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Predictors of loss to follow-up in patients living with HIV/AIDS after initiation of antiretroviral therapy in Benshangul Gumuz Regional State, Western Ethiopia

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Abstract

Background: Long-term regular follow up of ART is an important component of HIV care. Patients who are lost to follow-up (LTFU) while on treatment compromise their own health and the long-term success of ART programs

Objective: To assess prevalence and risk factors for LTFU in HIV patients on ART at ART clinic of Benshangul Gumuz, Ethiopia

Methods: A retrospective cohort study design was conducted among a minimum 1044 of people living with HIV/AIDS and attending an ART clinic in ten health care facilities of Benshangul Gumuz region between 2005 and 2014. The primary outcome variable was LTFU from ART follow-up care after initiation of treatment, confirmed by reviewing medical registration at the facility. The time to LTFU calculated in year's base according to the time interval between the dates of ART initiation to the date of termination, as recorded by the ART registration book. A logistic regression model was employed in order to identify independents predictors to Lost to follow up (LTFU).

Result: One thousand forty-four patients living with HIV, who were start ARV treatment, were reviewed their documents for this study. Three quarter (76.1%) of the clients had working functional at ART initiation for the adult. However, for children whose age less or equal to 15 years old: 54(43.9%) of the clients had appropriate developmental milestones at ART initiation. Nearly two-thirds (66%) of the study participants started ART at an advanced stage of WHO clinical stage III and 190(18.2%) of the clients started ART at WHO stage II followed by 97(9.3%) of the clients were initiate ART at WHO stage IV at the baseline of ART start. Majority 63.1% of the study subject was done TB screening among them 110(10.5%) of the clients were positive in the TB screening result where 549 (52.6%) of the clients were negative TB screening result. Regarding CD4 count, 248 (25.9%) of the clients were start ARV treatment, when their CD4 count were below or equal to 100 cells/mm3 and 282 (29.4%) of the client, was start ARV treatment when their CD4 count was 100 – 200 cell/mm3 which is below the threshold for severe immunodeficiency. From the study subject in this cohort analysis; the outcome of patients after ARV treatment initiative 883(84.6%) of the clients were active, 82(7.9%) of the clients died, 14 (1.3%) of the clients were lost (lost from the treatment for less than three months) and 65(6.2%) of the clients were drop (lost from the treatment for 3months and more). The main reasons for termination of ARV treatment were toxicity/side effect of the drug 10 (7.0%), far distance 13 (9.2%), forget 8 (5.6%), too ill/sick 29 (20.4%) and deceased 82 (57.7%). After initiating ART drug

there is an increment of CD4 count, which range from the mean number of CD4 count 216.73cell/mm3 to the mean number of CD4 count 609.89cell/mm3 after the 8-years treatment of ART. The socio-demographic predictors for lost to follow up were place of the residents being rural [AOR = 2.42, 95% CI: 1.64, 3.58] and marital status being married [AOR = 2.03, 95%CI: 1.04, 3.96] and being divorced [AOR = 2.94, 95% CI 1.96, 4.43] showed significant association on multivariate analysis. Furthermore, those patients whose CD4 cell count lied between 201–350 were 62% less likely to lost to follow up ART services as compared to those patients whose CD4 count was less than 100 cells per milliliter [AOR= 0.38; 95% CI 0.19–0.73]. Bedridden functional status of patients at the baseline of the utilization of the services was 6.28times more likely to become lost to follow up ART services compared with those patients who are working functional status of the patients at the baseline of the utilization of the services [AOR = 6.28; 95% CI: 2.85 – 13.97].

Conclusion and recommendation: The major determinate predictors identified for lost to follow up (LTFU) ART after staring ARV treatment were the place of residence, marital status, CD4 count and bedridden at the baseline of the treatment. So, increase the accessibility of ART programs and early initiation of ART while CD4 counts are higher and opportunistic infections limited, provision of early detection of TB and initiate Anti-TB drug by prescription initiative, and counseling of patients for early presentation during testing for HIV is recommended.

Keywords: *Assosa, mortality, Anti-retroviral therapy, lost to follow up, Benishangul Gumuz Regional*

Introduction

Globally, the HIV pandemic created an enormous challenge to the survival of humankind. By the end of 2008, of the 33.4 million people living with HIV/AIDS worldwide, 15.7 million were women and 2.1 million were children under 15 years of age[*UNAIDS; 2009*].

The widespread use of antiretroviral therapy (ART) has transformed national AIDS responses and had a huge positive impact on health [*WHO, 2013; Low-Beer S et.al, 2000; Smit C, et.al, 2006; Worls – Kalo, et.al, 2006*]. ART has been shown to reduce transmission of HIV and HIV-related morbidity and mortality [*Smit C, et.al, 2006; Lancet, 2008]*. In 2012, around 9.7 million people received ART in low- and middle-income countries (LMICs) whereas in 2013; ART prevented an estimated 4.2 million deaths in LMICs in 2002–2012 [*WHO, 2013]*. However, while increased access to ART has continued throughout the world, disparities in ART access still exist [*WHO, 2013; Gerver SM, 2010]*.

Despite improved and highly successful programmatic coverage with ART, significant numbers of adults and children drop out of care at various points along the treatment pathway and treatment gains fail to reach sufficient numbers of children and adolescents [*WHO, 2013; Schoni-Affolter F, 2011; Mashango T,2014; Berheto TM, 2014]*. It is essential to understand how and why people drop out of treatment programs, since retention of people on ART and ensuring adherence to treatment are critical determinants of successful long-term outcomes [*Low-Beer S et.al, 200]*.

Ethiopia is one of the seriously affected countries in sub- Saharan Africa, with more than 1.3 million people living with HIV. In 2003, the Government of Ethiopia introduced its ART program with the goal of reducing HIV-related morbidity and mortality, improving the quality of life of people living with HIV, and mitigating some of the impact of the epidemic [*FHAPCO, 2010].*

Even if Ethiopia is highly affected by HIV infection, but the magnitude and predictors of LTFU after initiation of ART were not well investigated. There are ongoing efforts to develop comprehensive strategies and recommendations to improve monitoring and optimize retention in care. This study aimed to assess the prevalence and identify potential risk factors for LTFU in an ART clinic of Benishangul Gumuz regional state of Ethiopia. Therefore, an attempt was made in this study to assess the prevalence of LTFU and associate factors among ART client in Benshangul Gumuz region

Method and materials

The study was conducted in Benshangul Gumuz Regional state of Ethiopia, found at 674 km in west from Addis Ababa. It consist of three administrative zones namely Assosa Zone, Metekel Zone and Kemashi zone. The ART service in Ethiopia was initiated in 2003on cost bases and then expanded to a large number of health facilities as a free service since 2005. A retrospective cohort study was conduct in all patients who initiated ART at Public Health care facilities of the west Ethiopia, mainly Benshangul Gumuz regional state of Ethiopia. The study was conduct from 1 March to 31 March 2015G.C. The source populations were all PLWHA on Highly Active Antiretroviral Treatment registered and following their treatment in Pawie General Hospital and eight-health facility. The study populations for this study were all clients who can fulfill the inclusion criteria- all PLWHA on HAART regardless of their treatment and age category during the study period and available during data collection period in the select health facility in Benishangul Gumuz Regional State. Dependent variable of the study was lost to follow up after initiation of ART whereas the independent variables were socio-demographic factor, clinical characteristics, associated diseases, CD4 count, ART drugs received and functional status (working, ambulatory, or bed-ridden). The inclusion criteria for this study was PLHIV Client who were start ART between the years of 2005 – 2014) however the exclusion criteria were PLHIV who were start ART but transfer out and transfer in to the selected health facility. The sampling procedure and data collection techniques were currently ART care service is delivering in 19 health care facilities (two general hospitals and seventeen-health center), BG region of Ethiopia, and provide the ART treatment for the 4712 people living with HIV/AIDS ever enrolled in the service. Regarding sampling procedure among all health facility, nine-health facilities were select using simple random sampling technique. For seeks of comparability patients who has been received ART since 2005 was identified from the program database and selected for study. Therefore, all clients who were enroll and start ART in the selected health facility were included as study subjects and the PLHIV peoples of any age who commenced ART at the date was eligible for study. A minimum sample of 1100 out of 2712 patients who had been enrolling to receive ART services were selected for the study subject. A semi-standard questionnaire was used for recording information extracted from patients' cards. This form was developing by using the standardized ART entry and follow up form employed by the ART clinic. So, data for the research was considered a secondary data which was collected routinely in the Hospital for clinical monitoring and evaluation purposes and entered in an ART electronic database during the follow up time. The CD4 count laboratory results recorded before starting ART were uses as a base line values. If there is no pre-treatment laboratory test, however, results obtained within one month of ART initiation will be consider as baseline values. Four experienced ART nurses who were trainee on comprehensive HIV care and involved in patient follow-up collected data. Data collection was supervises by the researchers. All completed data collection forms were examines for clarity and consistency. The data was entered and clean by trained data clerks and the investigators before analysis. Patients with a CD4 count less than 500 cells/mm^3 was eligible to take ART medication, based on 2011 WHO guidelines but who were not start ART will not eligible for the study.

The data was consider secondary data that had been routinely collected in the hospital for clinical monitoring and evaluation and entered into an ART registration database during the follow-up period. Health personnel working in the clinic was record the data. Data recording obviously started from the date that patients started regular HIV care in the clinic to confirmation of a final event. The ART register database was access recorded in Microsoft Excel, checked for consistencies and completeness, and then cleaned and edited prior to performing analysis in SPSS 20.0.

The time to LTFU was calculated in years according to the time interval between the dates of ART initiation to drop out, as recorded by the ART registration health information data manager. LTFU was define as "not taking an ART refill for a period of up to three months from the last attendance for refill, yet not transferred out. The patient characteristics were described in terms of mean/median or percentage, as appropriate. A logistic regression model was employed to describe the predictors of LTFU and, expressed as estimated odds ratios (ORs) with 95% confidence intervals (CIs). Ethical approval was obtained from the Institutional Review Board of the Assosa University. Patients shall be anonymize and data was handled confidentially during all phases of research activities. Since the study is to be conducted through review of medical records, the individual patients are not subjected to any harm, provided confidentiality was maintained.

Result

1.1 Socio-demographic Characteristics of the clients

One thousand forty four patients living with HIV, who were start ARV treatment, were reviewed their documents for this study. From the study subjects: 778 (74.5%) were urban and 582(55.7%) were females. Majority of the participants 972(93.1%), whose age is greater than 15 years old and having the mean age of 32.67.The distance that the patients get the ART services: 648(62.1%) of the participants were get service as far as greater than 5km whereas the rest get the services within 5km radius. Regarding religious aspect of the participants; majority of the ART service utilize were orthodox Christians followed by 119(11.4%) of participants were Muslim (Table – 1).

Table 1:- Frequency distribution of socio-demographic characteristic of the study subject in Benishangul Gumuz Regional State, Western – Ethiopia

Study Variable		Frequency	Percentage
Resident of the client	Urban	778	74.5%
	Rural	266	25.5%
Sex of the client	Male	462	44.3%
	Female	582	55.7%
Age of the client	Less than or equal to 15	72	6.9%
	Greater than 15	972	93.1%
Marital status of the client	Married	583	55.8%
	Single	122	11.7%
	Divorced	289	27.7%
	Widowed	50	4.8%
Occupational of the client	House wife	321	30.7%
	Governmental employee	121	11.6%
	Merchant	79	7.6%
	Students	62	5.9%
	Farmer	461	44.2%
Religion of the clients	Orthodox	900	86.2%
	Muslim	119	11.4%
	Protestant	19	1.8%
	Catholic	4	0.4%
	Others	2	0.2%
Educational status of the clients	Illiterate	527	50.5%
	Read and write	305	29.2%
	Grade 1 – 4	77	7.4%
	Grade 5 – 8	103	9.9%
	Grade 9 – 12	32	3.1%

Distance of their home from the health facility	Less than or equal to 5km	396	37.9%
	Greater than 5km	648	62.1%
Total		**1044**	**100%**

1.1.Clinical characteristics of HIV infected clients at the baseline of the treatment

At the beginning of ART service; 300(47.8%) of the participants were not using family planning methods whereas 305(48.6%) of the participants were using family planning methods. Three quarter 701(76.1%) of the clients had working (W) functional status followed by 177(19.2%) of the clients were ambulatory (A) functional status of the clients at ART initiation for the adult study subject. However, for children whose age less or equal to 15 years old:

54(43.9%) of the clients had appropriate developmental milestones at ART initiation.

Nearly two third 689 (66%) of the study participants started ART at an advanced stage of WHO clinical stage III and 190(18.2%) of the clients were start ART at WHO stage II followed by 97(9.3%) of the clients were initiate ART at WHO stage IV. Regarding TB screen status at the baseline of ART initiation majority (63.1%) of the study subject were done for TB screening. Of them 110(10.5%) of the clients were positive in the TB screening result. In addition CD_4 count, 248 (25.9%) of the clients were start ARV treatment when their CD_4 count were below or equal to 100 cell/mm^3 and 282 (29.4%) of the client were start ARV treatment when their CD_4 count were 100 – 200 cell/mm3which is below the threshold for severe immunodeficiency.

Among the subject participants 521(56.8%) of the clients were underweight whose BMI is less than 18.5kg/m^2 and the mean and median of BMI of the patients at the initiation of ART was 18.2kg/$m^2$and 18.0kg/m^2 respectively. In addition, almost one-third 296(30.8%) of the clients had suspected anaemia whose hemoglobin level is less than or equal to <10 gm/dl (Table 2).

Table 2: The baseline characteristics of the HIV infected clients during initiation of ART in Benishangul Gumuz Regional State, Western Ethiopia

Study Variable		Frequency	Percentage
Appointment of the clients (N = 1044)	*Scheduled*	859	82.3%
	Unscheduled	185	17.7%
Pregnant status of the clients (N = 628)	*Not using family planning methods*	300	47.8%
	At pregnant	21	3.3%
	At PMTCT	2	0.3%
	Using family planning methods	305	48.6%
Functional status of the clients (N = 1921)	*Working (W)*	701	76.1%
	Ambulatory (A)	177	19.2%
	Bedridden	43	4.7%
Developmental milestone (N = 123)	*Appropriate*	54	43.9%
	Delay	24	19.5%
	Regression	45	36.6%
WHO stage of the clients (N=1044)	*Stage I*	68	6.5%
	Stage II	190	18.2%
	Stage III	689	66%
	Stage IV	97	9.3%
TB screen result of the clients	*Not done*	385	36.9%

(N=1044)	*Negative*	549	52.6%
	Positive	110	10.5%
Number of CD_4 count	*=< 100 cell/mm^3*	248	25.9%
(N=959)	*100 – 200 cell/mm^3*	282	29.4%
	200 – 350 cell/mm^3	354	36.9%
	350 – 500 cell/mm^3	30	3.1%
	> 500 cell/mm^3	45	4.7%
Provision of co-trimoxazole	*No*	98	9.4%
(N=1044)	*Yes*	946	90.6%
Adherence of co-trimoxizole	Good (>=95%)	889	94%
	Fair (85 – 94%)	35	3.7%
	Poor (<85%)	23	2.4%
BMI (kg/m^2) (N=917)	< 18.5 kg/m^2	521	56.8%
	18.5 – 25 kg/m^2	375	40.9%
	> 25 kg/m^2	21	2.3%
	Total	**917**	**100%**
Hemoglobin level (N=962)	= < 10 gm/dl	296	30.8%
	> 10 gm/dl	666	69.2%
	Total	**962**	**100%**

1.1 Outcome status of ART and the reasons for termination and drug change

In this cohort analysis: the outcome of patients after ARV treatment initiative 883(84.6%) of the clients were active; 82(7.9%) of the clients were died and 14 (1.3%) of the clients were lost (lost from the treatment for less than three months) and 65(6.2%) of the clients were drop. The main reasons for termination of ARV treatment were toxicity/side effect of the drug 10 (7.0%), far distance 13 (9.2%), forget 8 (5.6%), too ill/sick 29 (20.4%) and deceased 82 (57.7%).

ARV drug that the client used at the beginning of the treatment for the adult were 1c regiment which accounts 306 (32.9%) followed by 1a regiment which account 249(26.8%) and for children whose age less than or equal to 15 years olds were 4a (D4T-3TC-NVR) regiment which account 84(68.0%) followed by 4b (D4T-3TC-EFV) regiment which account 23(19.0%). Among ART user throughout the treatment follow up 716 (68.6%) of the clients were change the regiments. Generally, regiment change starting from the beginning of ART up to ten years follow up there is a decrement of the magnitude of regiment changes which reveals that within six months interval 34.8% of the clients were change the drug regiments followed at the one year's15.1% of the clients change the drug regimen. The main reason of regiment change were 217(87.1%) of the clients said that due to toxicity/side effect (Table – 3).

Table 3: - Outcome of ART, Adherence status and reason for the termination and drug changed throughout the treatment from 1998 – 2007E.C in Benishangul Gumuz Regional state, Western Ethiopia.

Study Variable		**Frequency**	**Percentage**
Outcome of ART	*Death*	82	7.9%
	Lost to follow up (LTFU)	14	1.3%
	Drop	65	6.2%
	On treatment	883	84.6%

The reason for termination of the treatment (N = 142)	*Toxicity/side effect*	10	7.0%
	Far distance	13	9.2%
	Forget	8	5.6%
	Too ill/sick	29	20.4%
	Deceased	82	57.7%
	Total	**96**	**100%**
ARV Drug that the client used at the beginning of the treatment (N=1044)	***For adult***		
	1a	249	26.8%
	1b	107	11.5%
	1c	306	32.9%
	1d	123	13.2%
	1e	94	10.1%
	1f	51	5.5%
	Total	**930**	**100%**
	For children		
	4a (D4T-3TC-NVR)	84	68%
	4b (D4T-3TC-EFV)	23	19%
	4e	16	13%
	Total	**123**	**100%**
Drug changed for the client (N=1044)	*At baseline of ARV initiation*	249	34.8%
	12 month after ARV start	108	15.1%
	24 month after ARV start	68	9.5%
	36 month after ARV start	81	11.3%
	48 month after ARV start	75	10.5%
	60 month after ARV start	59	8.2%
	72 month after ARV start	64	8.9%
	84 month after ARV start	12	1.7%
	Total	**716**	**68.6%**
Reason for drug change at the beginning of the treatment (N =249)	*Toxicity/side effect*	217	87.1%
	Due to new TB	9	3.6%
	New drug available	3	1.2%
	Drug stock out	11	4.4%
	Clinical failure	6	2.4%
	Virological failure	3	1.2%
	Total	**249**	**100%**

1.1. Predictors of Lost to Follow up (LTFU) of ART

1.1.1. Socio-demographic predictors on lost to follow up of ART

Uni-variate analyses involving all socio-demographic variables were perform to identify candidate variables for multivariate analysis in order to identify socio-demographic predictors on lost to follow up of ART services. Consequently, place of residents, marital status and distance between client home and health facility were identify as socio-demographic predictors on lost to follow up of ART.

A multivariate analysis was performed for identified candidate variables for socio-demographic predictors on lost to follow up ART services in uni-variate analysis. Therefore, place of the residents and marital status showed significant association on multivariate analysis which identified as socio-demographic predictors for lost to follow up of ART service. The odds of lost to follow up of ART service among ARV users who live in the rural area were 2.42 times more likely than ARV users who live in the urban area [AOR = 2.42, 95% CI: 1.64, 3.58]. Similarly ARV users whose marital status was being single two times more likely become lost to follow up ART services than married [AOR = 2.03, 95%CI: 1.04, 3.96] whereas ART clients whose marital status was being divorced were 2.94 times more likely become lost to follow up on the ART services than being married [AOR = 2.94, 95% CI 1.96, 4.43]. (Table – 4)

Table 4: - Logistic regression model that determine the socio-demographic predictors of lost to follow up on the anti-retroviral treatment in Benishangul Gumuz Regional State, Western Ethiopia

Predictor Variables		**Follow Up Status**		***COR (CI 95%)***	***AOR (CI 95%)***
		On treatment	***Lost to follow up***		
Place of residence	Urban	685(88%)	93(12%)	1	1
	Rural	198(74.4%)	68 (25.6%)	**2.53(1.78,3.59)**	**2.42(1.64, 3.58)**
Sex	Male	382(82.7%)	80(17.3%)	1	1
	Female	501(86.1%)	81(17.3%)	0.77(0.55, 1.08)	0.71(0.49, 1.02)
Religious	Orthodox	768 (85.3%)	132(14.7%)	1	1
	Others*	115 (79.9%)	29(20.1%)	1.47(0.94, 2.29)	1.33(0.83, 2.14)
Educational status	Illiterate	447(84.8%)	80(15.2%)	1	1
	Literate	436(84.3%)	81(15.7%)	1.04 (0.74, 1.45)	1.17(0.81, 1.70)
Marital status	Married	521(89.4%)	62(10.6%)	1	1
	Single	97(79.5%)	25(20.5%)	**2.17(1.29, 3.62)**	**2.03(1.04, 3.96)**
	Divorced	222(76.8%)	67(23.2%)	**2.54(1.74, 3.71)**	**2.94(1.96, 4.43)**
	Widowed	43(86%)	7(14%)	1.37(0.57, 3.17)	1.41(0.59, 3.35)
Distance	=< 5km	348(87.9%)	48(12.1%)	1	1
	> 5km	535(82.6%)	113(17.4%)	**1.53(1.06, 2.203)**	1.15(0.76, 1.73)

Age	=< 15 years	55(78.6%)	15(21.1%)	1	1
	> 15 years	826(85%)	146(15%)	0.65(0.36, 1.18)	0.83(0.37, 1.84)

1.1.2. Determinate factors of HIV infected peoples on Lost to follow up of ART

In uni-varite analysis; CD_4 count, hemoglobin level, provision of co-trimoxazole treatment, TB screen result, WHO stage and functional status of adult ART user at the baseline of the treatment were identified as determinate factors associated with HIV infected peoples on the predictor of lost to follow of ART services. So those variables were imported in to multivariate analysis for controlling confounding effect. In the multivariate analysis, CD4 count and functional status of the clients determinate factors were independent predictors of lost to follow up on the ART services. Therefore, those patients whose CD4 cell count lied between 201–350 were 62% less likely to lost to follow up ART services as compared to those patients whose CD4 count was less than 100 cells per milliliter (AOR= 0.38; 95% CI 0.19–0.73). Bedridden functional status of patients at the baseline of the services utilization were 6.28times more likely become lost to follow up ART services compared with working functional status of the patients at the baseline of the services utilization (AOR = 6.28; 95% CI: 2.85 – 13.97) (Table 5).

Table 5: - The determinate factors of HIV infected peoples on lost to follow up of the anti-retroviral treatment among a sample of HIV infected cohorts in Benishangul Gumuz Regional State, Western Ethiopia

Predictor variables		**Follow Up Status**		***COR (CI 95%)***	***AOR (CI 95%)***
		On treatment	***Lost to follow up***		
CD_4cell/mm^3	<100	199(80.2%)	49(19.8%)	1	1
	100 – 200	245(86.9%)	37(13.1%)	**0.61(0.38, 0.98)**	0.62(0.34, 1.15)
	200 – 350	327(92.4%)	27(7.6%)	**0.33(0.20, 0.55)**	**0.38(0.19, 0.73)**
	350 – 500	26(86.7%)	4(13.3%)	0.62(0.21, 1.87)	0.56(0.12, 2.59)
	>500	39(86.7%)	6(13.3%)	0.63(0.25, 1.56)	0.84(0.25, 2.82)
Hemoglobin	< 10 gm/dl	233(78.7%)	63(21.3%)	1	1
level	>=10 gm/dl	604(90.7%)	62(9.3%)	**0.38(0.26, 0.56)**	0.85(0.49, 1.46)
BMI in	< 18.5	441(84.6%)	80(15.4%)	1	1
kg/m^2	18.5 – 25	331(88.3%)	44(11.7%)	0.73(0.49, 1.09)	1.63(0.96, 2.77)
	> 25	18(85.2%)	3(14.3%)	0.92(0.26, 3.19)	1.72(0.37, 7.99)
Provision of	No	60(69.8%)	26(30.2%)	1	1
cotrimoxazol	Yes	807(85.7%)	135(14.3%)	**0.39(0.24, 0.63)**	1.44(0.27, 7.77)
TB screen	Not done	324(84.2%)	61(15.8%)	1	1
result	Negative	479(87.2%)	70(12.8%)	0.78(0.54, 1.13)	1.15(0.66, 2.0)
	Positive	80(72.7%)	30(27.3%)	**1.99(1.21, 3.29)**	1.75(0.83, 3.66)

WHO stage	Stage I	60(88.2%)	8(11.8%)	**1**	1
	Stage II	167(87.9%)	23(12.1%)	1.03(0.44, 2.43)	0.84(0.22, 3.16)
	Stage III	583(84.6%)	106(15.4%)	1.36(0.63, 2.93	1.31(0.44, 3.87)
	Stage IV	73(75.3%)	24(24.7%)	**2.47(1.03, 5.89)**	1.86(0.52, 6.68)
Functional	Working	624(89%)	77(11%)	**1**	1
status	Ambulatory	148(83.6%)	29(16.4%)	1.59(0.99, 2.52)	0.99(0.51, 1.91)
	Bedridden	27(62.8%)	16(37.2%)	**4.8(2.48, 9.31)**	**6.28(2.85, 13.79)**

2.Discussion

This 10-year retrospective cohort study of AIDS patients on ART gives an insight into survival and its determinants in a Benishangul Gumuz Regional State, Western Ethiopia. In this study the finding reveals that among the study subject who were participate in this study; at the baseline of ART initiation majority 63.1% of the study subject were done TB screening among them 110 (10.5%) of the clients were positive in the TB screening result whereas 549 (52.6%) of the clients were negative TB screening result. However; this studies similar to the study done in Zewditu Memorial Hospital reveals that 11% of the patients had been screen positive and treated for TB in past prior to this study (*Shibre, et.al, 2014*). This is because there is national TB treatment guideline and protocol, which is, disseminated in the Ethiopia throughout the region and provides training for health worker who are working in the ART clinic on screen and treatment protocol.

In this finding the CD_4 count at the baseline of ARV treatment, 248 (25.9%) of the clients were start ARV treatment when their CD_4 count were below or equal to 100 cell/mm^3 and 282 (29.4%) of the client were start ARV treatment when their CD_4 count were 100 – 200 cell/mm^3 which is below the threshold for severe immunodeficiency. However, this study comparable to the study done in Felege Hiwot Referral Hospital in Northwest Ethiopia reveals that about half of them (52.6%) had absolute CD4 count below the threshold for severe immunodeficiency [*Digsu, et.al, 2012*).

Majority, 90.6% of the clients were on cotri-moxazole prophylactic therapy and majority, 94% of clients were adherence rate was good and the rest were considered as fair and poor adherence of co-trimoxazole. However, this studies higher than the study done in Felege Hiwot Referral hospital about half (52.3%) of the children were on cotrimoxazole prophylactic therapy [*Digsu, et.al, 2012*). In addition this finding is higher than the study done in Ethiopia 49.2% of the clients were have on co-trimoxazole treatment in the past [*Sibhatu et.al, 2012*]. This is because in the Benishangul Gumuz Region the catchment area is small because of this every person is accessible to the co-trimoxazole treatment in the region.

In this study 56.8% of the clients were underweight whose BMI is less than 18.5kg/m^2 and 30.8% of the clients had suspected anemia whose hemoglobin level is less than or equal to <10 gm/dl. However, this studies result higher than study done in Zewditu Memorial Hosiptal reveals that 19.6% of the clients were underweight whose BMI is less than 18.5kg/m^2[*Shibre, et.al, 2014*]. This study result lower than study done in Felege Hiwot Referral Hospital reveals that 82.5% were underweight and 19.8% had anaemia (<10 gm/dl) [*Digsu, et.al, 2012*). This is because of variation of the scope of research, sample size and target group of the study subject.

This study reveals that the outcome of patients after ARV treatment initiative 84.6% of the clients were active, 7.9% of the clients were died, 1.3% of the clients were lost (lost from the treatment for less than three months) and 6.2%

of the clients were drop (lost from the treatment for 3monthsand more). The main reasons for termination of ARV treatment were toxicity/side effect of the drug 7.0%, far distance 9.2%, forget 5.6%, too ill/sick 20.4% and deceased 57.7%. This finding comparable to study done in Felege Hiwot Referral Hospital reveals that 69.9% children were alive, 7.5% of the clients were death and 5.8% of the clients were lost from follow up. The mortality rate was 4/100 child-years of follow up [*Digsu, et.al, 2012*). In Jimma University hospital, 7.3% died and 71.9% were alive at the end of follow up [*Workneh, et.al, 2009*). However, mortality was lower in this study compared to a study from Kenya, which reveals that 8.4% [*Wamalwa, et.al, 2010*].

This study portrayed that the adherence clients on ARV treatment; 90.8% of the study subjects were had good adherence to ARV treatment and rest were fairly or poorly adhere to ARV treatment. The main reason for fairly or poorly adhere to ARV treatment were because of toxicity/side effect 21.9%, forget28.1%, felt better 19.8%, too ill 14.6% and felt stigma and discrimination9.4%. This finding is lower than study done in Zewditu Memorial Hosiptal reveals that the adherence rate: 98.8% of the clients were had good adherence to ARV treatment [*Digsu, et.al, 2012]*. Other study reveals that Three hundred ninety-five (97.5%) of the patients had adherence rate of more than 95% [*Shibre, et.al, 2014*].This is because lack of awareness within the community and there is no adherence supporter and case manager at the time of the study period that is 1998E.C up to 2005E.C.

ARV drug that the client used at the beginning of the treatment for the adult were 1c regiment which accounts 29.3% followed by 1a regiment which account 23.9% and for children whose age less than or equal to 15 years olds were 4a (D4T-3TC-NVR)regiment which account 68% followed by 4b (D4T-3TC-EFV) regiment which account 19%. This study comparable to the study done in Felege Hiwot Referral hospital reveals that 37.9% of the children received 4a (D4T-3TC-NVR) regiment and 6.7% of the children were receive 4b (D4T-3TC-EFV) regiment. Therefore, at the baseline of the treatment, the client were receive first line drug.

This study reveals that among ART user throughout the treatment (starting from zero month treatment up to ten years follow up): 68.6% of the clients were changing the drug regiments. Among this, 34.8% of clients were changed the regimens within the first six months, 15.1% of the clients were changed the regimens at 12 month after ART start and 9.5% of the clients were changed the regimens at 24 month after ART start. Generally, regiment change starting from the beginning of ART up to ten years follow up there is a decrement of the magnitude of regiment changes which reveals that within six months interval 34.8% of the clients were change the drug regiments followed at the one year's 15.1% of the clients change the drug regimen. The main reason of regiment change: 87.1% of the clients said that due to toxicity/side effect of the drug followed by 4.4% of the clients said that due to drug stock out. This study finding is more than study done in Zewditu Memorial Hospital reveals that 12.5% of children on ART, first drug regimen were changed and nearly three quarters (71.2%) within six months of ART initiation. Drug side effects (63.2%) followed by developing tuberculosis while on ART (20.1%) were the main reasons for changing initial regimen [*Digsu, et.al, 2012]*.

In this study, the result showed that place of the residents and marital status showed significant association on multivariate analysis, which identified as socio-demographic predictors for lost to follow up of ART service. Similarly, CD4 count and functional status of the clients determinate factors were independent predictors of lost to follow up on the ART services. Thus, these evidences consistent other study such that factors associated with ART failure may include socio-demographic factors (such as age, gender, being an orphan), baseline clinical factors such

high pre-treatment viral load, low pre-treatment CD4 count, prior World Health Organization (WHO) stage), drug-drug interactions (between the ART and concomitantly administered drugs), drug side effects, drug toxicity and inadequate adherence to treatment. [*Davies MA, et.al, 2011; Bolton, et.al, 2007 and Puthanakit T, et.al, 2009*]

Conclusion and Recommendation

Majority of the clients follow the schedule of the treatment and begin ART at their CD_4 count below the threshold. After starting ART, the mean CD_4 count were increases rapidly whereas there is slight increment of mean ideal weight and mean hemoglobin level. Majority of the clients were on cotrimoxazol prophylaxis, which is very essential for prevention of opportunity infection. Major determinate predictors identified for lost to follow up (LTFU) ART after staring ARV treatment were place of resident, marital status, CD_4 count and bedridden at the baseline of the treatment. Based on the above finding of the study the following recommendations were made

- Early initiation of ART while CD4 counts are higher and opportunistic infections limited, provision of early detection of TB and initiate Anti-TB drug by prescription initiative, and counseling of patients for early presentation during testing for HIV.
- Increase the accessibility of ART programs for the clients
- Ministry of health, regional health bureau and their partners should expand ART service and fulfil the material or equipment in the health facility in the study area

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