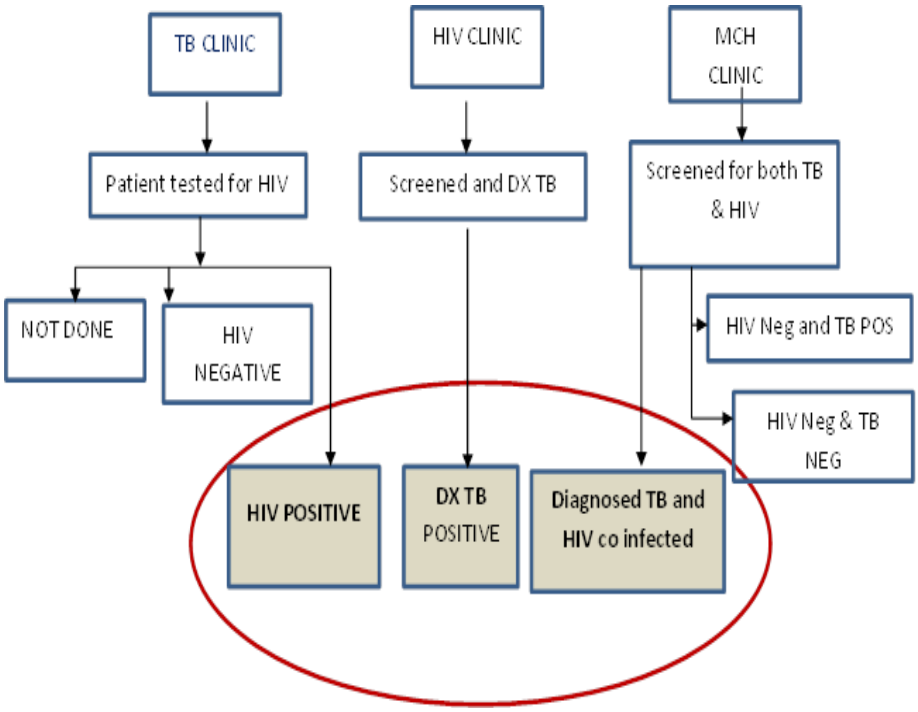

Figure 1: Flow chart describing identification of TB Co infected patients

2.4Sampling technique and Sample size determination

Due to low numbers (350) of co-infected patients within the review period, all the enrolled patients were reviewed hence sampling process did not apply which would otherwise skew the results.

2.5 Data collection and analysis

The clinic data was available in both paper and electronic versions. Using a standardised data abstraction form, patients' health information was retrieved, confirmed, or corrected in order to identify each individual to eliminate multiple records. Patients with multiple entries were reorganized to comprise a single entry. Date of enrolment referred to first time enrolment in the integrated TB/HIV clinic register. Demographic, clinical and TB diagnostic characteristics as well as outcomes were abstracted.HIV clinical information included CD4 data, Cotrimoxazole or Dapson prophylaxis and HAART regimen and timing at initiation whether before or after TB diagnosis. The TB treatment outcomes were defined at end of scheduled completion of treatment. Exact causes of death were not routinely captured in the registers and hence end point grouped as deaths if they occurred during the TB treatment period. There was no defaulter tracing or client contacting as this was entirely retrospective data collection at the end of treatment period. Between January 2012 to July 2013 over593

(99%)TB patients were seen all of whom knew their HIV status (sum of Known Positive and Newly tested positive). 350 patients were found to be co-infected of whom 87% were marked for initiation on ART.

2.6 Ethical Considerations

The study utilized summarised data on the TB/HIV registers and hence no direct patient contact or sample collections were required. Since the study subjects were considered vulnerable population (HIV Positive and TB co infected), the study process adhered to privacy and confidentiality requirements of the data as per Kenya Medical Research Institute (KEMRI) Ethical Review Committee (ERC) regulations. ALL critical personal identifiers linked to the clients were protected and all the computers and applications used password access control only to authorisedpersonnel. The study protocol was part of an existing JOOTRH HIV care and treatment protocol for HIV implementation systems and services (HISS) under KEMRI HIV program.

2.7 Data Processing and analysis

Using right protected Electronic Medical Register, data set was cleaned and information corrected where applicable while those with missing significant data were omitted. STATA version 13was used for analysis, and Chi Square test wasapplied for proportions while Fishers exact test was used to test differences by treatment outcomes (treatment completed, treatment failure, died or out of control). Odds ratio and 95% CI was calculated using multivariate logistic regression analysis to identify independent risk factors for mortality and treatment default. Inclusion of variables in the multivariate model for P values< 0.005 in the bivariate analysis was done. In the analysis all P values < 0.005 were considered significant.

2.8 Limitations /Constraints

The study was not without limitation. Linking HIV data from the HIV clinic to the TB integrated clinic was not possible due to nature of electronic system. Hence data based on variables that werecontained in the TB register was used.

There were documentation gaps that affected comparison of CD4 and ART at start and end of TB treatment. Of the 350 patients targeted, 273(78%) had at baseline compared to 12% who had follow up CD4 documented. Only 278(79%) had ART regimen documented on the EMRBased on the design of the TB register that enters weight at enrolment, it was difficult to compare weight at enrolment with weight at the end of treatment. Other relevant information that was missing in the register included marital status (only partner status was documented).

True outcomes of lost to follow up was challenging as it is possible that some had died. Among reported dead and due to lack of documentation and verification of causes, all deaths were deemed to be TB/HIV related if they occurred during the TB treatment period. This however might be misleading as non TB/HIV deaths could have occurred due to non communicable diseases, poisoning, trauma, etc.

III. Results, Discussions, Conclusion Andrecommendation.

3.1 Results

From January 2012 through June 2013, 593 patients were registered for TB treatment in JOOTRH. Of these, 142 (24%) were known to be HIV infected before their TB diagnosis allof whom were registered in the comprehensive HIV care clinic. Of the remaining 451 patients, who received HIV pre-test counselling, 447 (99%) agreed to HIV testing of whom 208 (47%) were found to be HIV infected. Of the total 593 registeredTB patients 350 (59%) were found to be co-infected with HIV.

Of the total 350 patients found to be co-infected with HIV 188(54%) were female and the rest 162(46%) were male. The patients with WHO Stage III WERE 157 while those with Stage IV were 23. There was no data on staging among 170 patients (Table 1a). TB was classified as sputum smear–positive in 114 (48%), sputum smear–negative in 100 (42%), while smear not done for 10(4.2%) adults and 14(6%) for children. Among new clients 59 (20%) had extra pulmonary TB with pleural effusion as most frequent location reported. See Figure 2 and 3 below.

Table 1: Socio-demographic and clinical characteristics by gender at enrolment in integrated TB/HIV clinic, JOOTRH, between January 2012 through July 2013.

Variable	Frequency	Male	Female	P value
Age		n(%)	n(%)	
0-4 yrs.	7	2 (28.6%)	5 (71.4%)	P- 0.712
5-9 yrs.	10	4 (40%)	6 (60%)	
10-14 yrs.	8	3 (37.3%)	5 (62.5%)	
15+ yrs.	325	153(47.1%)	172 (52.9)	
WHO stage				
III	157	77 (49%)	80 (51%)	P- 0.201
IV	23	8 (34.8%)	15 (65.2%)	

No data	170	77 (45.3%)	93 (54.7%)	
Primary Point of enrolment				
CCC	142	67 (47.2%)	75 (52.8%)	P- 0.781
TB clinic	208	95 (47.5%)	113 (54.3%)	
Timing for ART initiation				
<2 months of TB treatment	222	103 (46.4)	119 (53.6%)	P- 0159
>2 months of TB treatment	89	46 (51.7%)	43 (48.3%)	
Not initiated /documented	39	13 (33.3%)	26 (66.7%)	

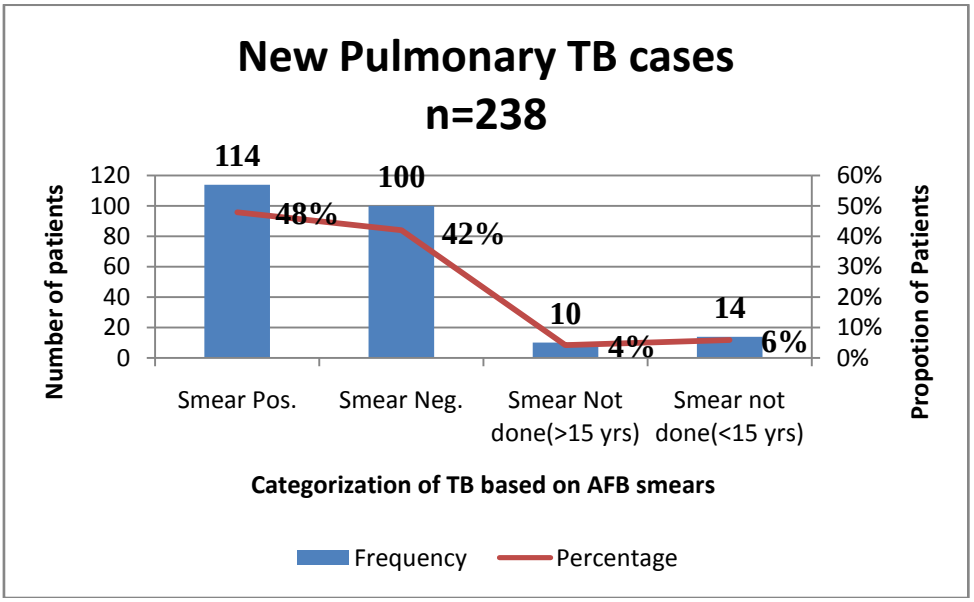

Figure 2: Disaggregated new pulmonary TB/HIV co-infected patients by Sputum smears among those enrolled in JOOTRH between January 2012 to June 2013.

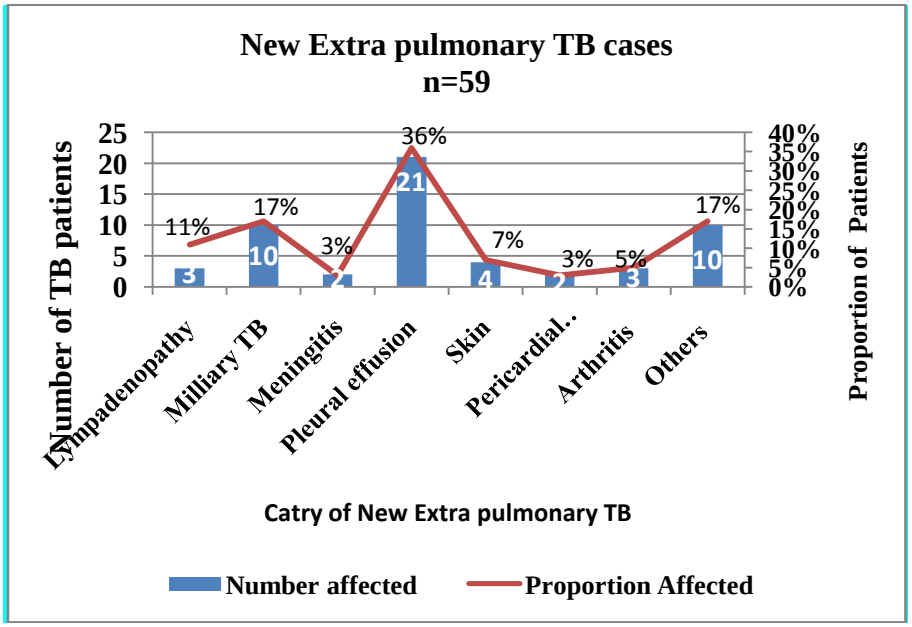

Figure 3: Disaggregated new extra pulmonary TB/HIV co-infected patients enrolled in JOOTRH TB/HIV clinic between January 2012 to June 2013.

As per standard national guideline, all the 350(100%) co-infected patients were initiated on cotrimoxazole/Dapsone. 222(63%) were initiated on ART within 2 months of TB treatment while 13(4%) were

not initiated or not documented. Among those marked to be on ART, only 27(8%) had ART regimen documented of whom 59% were on TDF (Tenofovir disoproxil fumarate)based regimen. It was worth noting that all the patients were on Efavirenz based regimen as per national guideline. Baseline CD4 count was available for 273 (78%). Of the 273 patients with CD4 results available, the median CD4 count was 246 cells/mm3 (IQR 269- 60-329); 61%(214) had CD4 <350 cells/mm3 while 22%(77) had missed CD4 (Table 2). There was a high ((304 (22%)) missed or non documentation of CD4 at end of TB treatment. Weight monitoring was weak as EMR had variable for baseline but not for progressive monitoring.

Table 2: Uptake of TB/HIV services among enrolled patients in JOOTRH integrated clinic between January 2012 through June 2013.

Variable	**Frequency n/N(%)**	**Male** n(%)	**Female** n(%)	**p-value**
WHO	**180/350(51%)**			**0.201**
III	157 (87%)	77(49%)	80 (51%)	
IV	23 (13%)	8(34.8%)	15(65%)	
Missing Data	170/350 (49%)	77(45%)	93(54.7%)	
CTX Prophylaxis				
Yes	350(100%)	162(46%)	188(54%)	
No	0	0	0	
ART Regimen	**N=27/350 (8%)**			**P-0.479**
3TC+ABC+EFC	3(11%)	1(33%)	2(66.7%)	
3TC+AZT+EFV	5(19%)	2 (40%)	3(60%)	
3TC+TDF+EFV	16(59%)	9 (56.3%)	7 (43.8%)	
D4T+3TC+EFV	1(4%)	0(0%)	1(100%)	
Others	2(7%)	0(0%)	2(100%)	
Missing Data	323/350 (92%)	150(46.4%)	173(53.6%)	
Baseline CD4	**273/350 (78%)**			**P-0.005**
<350	214 (78%)	87(41%)	127(59%)	
>350	59 (22%)	36(61%)	23(39%)	
Missing Data	77/350 (22%)	39(51%)	38(49%)	
Weight	**350(100%)**			**P-0.284**
<15	25	9(36%)	16(64%)	
>15	325	153(47%)	172(53%)	

Among the 350 patients followed up between January 2012 and June 2013 whose outcomes were documented, 138 patients with initial positive smears, 73(21%) had final sputa done and declared cured. 100(29%) had treatment completed, 4(1%) failed treatment, 19(5%) were lost to follow up (out of control) while 30(9%) were reported as deaths (Table 3). All clients who failed treatment had their sputum culture done and one found to have Rifampicin and Isoniazid resistance, hence declared Multidrug resistant TB and initiated on treatment as per MDR-TB treatment guidelines.

Table 3: TB treatment outcomes among JOOTRH patients followed up in the integrated TB/HIV Clinic between January 2012 through to July 2013.

Variable	**Frequency N=350(%)**	**Male**	**Female**	**P value**
Cured(C)	73 (20.86%)	36 (49.3%)	37 (50.7%)	0.337
Dead(D)	30 (8.57%)	11 (36.7%)	19(63.3%)	
Failure(F)	4 (1.14%)	2 (50%)	2(50%)	
Not Completed(NC)	93 (26.57)	46 (49.5)	47(50.5%)	
Out of control(OOC)	19 (5.43%)	4 (21.1%)	15(78.9%)	
Treatment Completed(TC)	100 (28.57%)	48 (48%)	52(52%)	
Transferred Out(TO)	31 (8.86%)	15 (48.4%)	16(51.6%)	

Figure 4below shows that overall; TB treatment success rate was lower than 85% that is national recommendation. At the time of analysis 27% of those who were marked as *treatment not completed* did not conform with the Division of TB and Leprosy's five outcome criteria of cured (C), treatment completed (TC), transferred out (TO), failure (F) and dead (D).

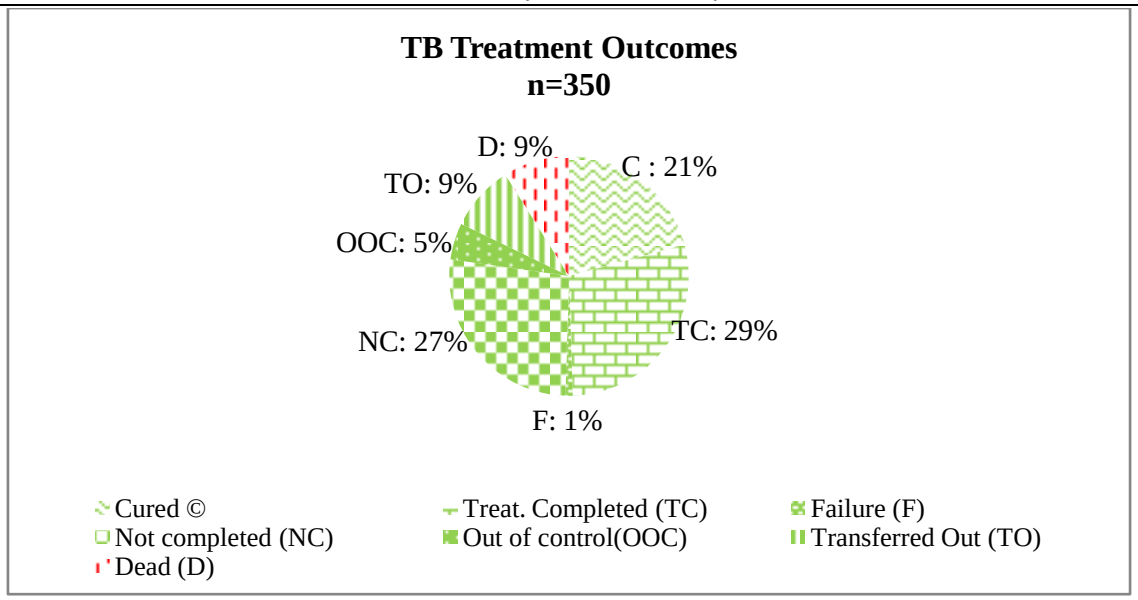

Figure 4: Pie chart for TB treatment outcomes of co-infected patients enrolled in JOOTRH between January 2012 and June 2013.

Among the factors associated with increased mortality using bivariate and multivariate analysis were that being identified TB in the HIV clinic, starting ART after 2 months of TB treatment, WHO stage III or IV and being amale was associated with increased odds of death. Only 170 (49%) of patients had WHO staging documented while 304(88%) had CD4 counts documented. Due to limited information from the HIV clinic it was not possible to establish the time at TB diagnosis in the HIV clinici.e. within <1 month of enrolment into care or <1 month of ART initiation).Table 4 below refers to odds of mortality among TB/HIV co-infected.

Table 4: Risk factors associated with TB/HIV mortality among co-infected patients enrolled in JOOTRH between January 2012 through June 2013.

Variable	**n/N(%)**	**Bivariate analysis**		**Multivariate analysis**	
		ORS (95% CI)	p-Value	ORS (95% CI)	p-Value
Age: Adult	325 (93%)	1.08	0.916	.87	0.870
Sex :Male	162 (46%)	1.54	0.272	2.56	0.074
WHO stage III& IV	170 (49%)	1.15	0.826	1.30	0.793
Initiated >2 months	89 (25%)	.86	0.746	2.27	0.269
Missing initiation data	39 (11%)	.84	0.789	3.89	0.195
Pulmonary	283(81)	.75	0.543	1.35	0.737
TB Dx in the HIV Clinic	142(41%)	1.31	0.478	1.17	0.822

3.2 Discussion

This retrospective study revealed documentation gaps especially weight, CD4, Partner status, and ART regimen. Despite an Electronic Medical Register(EMR) designed to link HIV and TB related data, this was not the case hence the noted limitation.

Summary of this data shows that TB occurred predominantly among persons with advanced HIV disease and that early initiation of ART within 2 months of TB treatment was protective(OR 0.999, CI .0625- .1568) compared to late or no ART initiation(OR .862, CI.351- 2.117). This finding is comparable to that found bySomsak Akksilp, S., Karnkawinpong, O., Wattanaamornkiat, W., Viriyakitja, D., Monkongdee,P., Sitti,W., Rienthong, D., Siraprapasiri, T., Charles D. Wells, C.D,Tappero,J. W., and Jay K. Varma, K. J., July 2007) and conforms to 2013 WHO recommendations. In the multivariate analysis, male patients(46%) were twice likely to die than women (OR 2.566, CI .9114- 7.2261); being initiated on ART late or no ART had 2 and 3 times risk respectively(OR 2.278, CI .5294- 9.8017; OR 3.8916, CI .4976- 30.430).More analysis is required to evaluate the time of highest mortality among HIV patients diagnosed with TB and state of ART at time of diagnosis as data suggest thatbeing identified with TB in the HIV clinic has 1.2 times higher risk of mortality compared to TB patients identified with HIV in the TB clinic(OR 1.1710 , CI .2947- 4.6521). Documentation of ART regimen and follow up clinical information including incidence and management of overlapping toxicities and immune-reconstitution syndrome is critical.

Major strides have been made in enhancing access to HIV treatment in the developing world. Nevertheless it is widely accepted that deaths of patients with both TB and HIV remain high, and, even in Nyanza with high rates of access to ART, more evaluation is needed to ascertain the correct timing for ART initiation and immune reconstitution syndrome monitoring and documentation. Globally, measures to save lives of patients with both diseases have focused on close collaboration of both TB and HIV programs.

3.3 Conclusion

This study confirms with other earlier reviewed literature that integration of TB and HIV services are associated with increased uptake of services; improved outcomes and organised client flow. Early ART initiation in the intensive phase of TB treatment; use of Cotrimoxazole; being WHO I & II and CD4> 350 were associated with reduced deaths or loss to follow up while being male gender, initiating or delaying treatment after 2 months of TB treatment, WHO stage III and IV and CD4 < 350 were significantly associated with high mortality. Due to non confirmation of patients lost to follow up in the facility, it would be argued that 19(4%) who were lost in the program died.

The hypothesis that "TB/HIV co-infected patients identified, enrolled and promptly initiated on HAART have better TB treatment outcomes" is thus accepted/confirmed.

3.4 Recommendations

Further evaluation is required to compare determinants for increased mortality among TB identified patients in the HIV clinics in comparison to newly diagnosed HIV among TB enrolled patients. Facilities using EMRs should regularly conduct Data Quality Assurance and Controls (DQA/C) and concurrence between primary source documents and the EMR. Documentation gaps could also be eliminated through regular Continuous Quality Improvement (CQI) assessments. There is need for improved adoption of integrated TB and HIV tools to reduce duplication.

References

[1]. Broek, J. V., Mfinanga, S., Moshiro, C., O'brien, R., Mugomela, A., Lefi, M., (1998) Impact of human immunodeficiency virus Infection on the outcome of treatment and survival of tuberculosis patients in Mwanza, Tanzania. International Journal of Tuberculosis and Lung Disease, 2, 547-552.

[2]. Cain, P. K., Mccarthy, D.K., Heilig, M.C., Monkongdee, P., Tasaneeyapan, T., Kanara, N., Kimerling, M.E., Chheng, P., Thai, S., Sar, B., Phanuphak, P., Teeratakulpisarn, N., Phanuphak, N., Dung, N.H., Quy, H.T., Thai,L.H., Varma,J.K., (2010) An Algorithm for Tuberculosis Screening and Diagnosis in People with HIV. New England Journal of Medicine, 362, 707-16.

[3]. Dltld (2011) Annual Tuberculosis and Leprosy Report 2012. Nairobi, Kenya, Division of Tuberculosis, leprosy and Lung Disease.

[4]. Gebremariam, M. K., Bjune, G.A., & Frich, J. C. (2010) Barriers and facilitators of adherence to TB treatment in patients on concomitant TB and HIV treatment: a qualitative study.BMC Public Health, 10, 1471-2458.

[5]. Harries, A. D., Hargreaves, N. J., Graham, S. M., Mwansambo, C., Kazembe, P., Broadhead, R. L., Maher, D. & Salaniponi, F. M. (2002) Childhood tuberculosis in Malawi: nationwide case-finding and treatment outcomes.International Journal of Tuberculosis and Lung Disease, 6, 424-431.

[6]. Hermans, S. M., Castelnuovo, B., Katabira C., Mbidde, P., Lange, J.M., Hoepelman, A.I., Coutinho, A., and Manabe, Y.C. (2012) Integration of HIV and TB services results in improved TB treatment outcomes and earlier prioritized ART initiation in a large urban HIV clinic in Uganda.Journal of acquired immune deficiency syndrome, J Acquir Immune Defic Syndr. 2012 Jun 1;60(2):e29-35. doi: 10.1097/QAI.0b013e318251aeb4.

[7]. Karim, S. S. A., Naidoo, K., Grobler, A., Padayatchi, N., Baxter, C., Gray, A., Gengiah, T., Nair, G., Bamber, S., Singh, A., Khan, M., Pienaar,J., Wafaa El-Sadr, W., Friedland, G., and Karim,Q. A. (2010) Timing of Initiation of Antiretroviral Drugs during Tuberculosis Therapy.The New England Journal of Medicine, n engl j med 362;8.

[8]. Manosuthi, W., Chottanapand, S., Thongyen, S., Chaovavanich, A., and Sungkanuparph, S. (2006) Survival Rate and Risk Factors of Mortality Among HIV/Tuberculosis-Coinfected Patients With and Without Antiretroviral Therapy.Journal of Acquired Immune Deficiency Syndromes, Volume 43 pp 42-46.

[9]. Marais, B. J., Graham, S.M., Cotton, M.F., Beyers, N., (2007) Diagnostic and Management Challenges for Childhood Tuberculosis in the Era of HIV. Journal of Infectious Disease, Supplementary Article 1, 76-85.

[10]. Nih. (2009) Starting Antiretroviral Therapy Earlier Yields Better Clinical Outcomes.

[11]. Somsak Akksilp, S., Karnkawinpong, O., Wattanaamornkiat, W., Viriyakitja, D., Monkongdee,P., Sitti,W., Rienthong, D., Siraprapasiri, T., Charles D. Wells, C.D,Tappero,J. W., and Jay K. Varma, K. J. (July 2007) Antiretroviral Therapy during Tuberculosis Treatment and Marked Reduction in Death Rate of HIV-Infected Patients, Thailand.Emerging Infectious Diseases Vol. 13, .

[12]. Topp, S. M., Chipukuma, J.M., Chiko, M.M., Matongo,E., Moore, C.B. And Reid, S.E. (2012) Integrating HIV treatment with primary care outpatient services: opportunities and challenges from a scaled-up model in Zambia. Oxford journals The London School of Hygiene and Tropical Medicine, Health Policy and Planning 2013;28:347–357, 347–357.

[13]. Undp (2000) Milleneum Development Goals beyond 2015.

[14]. Walters, E., Cotton, F.M., Rabie,H.,Schaaf, H. S., Walters, L.O., Marais, B.J. (2008) Clinical presentation and outcome of Tuberculosis in Human Immunodeficiency Virus infected children on anti-retroviraltherapy.BMC Pediatrics 2008, 8:1 doi:10.1186/1471-2431-8-1, 8.

[15]. WHO. (2012) Global tuberculosis report.WHO/HTM/TB/2012.6. Geneva 27, Switzerland.